Challenges faced by main-contractors in working with inexperienced sub-contractors on construction projects in South Africa

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Submitted in Partial Fulfilment of the Requirements of

Masters in Construction Management Studies

In Construction Studies

School of Engineering

University of KwaZulu-Natal

Howard College

South Africa

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December 2020

Preface

The research contained in this document was completed by the candidate, and at the time of conducting this study, the candidate was under the discipline of Construction studies, school of engineering of the school of Agriculture, Engineering and health sciences, University of KwaZulu-Natal. Howard college campus, South Africa.

The contents of this work have not been submitted in any in any form to another any other university and, except where the work of others is acknowledged in the text, the results reported are due to investigations by the candidate.

Declaration

I Mcebo Mpucuko Mathenjwa hereby declare that this submission is my own work towards the fulfilment of the Masters in Construction management and that to the best my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award o any other University degree, except where due acknowledgement has been made in text.

Mcebo Mpucuko Mathenjwa

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Signature

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Date

Certified by:

Dr Nishani Harinarain

Supervisor

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Signature

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Date

Dedication

I wish to dedicate this work to the most kind, loving, patient and strongest woman that I have ever got to share and spend so much with. I dedicate this work to you the Queen, my mother Busissiwe Maria Mathenjwa. Your unwavering support, love and desire to see me do better has carried me through the years and has led me to this point and it is for this that I say thank you mother, in this life I have been rewarded with you.

Acknowledgements

In life, we tend to go through different phases with different people and we live our lives in what we consider normal. However, what is happening in hindsight, it is the people that you spend the most time with that help carry you through the particular phase in life. It is therefore common curtsy to acknowledge such people and their efforts in your life.

I would firstly like to acknowledge my supervisor Dr Nishani Harinarain, programme coordinator of Construction Studies at the University of KwaZulu-Natal. I can never thank you enough for the time spent on this.

Nhlanganiso Martin Shabangu, you have a been an extremely interesting character. I really think we push each other and that the completion of this is another true reflection of that. I wish you all the best in the life ahead of you and understand that this means you have been recognised. Siyabonga Zondo you are true friend and a massive driver for excellence, I think that you have really challenged me and allowed me to push myself beyond of what I thought was possible to achieve academically and personally. To my family members, Wandile Mathenjwa and Thami Mathenjwa, you guys are extremely awesome brothers and I am glad I got to acknowledge in one way without having to speak out.

And finally, to Dr Thokozani Mhlambi, you are an extremely amazing friend. You have played such a big role in the past 4 years of my life; I don't think you realise it. Thank you.

I thank everyone that played a part in the completion of this research paper.

Abstract

Sub-contractors are an extremely important in the business of main contractors and as such collaboration between them is largely significant to the success of the construction industry and the continued existence of both of these entities. This research hereby assesses the challenges that main contractors face when working with inexperienced sub-contractors. The study also looks at the measures that a typical main contractor would apply in cases where they have to work together with an inexperienced sub-contractor. Finally, this study assess what other measures could be adopted by inexperienced/emerging sub-contractors so as to accelerate the growth in this high paced industry.

Main-contractors are organisations that ensure the success of construction projects. Successful construction projects depend largely on the physical influence of this entity over the construction period. The main contractor and the consultant ‘s ability to achieve a project within the stipulated time and within cost, is largely dependent on the subcontractor ‘s performance. A construction sub-contractor is an organisation that goes into a contract with a main contractor with the duty to execute a portions of work for the main contractor. While sub-contractors have the opportunity to produce quality results, it also has the potential to disrupt a project if performed incorrectly. This is found to be case with new inexperienced/emerging sub-contractors that are still trying to make their way into the competitive market. In the competitive market, where best bid price often gets awarded contracts to perform certain trades related to construction, inexperienced sub-contractors are often found making these mistakes and end up taking work that has been under-priced for even work that they have no extensive knowledge off.

The research study looked at the challenges that main contractors face when working with inexperienced/emerging sub-contractors. Contractors registered on the Master Builder Association of South Africa under general builders for the provinces of Western Cape indicated a number of 44 registered contractors, and KwaZulu-Natal indicating a total 177 registered contractors under residential and commercial buildings, and this made up the sample for the study. The purposive sampling method was employed for the qualitative data and stratified sampling for quantitative data. The study further discusses the efforts and interventions that main contractors make in an effort to reducing the impact of working with such contractors on construction projects. Finally, the study discusses what main contractors can do to further assist inexperienced/emerging sub-contractors in attaining the necessary competency to operate efficiently in a high paced environment. The qualitative data showed that quality, technical performance, and functionality lack of communication poor collaboration, time delays and conflict deceitful practices and safety compliance as being the challenges that main contractors agree to be the case when working with inexperienced sub-contractors.

Quantitative found that quality, shortage of skills, poor planning skills/management, low communication levels, risk to health and safety risk and the lack of understanding of construction contracts as being among the most significant challenges of working with inexperienced sub-contractors.

In conducting the study, the pragmatism paradigm was used in this study. Qualitative research was done in the form of semi structured interviews and quantitative data was collected by way survey questionnaires. The data was analysed simultaneously using the concurrent triangulation strategy. A total of 8 participants took park in the semi-structured interviews, and a total of 70 participants took part in the survey questionnaire.

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List of acronyms

CIDB- Construction Industry Distribution Board

CTS- Concurrent Triangulation strategy

GDP- Gross domestic product

JIT- Just in time

UKZN- University of KwaZulu-Natal

SPSS- Statistical Package for the Social Science

SMME- Small Medium and Micro enterprise

KMO- Kaiser-Meyer-Olkin

CVJ- Construction joint venture

OHS- Occupational health and safety

Chapter One - Introduction

1.1 Introduction

Chapter one of this study contains the basic introduction to the research study, which investigates the challenges main contractors face when working with inexperienced sub-contractors. This chapter essentially introduces the research problem, research question and objectives. This report is on MSc (Construction management) dissertation done under the supervision of Dr N. Harinarain.

1.2 Background

The construction is one industry that plays and continues to play an extremely important role in the economy economy of every nation (Enshassi, 2011). The nature of this of this industry can be considered as being lively towards attaining socio-economic growth like the providing housing, infrastructure as well as massive employment (Kadan, 2016). Construction projects can take numerous forms and magnitude, ranging from small and simple projects to large and extremely complex (Chamara, 2015).

Construction projects often involve consultants such as cost consultants, service engineer consultant, structural engineer consultants and architects. A sub-contractor is regarded as a specialist in the carrying out of a certain work trades, and they act as an implementing party for the production system of main contractor companies by supplying materials, manpower, tools and equipment and designs (Chamara, 2015). A sub-contractor is also seen as an organisation that goes into agreement by way of contract with a principle contractor to perform some aspect of the general contractor's work (Nasyrah Fahada Binti Abdul Razak, 2013). Sub-contractors' range in many different forms, from specialist sub-contractor, to labour-only sub-contractors (Windapo and Cattell, 2013). With most construction projects, sub-contractors play a vital role as they are hired to do specific responsibilities on a construction project. Usually principle contractors perform the basic processes and operations and thereafter sublet the rest of the works to several specialists in the trade to sub-contractors. Sub-contracting is used much more extensively on housing and building construction projects as compared to engineering projects (Nahan, 2013).

Sub-contracting is seen as a business strategy for business which is commonly made use of by principle contractors so as to avoid some uncertainties in performing certain trades of the construction market and also to shift risks, such as financial risks, completion risks and responsibility for employees (CIDB, 2013). What sub-contracting does essentially, is that it decreases direct costs and overheads, and therefore allows for main contractors to use more competitive local firms with their lower overhead costs and better knowledge of the local market conditions, practices and procedures (Isaac, 2015). Sub-

contracting simplifies the production of quality work by using the specialist sub-contractors with the required familiarity and skills in the particular trades (*ibid*). The selection of sub-contractors is a vital process and must be taken into consideration as this will have a big impact on the outcomes of the project and the credibility and reliability of a contractor.

1.2.1 Impact of sub-contractor performance on main contractor credibility

According to Hassim, (2012:45), the main contractor's performance is strongly dependant on sub-contractor's performance on a specific trade. A large amount of work in construction is carried out by sub-contractors due to the need of specialised skills and approximately 60% of the entire value of the project is carried out by sub-contractors (Isaac, 2015). The risk for main contractors when employing sub-contractors is lowered as sub-contractors are contracted for an individual task *(ibid*). A sizeable amount of work is contracted to a sub-contractor and as such this creates a risk for the main contractor to manage another organisation to handover a portion of works project to the main contractor as specified. The principal contractor must manage and direct the sub-contractor, and this therefore makes selecting appropriate sub-contractors a significantly vital process to a project's success (Farnaz, Ghaffari, Dolama, 2016). However, in selecting sub-contractors the contractor, the best price system often takes first preference but the lowest price does not necessarily guarantee the best quality (Valluru, Rae, Dekker, 2020). Furthermore, sub-contractors that price the lowest are often not established sub-contractors or are either emerging contractors and this creates a new risk for main contractors to manage so as to increase their profits (*ibid*). Inexperienced/emerging contractors tend to price really low and this raises the question of quality on that particular trade of work (Donald, Gregory and Travers, 2010). Donald, Gregory and Travers, stated that (2010:29) "*maybe the bidder that has submitted an unreasonable price is likely inexperienced. As a result, this could impact the quality of the works that need to be completed. However, if the low bid was purposeful, the contractor may be forced to swap out requested materials for cheaper alternatives, or may have to find other approaches to make it work. Either way, a bid that's far too low can result in a project poorly constructed*".

Furthermore, sub-contracting means that the main contractor loses a certain degree of power or control over the project and the risks of cost overruns, time delays and quality non-conformance may be experienced (Isaac, 2015). Guers, Martin and Wybo stated that (2014:1029) "*it also extremely vital to recognise areas where sub-contracting can be used: on-site, internally or externally. External sub-contracting may be local or abroad, known as offshore delocalised outsourcing and this practice runs the risks found in both outsourcing and offshoring which loss of control and ownership of one or more delegated activities*". This means that a contractor will not always perform according to the conditions of the principal contractor as they are an organisation on their own and this may create time uncertainties or the main contractor (*ibid*).

Main contractors need small business just as much as small businesses need main contractors. The truth is that principle contractors, cannot really do everything in-house and as such they need products or services in which only qualified small businesses can achieve (Isaac, 2015).

Despite the many benefits of making use or employing the services of sub-contractors, the quality of work often produced by sub-contractors that have little or no experience in performing the required construction works is often not up to the standards set by main-contractors (Wai Fung Chang, 2013). Furthermore, sub-contractors with limited experience usually fail to meet the scheduled deadlines of main-contractors (*ibid*). Sub-contractor failure creates distrust between the two parties and argumentative relationships could mean delays on the project. It also creates difficulty in resolving claims, cost overruns, and also compromise project quality and which ultimately jeopardises the main contractor's credibility to the client (Enhassi, Tayeh and Arain, 2014). Enhassi, Tayeh and Arain (2012:94) exposed that the absence in quality work in construction projects, poor planning and scheduling, fights, change orders and the delay in payments are common problems that negatively affects the implementation and completion of construction projects.

1.2.2 Challenges facing emerging sub-contractor

Factors affecting emerging/inexperienced sub-contractors include poor management and leadership, timely completion of the project, profit, staff qualification/skill, reputation. Many sub-contractors are small companies and they rely heavily on timely payment in order for them to be able to uphold their cash flows and work progress as delay in payments often results in the delay in work progress. Delays in payments causes problems with suppliers and in some cases result in bankruptcy (Thwala, Mvubu, 2009). Other challenges faced by emerging sub-contractors include contractual issues, the ability to develop long term strategies and the issue of experience (*ibid*).

1.2.3 Challenges that main contractors encounter when working inexperienced sub-contractors.

Inexperienced sub-contractors tend to come with weak management practices and that is the start of the problem. Many emerging sub-contractors have rather poor management practices, and particularly when it comes to cash flow management and they generally lack business systems and thus negatively impacting their ability to perform work successfully (Yoke-Lian, Hassim, Muniandy, Teik-Hua, 2012). Main-contractors point out that there are clear distinctions between the specialist who are usually more established sub-contractors who carry out trades such as concreting and tiling and the generalist subcontractor (Murray, Appiah-Baiden, 2010). Among the biggest issues that main contractors call out the lack of capital, poor management and lack of financial management training is considered as most challenging and disturbing (*ibid*).

1.3 Problem statement

Construction companies that act as main-contractors on construction projects continue to struggle with achieving the project outcomes in time and within budget, and this is the case even though the concept of sub-contractors has yielded positive results (Chileshe, 2011). Main contractors have relied largely on sub-contractors for performing certain works that require a degree of specialisation. This has led to an array of challenges that main-contractors now have to deal with such as having sub-contractors that fail to perform and meet the expected targets of the scope of works required by the main-contractor and the relevant stakeholders. Poor performance of a sub-contractor carries not just financial burdens but also impacts on the main contractor having to deliver the project in the required time.

1.3.1 Research questions:

1) What are the main challenges that main-contractors face when working with sub-contractors with limited experience?
2) What measure/interventions are put in place by main-contractors that seek to reduce the impact of working with inexperienced sub-contractors?
3) How can sub-contractors with limited experience improve their standard of work to conform to the requirements of principal contractors?

1.3.2 Aims and objectives of study:

The aim of the proposed research study is to review the challenges that a main-contractor have to go through when employing the services of a sub-contractor.

1.3.3 Objective:

1) To determine what challenges main contractors face when working with inexperienced sub-contractors on construction projects.
2) To determine what efforts are made by main-contractors to assist inexperienced/emerging contractors to acquire the necessary experience to perform effectively in construction projects.
3) To develop a model to improve inexperienced/emerging sub-contractor standard of work for the construction industry.

1.4 Methodology

This research study employed a mixed method research style whereby the data was collected through qualitative and quantitative research, otherwise known as the concurrent triangulation (CTS) method (Wium, Louw, 2018). Using these methods will ensure that all possible data is collected and that the data presented is unbiased**.**

Research that is qualitative is the type of research that gives results that are not arrived at by quantification or does not use statistical procedures (Seely, 2012). Qualitative data collection used interviews to collect this type of data and as such was used in this study, due to its ability to capture information from the selected participants based on their experience with the issue and this allows the opportunity for the researcher to obtain the opinions and feelings of the participant (*ibid*). This information was collected through conducting personal interviews with participants. For the qualitative data collection, eight interviews were carried out among different construction sites.

The quantitative data collection method is a method that uses an approach which highlights quantification in the collection and analysis of data (Bacon-Shone, 2013). This method employed the services of a survey questionnaire. The use of this method enabled the researcher to obtain quantifiable data from a predetermined set of questions.

Prior to conducting the field survey of data collection, a critical review of relevant literature related to the challenges main contractors face when working with inexperienced sub-contractors. This assisted in finding previous work and existing knowledge to the and the literature review assisted in in facilitating the development of vital questionnaires and research questions. The literature review included finding data on past research papers, international conference proceedings and journals.

In conducting the field survey, data collection tools were prepared in accordance to the data obtained in the literature review and upon verification, data collection process commenced. The study used a mixed-method approach which meant that questionnaires and semi-structured interviews were used in the process to collect the data. Questionnaires are essentially a list of questions that are set up for a respondent to give their thoughts based on their experience on particular item. Questionnaires in this study were used to collect quantitative data. This type of data collection was done by sending out a google form that was created by the researcher through email. This made the quantitative data collection process easier and more efficient as more respondents could be reached. The research questionnaires had a total of seventy (70) responses and had a response rate of 43%. Data collection collected from the field study was then analysed through using the Statistical package for social sciences software (SPSS V27), and focusing on descriptive statistics. Qualitative data is considered as a type of research that produces findings through other means than using questionnaires, and the finding obtained are not arrived at by quantification (Rahman, 2016). This method of data collection made use of semi-structured interviews, where the researcher invited the selected participants to take part in a semi-structured interview to give their views based on their experience on the problem. A time and date were set with the selected participants of the study, and the qualitative data collection commenced.

1.4.1 Sampling

Sampling is the taking of a people, items or objects from big population for a measurement and the particular sample requires to be representative of the population to ensure that generalisations of the study can be made (Mujere, 2016).

Qualitative data was collected by conducting eight (8) interviews out twelve, as at this point saturation had been reached. The response rate of the interviews was w 67%. The data for the qualitative data was analysed through using Nvivo (V12). Interviews were conducted with participants who represented both main contractors and sub-contractors where six (6) of the participants were from main contractor organisation and five (2). To collect such data, the participants selected had to be representative of the required skill set to provide previous experiences on the problem. As such, interviews were carried out contract managers, site agents, foreman's and quantity surveyors. The qualitative data was collected over a period of six weeks and the study was conducted with participants from Durban and Cape town. The selection of these cities was based on the researcher having made contact with the participants previously, collecting data from such participants would be quicker and more accurate. Furthermore, referrals obtained from the participants while conducting the study participated.

Quantitative data was collected and stratified sampling was used to gather the quantitative data. Stratified sampling was used as the the sample size was obtained by considering the contractors registered on the Master Builder Association (MBA), under general building. Through obtaining the sample, a sample that would be a true representation of the population was required therefore the collected data was separated into strata between general builder in Cape town and general in Durban registered under the MBA. The response rate in Cape town was 41.43% as 29 participants took part in the study from the Western cape region. In the KwaZulu-Natal region the response rate was 58.571% as 41 of the participants took part in the study. The overall response rate in the study was 43%.

1.4.2 Limitations of the study

This study was only limited in Durban and Cape Town.

1.4.3 Significance of research

The construction industry is one that highly labour intensive, and it is temporary endeavor which needs a wide range of specialist sub-contractors for implementing or executing the project goals in the most effective and cost-effective way (Isaac, 2015). With that in mind, problems will often arise on construction projects. Main-contractors are often faced with having to organise the activities of a construction project and to achieve project objectives successfully and that means having to sometimes work with emerging/inexperienced sub-contractors. Main-contractors employ the services of sub-contractors in an effort to minimise costs and also to finish a project in the specified time while

maintaining quality as prescribed. Findings from this study, when applied, is going to lead to better collaboration between main contractors and emerging/ inexperienced sub-contractors for well-organised project execution.

1.5 Chapter summary

Chapter one is a general background study of the research paper which gave a brief description of the construction industry as well as the problem being studied. This chapter provided a brief description of the two entities the study is really based around on, which main-contractors and sub-contractors. The research problems and research questions were discussed in this chapter as well as the aims and objectives of the study. The proposed methodical approach is finally discussed in this chapter. Chapter two discusses the detailed literature review of the challenges main contractors face when working with inexperienced sub-contractors.

Chapter 2- Literature Review

2.1 Introduction

This literature review gives attention to previous research studies conducted within the field of construction and draws knowledge from it, particularly in the areas and themes relevant to the empirical study pursued in this chapter, are identified and reviewed. The themes being explored in this literature review is concerned with the relationships between main-contractions and sub-contractors with limited experience in the construction industry.

The literature review below is to provide more insight and clarity into the main problem of the research study based on knowledge that is already existing on the problem.

2.2 The nature of the construction industry

The construction industry is not a very well understood industry as it is quite a complex one (Ofori, 2015). What really constitutes the construction sector further goes down to a myriad of activities from the design phase to the engineering, procurement and the execution of small, medium and large-scale infrastructure projects (Alagidede and Mensah, 2016). Other activities relate to alterations, maintenance, and repairing of infrastructure and all these items all fall under the construction sector. The nature of construction business can be summarised by the three sectors which is:

1) Building construction;
2) The construction of roads, railways, bridges, dams etc. and
3) Specialty trades (Klein, 2016).

The construction industry is largely characterised by the fact that is:

- Large, heavy and expensive in its physical nature
- It is required over a wide geographic area;
- Most parts of the construction are made elsewhere and the structure itself is customer tailored (Hyari, 2015).

The construction industry can be defined in numerous ways, as definitions will vary according to the focus, but a definition that is widely accepted is outlined by Fernandez-Soils (2011:1598) "*the construction industry consists of on-site assembling which can include but is not limited to repair work, which incorporates the preparation of a site, the constructions of buildings and infrastructure, building installation and building completion*". A much wider characterisation of the construction sector can be mentioned to include the supply chain for construction related products, to which it includes the mining of construction materials as well as the production of construction requirement such as steel (*ibid*). The

expansive definition of this industry includes professional services like management services, architectural services and design and facilities management services. It is these professional services that make up the professional industry role players. Some of the industry role players that make the industry include:

- **Architects**: In its simplest state, architecture is the *"organisation and design of spaces, and in its simplest form, it is the design of buildings, the interiors of buildings as well as the surrounding spaces*" (Hofstade, 2009:4). Architects acts as a designer, that can work in a wide range of scales, from designing something as large as a city, all the way to designing something as small as a chair.
- **Engineers**: engineering in construction is concerned with the analysis, the design, the materials, and methods of building large structures such as water treatment plants, large scale building, bridges, water treatment facilities, and traffic and transportation systems and that is civil engineering (Buckley, 2012).
- **Quantity surveying:** is characterised or described as, a profession that assures that the assets of the construction business are used in the best interest of society and it does this through suggesting the most inexpensive monetary administration for doing construction related activities and they are also offer consultancy services to clients, builders and planners amid the entire construction process (Reddy, 2017:2).

The construction industry role players or stakeholders includes clients, main-contractors and sub-contractors among many other (Enshassi, 2011). Clients are referred to as project owners are are essentially the organisation/group/individual that is the financial investor in the construction project (Latiffi, Brahimi and Fathi, 2016).

Figure 1: image showing the traditional procurement process

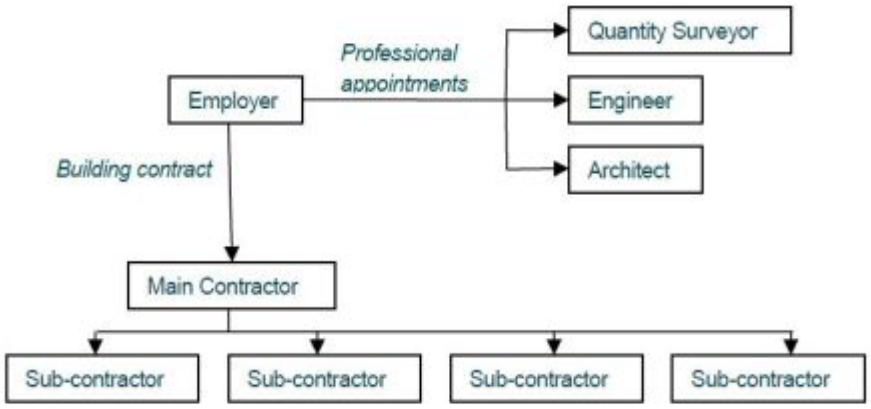

Figure 2: Traditional procurement. The collaboration of stakeholders under the traditional procurement (Quodarchitects, 2020: 19**).**

Figure 2 describes the traditional procurement system/method. The key element of this procurement method is that the design function is kept separate from the construction of the project. The employer/client engages with a professional team (Architects, engineers and quantity surveyors). It is then the same professional team that will administer the building contract on behalf of the employer.

Contractors: the construction part of the industry encompasses other professionals such contract managers, construction managers, quantity surveyors, safety officers etc. The professionals mentioned make up a construction team. Main-contractors, simply described are the entity that is given the responsibility to carry out the required works by the client (*ibid*). Sub-contractors are business entities that are awarded a contract which entrusts the entity to perform part of the works or services that are subject to matter at hand within the contract and the selected entity is thereafter referred to as a sub-contractor (Hill, 2016). Detailed below are the roles of these professionals:

- **Contract manager:** Contracts managers oversee construction projects from its inception right through to completion, whereby they ensure that work is finished as scheduled, and while working within the budgeted costs (International Association for Contract and commercial managers, 2008). The main duties of a contract manager are to manage, supervise as well as observe contractor activities in order to ensure that work that is being done conforms to the specifications of the approved designs. Furthermore, contract managers ensure that quality requirements are met and that occupational health and safety and environmental standards are kept (DeYoung, 2018).
- **construction managers:** construction managers are often referred to as site agents or site managers, and they are required to directly supervise and direct several procedures during the construction of a building project. Construction managers must ensure that a project operation runs smoothly so and work closely with the contracts manager so to ensure that work is conducted with the interest of the project and workers in mind (Howes, 2009).
- **Safety officers:** these are personnel that assess and monitor the hazards that pose as threat to health and safety and develop plans to regulate and control risks in the workplace. They observe construction sites to safeguard the lives of workers and everyone that is on the construction site. (Colins, 2014).

2.3 The role of construction in South Africa

When compare to other industries that exist, the industry of construction is one that has a very critical and crucial part in the economy of South Africa and is a noteworthy contributor to the country's economic growth (Windapo and Cattell, 2013). The contribution in which the construction industry makes in South Africa is quite significant to the national economy, as it allows for the creation of a lot of employment skilled and for less skilled members of society. Furthermore, it also takes an important

role in the development and transfer of technology (Dithebe, Aigbavboa, 2018). The industry creates openings for other initiatives and businesses to thrive, and it also contributes to bettering the quality of life of the users of its products (*ibid*). The construction industry plays a very important role in the performance of the national economy (Alagidede and Mensah, 2016). The construction industry is an important player in the economy and it is regarded as the key measure of the health of an economy because of its strong linkage to output fluctuations (*ibid*). The construction sector also further plays a significant role in contributing directly to the Gross Domestic Product (GDP) by entering the national accounts as a component of fixed investment (*ibid*).

When looking at employment, the construction industry shows to have a high absorption rate even in times where the economy is underperforming (CIDB, 2019). According to CIDB, 2019, "*the informal sector employs approximately 2,8 million people, and it is therefore the biggest contributors of jobs in the informal sector are trade (41%), community and social services (16%) and construction (16%). Based on the Quarterly Labour Force Survey data, formal employment accounts for 64%, while informal employment accounts for 36% of total construction employment. The contribution of the construction sector to informal employment is significant; at the end of 2019Q3 around 483 000 job opportunities were created*".

Other conditions which make the construction sector very important to the country's economy is the part it plays in sustainable development through proper implementation of sound infrastructure which is the basis for sustainable development (Ruddock, Foulkes, 2010). The CIDB (2019:3) states that "*according to the Quarterly Employment Statistics (QES)10, at the end of 2019Q2 the construction industry employed around 611 315 people in the formal sector, with civil engineering contributing to the bulk of the employment of 368 525 people (60%) and general building contributing around 212 667 (35%), the rest of the employment was for site preparation (1%) and renting of construction equipment with operators (4%)".*

Construction is a dynamic and responsive industry and it has high productivity outputs which stimulates large amounts of growth in the economy through intersectoral linkages between construction as well as other sectors (Durdyey and Ismail, 2012). This makes the construction sector powerful in the economy. This industry makes a remarkable influence towards sustainable economic development through satisfying the basic objectives of development which include, employment creation, income generation and re-distribution (*ibid*). It has also a significant role in satisfying basic physical and social needs, including the production of shelter, infrastructure and consumer goods (Ruddock, Foulkes, 2010).

2.4 Factors affecting the South African construction industry

Even though the construction industry has a crucial part in the development of the countries economy, there are problems associated with trying to improve its performance. The reseaon for this can bedirected to the nature of the industry itself or the nature of work, as it has high fragmentation, poor quliayt control, non-conformity, instability and a shortage of skills and experienced. (Chinda, Soewin, 2017). Listed below are the problems that the construction industry faces:

2.4.1 Fragmentation

Fragmentation is defined in terms of the number of firms/ specialists that are involved in construction projects, and in terms of its effects on the multiple processes in construction projects (Nawi, Baluch and Bahauddin, 2014). The impact fragmentation issues cause such as the separation of the design stage and construction naturally mean that the traditional procurement system which is essentially a design and build process is conducted in a successive manner and is therefore made up of separated professionals and that means there is a lack in interaction between builders/contractors and architects during the design and construction phase (*ibid*). This often makes for a system that is not efficient during the construction phase and because of this there is an increased level project complexity, the risk of having to do a lot of reworks, and it increases costs and makes longer the duration of construction. Other issues that the industry faces as a result of fragmentation are insufficient levels of communication (hinda, Soewin, 2017). To begin with, the flow of important data amongst the relevant stakeholders is extremely limited (Naoum, Fong, 2010). Additionally, the levels of interaction between the main contractor and sub-contractors and the interaction between the specialists within traditional project procurement is rather low more so in the design phase (*ibid*). Fruitful design performance of large projects needs considerable amounts co-ordination so as to guarantee that all cross-discipline interactions between architects, consultants and contractors are facilitated and all parties are continually aware of the ever-changing state of the project (Dahmas, Li, Liu, 2019).

2.4.2 Low productivity

Productivity is a term that is traditionally used to describe the ratio of input/output of an associated resource (Minde, 2016). Low productivity is regarded as the primary factor in construction projects cost overruns (Dekker, 2017). Low productivity from management (designers/consultants) creates an array of issues that carry cost burden such as overtime, the stacking of trades which creates overcrowding on a site (*ibid*). in order to improve the effectiveness of labour, numerous factors can be taken into consideration, and this may include motivation, job safety, environmental factors, and physical limitations. Management practices comprise of scheduling, planning, job analysis, control and data collection (Minde, 2016).

2.4.3 Poor quality

The term quality is one which is associated as conformance to the standard requirements, and for construction quality is the satisfaction of the client's needs and requirements as defined in scope of works, within the allocated budget and meeting the scheduled time and it is these aspects that satisfy the owners/user requirements in accordance to the given scope of works (Agibavboa and Mashwama, 2019). Failure in achieving required quality has significant impact on project cost (John, Elkanah, Ayibiowu, 2019). The absence of quality throughout the construction procurement results in deprived quality doings, of which this is regarded as not adding value to the activities of the project and ultimately leads to overruns in costs but also the time it takes to finish a project (Abbasnejad, 2013). Low quality negatively impacts a construction project as it affects the performance and productivity (*ibid*).

2.4.4 Lack of experience

Skills are the essential capabilities which need to be utilised in a specific context for a specific purpose, and the scarcity of skills happens when businesses struggle to in vacancies for a certain job, or specialised skill needed for that job (Utting, 2010). A shortage of skills poses the highest risk to the future of the construction industry, and will remain a challenge as the need for construction works intensifies (*ibid*). Work that meets a good quality criterion is at risk as there is a larger amount of workers that are unskilled, and the shortage of skills risks making, making the industry a less attractive one as a career. The shortage skills will see a decline in small medium and micro enterprise (SMMEs) with more bankruptcies.

The South African construction industry faces many difficulties which in turn influence the performance of the construction industry directly. Studies have found the factors that influence the performance of the construction industry in South Africa (Dithebe, Aigbavboa, 2018). There are many influences that lead to the development of rather poor performances of the South African construction industry such as poor delivery capacity and performance (*ibid*). Business disappointment is the inadequacy of a firm to pay its commitments or deliver when they are expected. Dithebe, Oke and Muyambu, (2018:304) state that "*the CIDB report features that the disappointment rate of South African development organisations is unsatisfactorily high*".

The poor performance of the South African construction industry is also largely influenced by misinterpretation, insufficient workmanship and incompetences of workers. This is some of the issues which influence the performance of the South African construction (Adeyemi, 2018). Other factors that are said to be among the leading factors of the deprived performance of the construction industry are conflict and performance.

2.4.5 Conflict

Conflict is unavoidable in a what is project orientated industry, and the construction sector has no exceptions with this respect. Due to the participation of multiple disciplines, which are intricate in the construction of a project (Yusof *et al*., 2011). In the period of construction, conflict is certainly inevitable due to the many uncertainties that exist in the period of construction. Conflict involves the communication difficulties which carries the opportunity to negatively impact the relations between two or more parties involved in the project and this ultimately impacts on the effectiveness of production during the project (YiSan, 2013). Conflict creates problems of communication and this does can impact the relationship amongst parties of which this ultimately has an impact on the efficiency and effectiveness of the job of the project (*ibid*). the two kinds of conflict that usually happen within the big construction projects, are mostly internal conflicts and interface conflicts. Internal conflicts relate to the participants that are inside of the project; whereas interface conflicts are those which have the outside parties in the project (Soni, Pandey, Agrawal, 2017). Conflict that is regarded as internal conflict transpires amongst the parties directly involved with the project team of the construction project of which the attainment of a solution can be done within the project. Iinternal conflict can be said to be the conflict among the internal stakeholders of the project (YiSan, 2013). Usually these conflicts arise because of issues such as:

- **Omissions and errors in construction contract**- mistakes and changes in the contract is amongst one of the biggest reasons for contractual claims and disputes (Rahman, 2017).
- **Scope changes**- in recent times, it was said that changes in drawings is a big problem in the construction industry (Rahman, 2017). Changes in the scope are caused by new additions, new deletions, and changes in the works that needs to be performed and it these changes in the scope that are regarded as the main influences that lead to claims and disputes (Jaffer, Tharim, Shuib, 2011). A developer is he as buyer of the services of construction and has the ability to decide the construction, the issuing of payments and also influence changes in contractual documents in the design and construction stages as well as the selection the contractors they want (YiSang, 2013).
- **Different site conditions**- disagreements nay rise because of large amounts of unexpected rock difficulties or bad underground conditions that is picked in the excavation process. Unexpected subsurface conditions during construction often lead to litigious and acute battles between project developers and contractors (YiSang, 2013).

2.4.6 Performance

The construction industry encounters difficulties and challenges. However, in countries that are developing, their problems and difficulties are simultaneously present together with the challenges of chronic resource shortages, socio-economic stress, institutional weaknesses and the general inability to deal with the important concerns (Ofori, 2015).

A study conducted by Adeyemi, (2018) showed the noteworthy elements influencing project performance are delay due to:

- **Materials scarcity**: scarcity as well as delays in materials supply is among some of the most significant factors that lead to the interruption in construction project delivery worldwide (Rahman, 2017). The availability of material is an existent problem due to that some materials required in construction not being available locally and the reliance on the importation of materials becomes in general (Rahman, Ramli, Shamsuddin, 2017). Quality of material can delay the use of material in a particular site if the that material does not meet the required standard or has defects. Some minor defects in a material can be repaired (*ibid*). Poor approximation causes a shortage of supply or causes an oversupply. The unavailability of uninterrupted supply interrupts the progress of construction on site, as this will require re-orders to be done and that prolongs, delays and adds additional costs, particularly if the material requires to be sourced from overseas (Sayed, Ali, Ahmed, 2017). Reordering causes additional problems too, such as variations in colour and size tolerance. Over supply on the hand incurs additional costs/losses to contractor (*ibid*).
- **Lack of resources**: it needs to be noted that the accomplishment of a construction project depends on how competent and effective the management of construction resources flow (Rahman, Memom, Karim 2013). The main aim and objectives of contractors in the construction industry is to finish a project within the budgeted that has been allocated regardless of the magnitude and complexity of project (*ibid*). However, it must be noted that the finishing of a construction project depends on the available construction resources. Project resources offer the means for achieving the projective objectives (Rahman, Ramli, Shamsuddin, 2017).
- Material resource is essentially the core essence of the construction industry of which it signifies a considerable amount of the total value of the project (*ibid*). Issues related to the availability of materials constitute to overruns in cost and therefore, well-organised management of materials is an imperative benchmark for the success of any project. A system of material management comprises of the essential functions needed in any construction project such as finding suitable storing areas (Ngangwara, Datche, 2015). Adequate supply of materials is an extremely crucial task as late or irregular delivery leads to the mismanagement of resources and thus leads to delays and cost overruns (Ngangwara, Datche, 2015).
- Machinery and equipment are also extremely crucial to have as it has an advantage over manpower which is that it can work under extreme or adverse circumstance (Adeyemi, 2017) however financing, it is the most important resource required for any construction work.

- **increase of material prices**: Price fluctuation can occur at any market and a contractor that tenders at prices that are fixed carries the risk that at a later stage, he may have to pay for labour

and materials at the prices and wages of the current at the time of submitting he's tender and this is usually unfavourable for the contractor as it may impact the financials of the project when it starts (Sawalhi, Eleyan, 2018). Contractors are then confronted many uncertainties during the bidding and financing work on projects (*ibid*). Clients too are affected as they are only paying for the enlarged or inflated costs of capital and facilities but also have to pay for premiums on construction prices as a result of the uncertainties of inflation and its side effects (Mishra, Remi, 2017). This means production is impacted because contractors cannot precisely predict future long-term returns on investments made and they forced to divert essential capital to meet their resource costs (*ibid*).

Enshasi, Mohamed and Abushaban 2016, reports that skills shortage, limited manpower, deprived supervision as well as poor site management practices and the breaking of equipment is among other contributors of the poor performance of the South African construction industry (Enshassi, Mohamed, Abushaban, 2016). Other factors that can be said to be influencing construction performance negatively

- **Deceitful practices and bribery**: Bribery is defined as "*robbery, theft; extortion; or the taking of a bribe*", and this creates dishonest behaviour (Chiocha, 2009). Chiocha, (2009:1) states that corruption is a dishonest activity that is directly linked with bribery and it is defined as "*illegal behaviour or dishonest acts, particularly for people who are in authority making deals in which they in come in many forms and can switch the allocation of resources and performance of firms or government in many ways"* (*ibid*). The characteristics of the construction sector make it prone to corruption with the extreme technicalities such as: complex requirements of projects, providers of goods and services; number of contractors, the; complex contracts, levels of official approvals and permits and the fact that the poor quality finishes is quickly hidden by being covered over by plaster, stone cladding and concrete (Cavill, Sohail, 2008). The effects of corruption are not felt instantaneously but are rather felt in the long run. Evidence from research submits that corruption generally reduces investment and growth, it decreases investments from foreign countries, and it also leads to reduced investments in education and over-investment in public infrastructure (*ibid*).

  Acts of corruption are always between two or more parties and bribery is most commonly going to be between public officials and their fellow contemporaries in the other departments (public-public interactions) it can be amid private companies providing materials and public officials (Wells, 2015). There several types of corruption such as: Grand, fraud and bribery which usually includes senior official's, politicians and high level technical staff (*ibid*). A usual practice by private companies is to employ representative agents with a mandate to secure contracts and provide a veneer of respectability and distance when bribery is involved (Cavil, Sohail, 2008).

- **Poor monitoring and management**: many factors contribute to the construction industry not being able to perform at its maximum and this is resembled in a study done by Vimonsatit and Wong (2012:) it was highlighted that the perhaps the most significant delay factors are: poor site management from contractor, limited experienced from contractor, improper planning by contractor, insufficient client finance and payments for finished work, issues with sub-contractors, equipment unavailability, labour supply and absence of communication amongst parties, and errors made throughout the construction stage (Vimonsatit and Wong, 2012). It is common for delays to happen in the construction industry and more so in the countries that are developing and also countries that are regarded as developed countries (Khalid, 2019). Interruptions and delays in construction are typically responsible for converting positive productive ventures into failed projects. Delay issues can be limited or prevented by applying an escalation in the planning of projects and good project management as this is one of the most critical success factors of project completion (*ibid*).

  The rapid development of the construction industry has left side effects to society as well as the economy as organisations with lesser experience and knowledge do not have a sturdy financial position (such as sub-contractors) cannot not manage the projects offered (Lian, Hassim, Muunimandy, Hua, 2012). Unorganised and weak management is another one of the factors which add to this problem. A competent project management team yields outstanding results however; most organisations are only good in finding projects but lack the necessary management skills and project itself is somewhat neglected (*ibid*). This will give an adverse effect to the organisation, especially new emerging sub-contractors.

The construction industry is indeed a very complex industry in which business entities, which are referred to as contractors in this industry and they utilise the expertise and skills of professionals, semi-skilled and unskilled individuals. The responsibility of the construction industry is to provide infrastructure to society, and the stakeholders that are given this responsibility are referred to as contractors (Ruddock, Foulkes, 2003).

2.5 Main-Contractor overview

2.5.1 A main contractor described

A main-contractor is an entity whose duty is to ensure the success of construction projects. The success of a project depends largely on the physical influence of this entity over the construction period. A team that possess individuals with a lot of experience in the industry usually have strong depths of knowledge and as such will often be the team or entity to deliver a project that above expectations (Chigangacha, 2016). The main-contractor is also viewed as the contractor or entity that is in charge of the overall construction project phase (CDM, 2015). A prime contractor is an organisation who undertakes the construction of a project, but who usually sub-lets parts of the works to a specialist or trades contractor

(Wikipedia, 2020). The definition further describes a contractor as a person who undertakes to or offers to undertake work by submitting a bid to, construct, alter, repair, add to, improve or demolish any building, highway, road, railroad, or other structure, project, development, or improvement to real property (*ibid*).

Contractors play a massive role in achieving the project outcomes and that is why contractor selection constitutes a critical decision for construction clients (Chigangacha, 2016). The process of selecting the best contractor should be explored in terms of a contractor with the most promising potential to fulfilling the outcomes of completing on time, within cost and to the expected quality criteria (Emuze, Monyane, 2015). The selection of contractors was usually based on the lowest tenderer being awarded the contract (*ibid*). Tendering is a vital stage in the procurement plan which includes getting a price for the contract as that is how contractors are actually selected (Chigangacha, 2016). Tendering involves the client to provide contractors with tender documents for contractors to price accordingly and submit what is called a bid proposal, of which upon the appointment of suitable of a suitable contractor is given, the contract may be executed (*ibid*). The client selects contractors either publicly or privately upon which the successful bidders/tenders are notified by means of letters of acceptance. The contractor subsequently approves acceptance on behalf of the relevant public institution. The award letters are the foundation for the administration of contracts, placements of orders and settlement of disputes (Ngobeni, 2011).

In South Africa, the Construction Industry Development Board (CIDB) is given the duty to lead the construction industry stakeholders in construction development as well as to drive regulation and the development of the construction industry (CIDB, 2016).

2.6 Roles and responsibilities of a main-contractor

The main contractor is the entity which has the overall say and responsibility over a construction site during a construction project (Mzyece, Ndekugri, Ankrah and Hammond, 2013). Parts of the responsibility of a main-contractor are to coordinate all healthy and safety in accordance with their construction phase by planning, managing and monitoring (*ibid*). Main-contractors have a variety of duties which depend on whether more than one contractors are involved in the particular project. If it a sub-contractor is to be involved, their duties will involve the coordinating of their activities with others that are part of the project team and in particular, conforming and accepting instructions given to them by the principal designer as per contractual agreement (Construction Industry Development, 2015).

What a main-contractor does is to oversee and manages large home, and building and infrastructure development, and in acting as a main-contact they ensure that the clients project is done according to

specification (Ndekugri, Mzyece, Ankrahn Hammond, 2012). Many of the responsibilities of a main-contractor include:

- **Interacting with Architects**: in the cases where there is an architect involved, the main-contractor becomes the main point of contact, the designer and the main-contractor study the plans together before any work is performed and upon inception, if issues come about, the designer would tend to go to the principle contractor to propose solutions that can be implemented. The relationship of the architect and the contractor is a two-way relationship that is difficult for most clients to replicate (Mzyece, Anikrah, 2012).
- **Coordinate specialty contractors**: When the principle contractor is on a project, specialist's sub-contractors are usually prepared to commit to tight project schedules. The main-contractor is entrusted with the responsibility of ensuring that all dates are met by all sub-contractors and also ensuring that the quality of the work is monitored. (Ndekugri, Mzyece, Ankrahn Hammond, 2012).
- **Liaise and resolve issues with sub-contractors**: the main-contractor is required to be on site on a regular basis, examining the work as it is being done, giving answers and solving issues that visitors, clients, citisens and sub-contractors have. If the main-contractor is not stationed on site at all times, sub-contractors might have to wait or make assumptions of what would be a viable solution and this can create delays and mistakes which affect the overall project of all the sub-contractors who follow (Atouot, 2008).
- **Arrange permits and associated paperwork:** main-contractors have the responsibility to make sure that the safe community and necessary municipal permits are acquired prior to start working and this gives sub-contractor the right of way to build, demolish and improve a property. Principle contractors will have the information of what tasks need permits and which do not. Main contractor will co-ordinate all of the inspections associated with complying with the associated paperwork.
- **Communicate with the consultants**: main contractor duties also involve working closely with clients in order to ensure that there is cooperation with others outside the construction site that may be impacted in one way or another by the activities that take place on an active site (Harly, 2010).
- **Performing the physical building:** A contractor would be responsible for providing the, labour, material, equipment (like engineering vehicles and tools) and services that essential for driving the construction of the project (Bowmans, 2015). A principle contractor hires specialised sub-contractors to perform all or sections of the construction works.

The main-contractor carry much responsibility and they assume much of risk throughout the course of a construction project. Main-contractors also manage the construction phase. In managing the

construction phase, the planning art of a project becomes the most essential part (CITB, 2015). The main important item for a main-contractor is the health and safety of everyone that is on the construction site and this is their number one priority (Mzyece, Anikrah, 2012). The main-contractor, once it has been awarded a contract, it takes up responsibility and is essentially obligated to perform according to the agreements made in the contract. In the construction stage, the responsibilities of the principle contractor go into managing and monitoring the construction work in a way that ensure the work is performed in a safe environment (Omran, Hussin, 2009). The main-contractor is required to simplify, co-operate and co-ordinate all of the contractors as well as consultants or designers if necessary (*ibid*). In an effort to achieve this obligation, main contractors evaluate the risk in written safe system of work document (method statements) that is handed in by the different contractors involved on the project to ensure that workers are comply with health and safety laws and regulations; sufficiently define the safe method of working; and they will not create additional risk to themselves and others due to interactions with other activities that are being done in the same place at the same time (Wikipidea, 2020). In certain instances, it can happen that these responsibilities of main-contractor can be shared or between two or contractors in what is called a joint venture. Construction Joint Venture (CJV) refer to the partnering of two or more construction companies with a view of accomplishing the same objectives, whereby they split project risks, resources and knowledge (Tony, 2014)

2.7 Sub-contractor overview

A sub-contractor is defined as a contractor to the principle contractor. Sub-contractor is a business or a person that goes into contractual agreement with main contractors to deliver service and materials deemed essential for the particular construction project (Markiwitz, 2012). A sub-contractor is basically a person or firm that completes work for another organisation guided by contracts agreement (Hill, 2016). Sub-contractor is part of a project and it generally makes available services that specialised like painting. The key about point about a sub-contractor is that they go into agreement with the principle contractor, and not particularly with the client (Markiwitz, 2011). Sub-contractors specialise in one or more areas of construction and they make efforts to connect with other contractors who negotiate for larger jobs that include their area of specialty (*ibid*).

Sub-contracting is characterised by the exploration of services and products which form part of the principle contractors end activities (Ohnuma, Perira, 2012). Sub-contracting is utilised extensively on housing and building projects as compare to civil engineering works and industrial projects (Yoke-lian, Hassim, Muniandy and Teik-hua, 2012). According to Anbessie, (2017:17) and Cidb (2013) sub-contracting is an approach to business made use of by principle contractors in order to reduce operational costs and overheads, and in doing so, it enhances competitiveness of the construction market and to also shift or transfer risks, which include financial risks, risk of completion failure and the responsibility for employees (Anbessie, 2017).

The substitution principle essentially means that the sub-contractor is to execute or perform the operation with financial as well technical risk instead of the main-contractor (Cattel, Windapo, 2013). The subordination criterion therefore means that the sub-contractor must follow all instruction given to by the principle contractor for the duration of the contract (*ibid*). Sub-letting work to other contractors is a highly inexpensive approach of procuring specialised works for construction building projects, however it may also give rise to various kinds of problems (Rajput, Agarwal, 2013). Sub-contracting on construction projects has become a common and well-established practice (Choudhry, Hinze, Gabriel, 2012).

2.8 Roles and responsibilities of a sub-contractor

Sub-contractors when awarded a project under a main-contractor, they carry a certain amount of responsibility which is performing what has been given on the terms of agreement (Ohnuma, Perira, 2012). When sub-contractors take work, they have to undertake a number of responsibilities such as ensuring that they maintain frequent communication with the main-contractor (Sigma, 2016). Sub-contractors also have a duty of care of ensuring that health and safety is up to standard and as a result they need to ensure that they provide proper personal protective equipment (PPE) for their workers (Ohnuma, Pereira and Cardoso, 2012). It also becomes important for the sub-contractor to acknowledge the presence of the main-contractor by ensuring that they adhere to all safety policies and procedures as well the main-contractors company policy.

A sub-contractor is usually made up of a team of skilled and unskilled employees and it therefore becomes the responsibility of the sub-contractor to recruit and pay salaries/wages and deal with any employment issues for their own staff (DIR, 2017). The main-contractor has no authority and control over the business dealings of the sub-contracting firm. Furthermore, it is also the duty of the sub-contractor to ensure that they pass on important information to them and supervise their work (Dyke, 2017). Furthermore, the sub-contractor must keep an accurate record of all workers on site on the day and ensure that the number of worker's board is updated on a daily basis, while also monitoring the number hours they work (CIDB, 2013). This information needs to be stored correctly in a database. Most of all however, a sub-contractor has the duty to carry out the work with minimal supervision from the main-contractor. The sub-contractor must also co-ordinate their portion of work with other sub-contractors on the project so as to ensure that everything is completed efficiently and on schedule (Yoke-Lian, 2012). Problems encountered during the duration of the project that the sub-contractor cannot solve by themselves may go up to the contractor for a decision (Dyke, 2017).

2.9 Types of Sub-contractors

The length of typical contract between principle contractor and sub-contractors within the building industry usually lasts for a period of three to six months with civil engineering agreements with sub-contractors lasting for a longer duration approximately twelve months' agreement on average (CIDB, 2013). Sub-contractors are generally broken down into categories of the following trades:

1) **Generalist sub-contractors**: these sub-contractors are the type that takes on general trades which include works such as painting, plastering and brickwork.
2) **Labour-only sub-contractors**: this type of sub-contracting are the ones which supply labour only services where the principle contractor on the project provides the sub-contractor with material as well as supervision.
3) **Specialist sub-contractors**: these contractors take on specialised services only. These contractors are especially used in building and engineering services and they take works such as plumbing, electrical instillation and air-conditioning and ventilating systems (HVAC) (CIDB, 2013).

Sub-contracting is also taken a step further and can be described into different categories, which include:

1) **Domestic sub-contractors**: are sub-contractor that are nominated and selected by the principle contractor at their will (Yoke-Liam, 2012). The main-contractor appoints this sub-contractor usually due to previous working relationships and these sub-contractors carry out parts of the work of a main contractor. The use of these type of contractors allows the principle contractor to take on projects that are highly complex in their nature whilst not unacceptably increasing their risk (Yoke-Liam, 2012).
2) **Nominated sub-contractor**: is a contractor that chosen or rather chosen by the client itself in whereby the principle contractor is obliged to appoint the sub-contractor. The main-contractor does not have control over the appointment of nominated sub-contractors as this done so that the client has some degree of power over the project. There are mutual benefits that come with these nominated sub-contractors for both the employer/client and the sub-contractor by making use of the nomination way (CIDB, 2013). In this case, the client gets to choose or select the specialist sub-contractor it requires and thereafter obtain design and value engineering input and have direct access during the progress of works. The in this respect gets to benefit by having certainty of payment from the (*ibid*).
3) **Selected sub-contractor**: a sub-contractor that is chosen by the contractor through discussions with the client in terms of the requirements of the contract. Again, in the case of a sub-contractor that is nominated by the main contractor and, as such main-contractor has control on the appointment of selected sub-contractors. Selected sub-contractors allows the client to influence

the main contractor's selection of sub-contractors, while still leaving the responsibility of their performance with the main-contractor (Hua-Jin, Zhang, Feng and Xia, 2013). This may be viewed as another approach of suggesting or proposing a sub-contractor as the contractual relationship is less complicated (*ibid*).

2.10 Purpose of sub-contracting

Sub-contracting has become a common practice in South Africa and this is with good reason. Ohnuma, Pereira and Cadoso, (2012:6), stated that "in recent times, lots of building companies are making efforts to advance their effectiveness in the constructive processes, which led to contributing towards the re-organisation of the structure of the company through the definition of a competitive strategy. It often makes good financial and business sense to do so" (Ohnuma et, 2012). For example, main-contractor finds that it is less expensive to use a specialist sub-contractor for a specific element of a contract rather than executing that element of the contract itself (Sigma, 2016). The reason for this change is that a specialist sub-contractor will have the necessary equipment and expertise, in which the main-contractor might not have and in certain cases, a main-contractor may not be authorised to provide all of the services or works required by the contracting authority (*ibid*). Main-contractors rely largely on the experience of specialised services of sub-contractors so as to reduce costs and increase efficiency on construction projects (Choudry, 2012). Through the focussed services of sub-contractors, they are able to perform specific tasks that the main-contractor cannot perform (*ibid*). Most of main-contractors usually sublet a large portion or sometimes all of the specialised work on the project due to their inability to perform that specialist task (Salkonakorn, 2016).

It has appeared that the sub-contracting strategy is an effective and inexpensive means of acquiring the necessary resources and it is largely for this reason that main-contractors make use of sub-contractors to such a large extent (Salkonakorn, 2016). Choudry, (2012:1354) in a study he stated that "*the increase in sub-subcontracting can be attributed to the increased complexity of construction projects, the shortage of experienced workers, the temptation to increase profits, and risk reduction*" (Choundry, 2012). The benefits of sub-contracting are clearly of a positive nature since it has been largely implemented, and below are the benefits sub-contracting offer.

2.11 Advantages of Sub-contracting

Numerous advantages come with the concept of sub-contracting and some of these advantages include:

- Reducing costs: Reducing costs is the one major advantage of sub-contracting and there are two possibilities for saving money through sub-contracting which includes remuneration and performance of the work (Sakolnakorn, 2016). When considering remuneration, it is through

sub-contracting, that main-contractors achieve the benefit of savings costs as it saves from having to pay a number of fees such as employment insurance, social; benefits and union fees (Gila tools, 2014). Performance also increases as experts in the field are hired, and so it therefore becomes easier to entrust the external resource person to perform the job well.

- Reduced risk: sub-contracting is identified as a good business strategy, particularly due to the fact that it transfers risk from the main-contractor to the sub-contractor and not only that, but it also puts the process of the works in the hands of experts in that field
- Simplicity: sub-contracting provides the benefits of satisfying clients with a single solution, accessing additional resources as well as having the opportunity of obtaining complementary capabilities
- Flexibility: Sub-contracting allows for operations that are seasonal demands to bring in additional resources and needed and released when they are no longer needed
- Less legal obligations: when viewed from the eyes of the law, sub-contractors are the owners and drivers of their businesses and, therefore, are not entitled to the same legal protections as employees.
- Negotiations are all done for the sub-contractor which means there is less administrative work (Sakolnakorn, 2016).
- Better quality: the specialist sub-contractors can add value to the project and be "part of the team and if the organisation does not have a specialist for the trade or when a specialist is not going to be needed ongoing time, it is good to hire one for a short-term basis. This is preferable to hiring a full-time staff of engineers, architects or legal professionals (Tomicki, 2020). Furthermore, sub-contractor is likely to have done comparable work previously and will be able to get the job done quickly and efficiently (*ibid*).

Other benefits may be gained from working with sub-contractors. Sub-contractors provide skilled labour, reduces the pressure on the main-contractors and it decreases overhead costs (Enshassi, 2013). Observing and managing safety, quality control, and labour management difficulties on projects becomes simpler for main-contractors (*ibid*). Sub-contracting is a good practice even though it does have its own disadvantages. Sub-contracting also becomes much of a problem to the main-contractor when the sub-contractor that is to perform the work lacks experience, or has limited experience (Ulubeyli, Manisali,2010). Where there are specialised skills required, many main-contractors tend to rely heavily on sub-contracting the work to another company with the aim of reducing their risk (Kowshik, Deepak, 2017). Making use of sub-contractors is largely advantageous to main-contractors in many cases as they stand to make larger profits from this and have much less administrative work,

however, despite these benefits, the quality of work carries a greater risk of being completed poorly if it is carried by an inexperienced sub-contractor (Al-tmeemy, 2017).

2.12 Disadvantages of Sub-contracting

The logic behind sub-contracting is one that makes sense, however sub-contracting does come with a number of disadvantages to main-contractors such as:

- Less control: because of the fact that the main-contractor passes some responsibilities sub-contractors, they automatically have less control over that specific trade in the project (Gila tool, 2014). However, at the same time, if something goes wrong during the construction of that particular trade, the sub-contractor's reputation that gets negatively affected, and also the contractor's (*ibid*).
- May be cause for delays – generally sub-contracting should hasten activities and productivity. However, interruptions could arise from disagreements if expectations are not met. Disputes may arise from simple issues such as where to purchase tools and materials may spark arguments (SAMS, 2013). In such cases, not just time lost, but even resources may be impacted on negatively and ultimately the project itself (*ibid*).
- Quality problems may arise- Often and especially with sub-contractors with limited experience, the organisation will be motivated by profit (Ulubeyli, Manisali, Kazaz, 2010). Since the contract sum is fixed, the best way for the sub-contractors to increase profit is by decreasing their expenses and this often negatively affects the quality of the project (*ibid*). as much as sub-contractors are expected to perform their duties; quality cannot always be guaranteed.
- Loss of power: the main-contractor loses a certain degree of power as the main-contractor shifts the responsibilities to a sub-contractor (Tomicki, 2020).
- May cause delays – although it will generally fasten things, delays could come from differences between parties and when expectations are not met. Simple disputes can cause delays and as a result, it not just time, but even resources may be affected (Ulubeyli, Manisali, Kazaz, 2010).
- More Potential for miscommunication arises- projects tend sometimes become expensive due to poor co-ordination and management of sub-contractors in the construction industry and this is a result of low performance of sub-contractors (Chileshe, 2011). This makes it problematic for project managers to deliver a project within cost, with good quality and on time (*ibid*). Deprived levels of communication have numerous negative consequences in construction industry and such as: cost time overruns, overruns, disputes and the failing of a project (Rahman and Malaysia, 2018). According to Malaysia and Rahman (2018:239) This was

proven true that ineffective communication leads to unfavourable outcomes. Deprived communication among the main reasons for disputes amongst the project stakeholder's and poor communication has been said to affect important aspects of a project's success such as timeframe, budget and agreement amongst stakeholders (Othman and Hussien, 2018). Because of low levels of communication reworks are often needed all the way through the project and this means time and cost overruns and all this is the results of poor communication which could ultimately lead to the project's failure (*ibid*).

- Inability to deliver on time: when sub-contractor fails to meet the required deliverables on time, it delays the principle contractors on-time delivery and thus negatively impacts on customer satisfaction. Poor quality and delayed deliveries means additional costs need to be used this ultimately decreases the trust between the principle contractor and client. The most unfavourable scenario is non-delivery, and this means relationships are damaged further. This is particularly problematic with organisation that rely on the just-in-time-deliveries (JIT), the punctual delivery from the subcontractor is a necessity. Postponements on production or deliveries are also caused by factors that cannot be controlled by either the main contractor or sub-contractor. Events weather conditions, labour disputes like strikes; delays in harbour or customs office and situations of political unrest.
- Sub-contractor failure is a common event in the construction industry and with more and more competition and competitive pricing, newer and less experienced sub-contractors are awarded a contract to carry out works. With less experience, sub-contractor failure can be expected to arise (Joshua, Fagbenle, Adedeji, Ojelabi, 2018).

There are a number of risks that come with making use of sub-contractors which deserve to be mentioned. The major risk with sub-contracting is that the performance of the sub-contractor essentially has impact on the reputation of the main-contractor. For example, if the sub-contractor's finished product or outcome is bad, it impacts negatively on the other operations of the company and also their relationships to customers (Paaiso, 2011). Therefore, the risks in outsourcing work lie in sub-contractor selection, and in the performance of the selected sub-contractor(s). the evaluation of performance is done by reviewing the production rate, production quality, accuracy and delivery speed. In the transferring of knowledge, some problems may emerge, and cultural issues should never be underestimated. However, it must be noted that sub-contractor failure still exists in this industry and the reasons behind these failures need to be investigated.

2.13 Sub-contractor failure

Sub-contractors are very critical and important aspect to the fruitful completion of construction projects, however, there are numerous issues that are intricate in the sub-contracting practice are rarely recognised (Ardit, Chotibhongs, 2015). Sub-contractor difficulties are regarded as the main risks of construction projects on a worldwide basis (Yoke-Lian, Hassim, Muniandy, Teik-Hua, 2012). The problems that have been identified when it comes to using to using inexperienced sub-contractors vary, but all these problems are a contributing factor to delays in the construction program. Delays in the sub-contractor performance are found to be due to a lack of skills as well the failure to coordinate their works (*ibid*). AL-Tmeemy, (2017) stated that "*the absence of quality in construction is ranked first to what leads to issues between the contractor and sub-contractor*" (Al-Tmeemy, 2017).

Some of the other difficulties that sub-contractors face which ultimately affect their selection as well the progress of the works includes; a deficiency of capital, trouble in accessing finance, limited experience and a lack of financial management training (Murray, Appiah-Baiden, 2010). The three most important effects that inexperienced sub-contractors bring over construction projects are time-overruns, budget over-runs and quality issues (Sunja, Jacob, 2013). Project failure affects a project negatively and it can cause major delays on time and also compromise quality. Sub-contractors that fail at a project that have been awarded to them due to a number of reasons such as:

- **A Lack of capital:** Because sub-contracting is such a high risk business, it often becomes problematic for these emerging contractors to acquire capital from traditional banks (Construction executive, 2014). This is also particularly true in today's ever declining economy, whereby lending institutions tend to be a bit reluctant to fund construction investments (*ibid*). The result of this is that sub-contractors find it difficult to gain access to affordable capital (Laryea, 2010).
- **Cash flow:** The simplest explanation for sub-contractor failure is that the business runs out of cash flow. Many reasons exist that may attribute to this. Sub-contractors are often expected by many to float the project costs (Al-Tmeemy, 2017). They would pay for materials on terms, pay all labourers weekly, give 10% of their revenue to retainage, and then wait for months after fronting the cash to get paid from the principle contractor or owner. Such expectations are impractical for any company that is not flexible with cash flow (*ibid*).
- **Nature of the work:** other industries are simple in their nature as they involve only simple transactions of trade**.** Such is not necessarily the case with sub-contracting (Murray, Appiah-Baiden, 2010). With sub-contracting, work is layered upon the work of quite a number of other parties and the work itself must meet a subjective-type approval. Another thing that makes it so complex is that there are many things that can wrong on the jobsite such that it puts the sub-

contractor in a difficult situation as there are financial implications to every action (*ibid*). This all feeds into the above-mentioned problems, as this is yet another cause for steep cash needs.

- **Client Communications:** Lian (2012:7) states that **"***often, difficulties with failed cash flow are traced back to failed client communications. Yet that is only one aspect of operations complications created due to poor communication with the general contractor*" (Lian, Hassim, Muniandy,Teik-Hua, 2012). Sub-contractor communications levels are generally low and that in itself creates a problem for main-contractors.
- Business failure at the sub-contractor level is largely because inadequate capital and a lot of debt, the deficiency in managerial maturity, not being able to recognise early warning measures, increased project scope, inability to evaluate project profitability, and poor use of accounting systems (Mahamid, 2012).
- **Scope challenges**: Sub-contractors face key challenges in their scope of works and these challenges are acknowledged by both main-contractors and sub-contractors and these challenges end up causing problems for the main-contractor (CIDB, 2013).

2.14 Key challenges facing sub-contractors

Sub-contractors are an important component for the success of construction projects The issues that affect the performance of sub-contractors are categorised, as those issues that are related to the project or an organisation and these are significant factors that affect the performance of the sub-contractors (Anbessie, 2017). The factors comprise of leadership skills, profit, on time completion of works, staff qualification/skill, company, history reputation, payment method, and project procurement method, and relationship with main contractors (*ibid*).

Sub-contractors face challenges in their business (Laryea, 2010). Some of the major challenges that sub-contractors face includes:

1) **Delayed payments**: these can be attributed by either the principle contractor or the employer/client. This is viewed as the most serious issue that is faced by sub-contractors (Laryea, 2010). Many sub-contractors are small companies that rely strongly timely payments in order to uphold cash flows and the production of work and so delayed payments tends interrupt the flow of work, and creates complications with suppliers and in some instances it results in bankruptcy (Thwala, Mvubu, 2009). Principle contractors are not obliged to provide payment guarantees to sub-contractors as they seldom get these themselves from the client. The pay-when-paid practice that is predominant in the industry greatly affects sub-contractors (*ibid*).
2) **Bid price pressure from main-contractors**: tight competition of the construction industry means many contractors price their tenders low in order to acquire work and thereafter look for ways to make profits from the on-going projects by forcing sub-contractors to the lowest

possible bid price (Paaiso, 2011). These low margins tend to results in deprived quality work, disputes, time delays and losses on projects (*ibid*).

3) **Subcontractor experience**: Laryea, (2010:215) stated that *"when sub-contractors with limited experience are employed, the quality of the final product could be compromised*" (Laryea, 2010). The performance of the subcontractor's project team impacts on the outcome of the project particularly with quality and timely delivery, thus a key determinant of a project's economic performance.
4) **Contractual issues**: When a main contractor considers making use of a certain sub-contractor in a construction project, the parties would typically enter into what is referred to as a sub-contract negotiation (Paiso, 2011). Often principle contractors make the sub-contract agreements non-negotiable and this can put sub-contractor in a difficult position (Paaiso, 2011).
5) **Attitude**: According to CIDB (2013) many sub-contractors, that are relatively new to the construction industry, have a materialistic mind-set and "*only want make a quick buck*". Principle contractors think that this is not a sustainable mind-set because it often leads the cutting of corners on important aspects such as quality, and this is simply ultimately unsustainable (CIDB, 2013).
6) **Ability to develop long-term strategy:** (Ncwadi and Dangalazana (2005:27-30) found that on average many emerging sub-contractors agreed to that the capability to create a long-term strategy was a problem in their firms and this is because of the nature of their work, which depends a lot on contracts available with the developers. Therefore, it become difficult for emerging contractors to develop long-term plans.
7) **Lack of incentives from government to encourage emerging contractors**: inexperienced sub-contractors agree government does not create enough incentives to encourage an emerging contractor to grow, and emerging contractors hinted that the black economic empowerment in construction industry was not a reality to them (Ncwadi and Dangalazana, 2005).
8) **Lack of professional advisors and consultants in the construction industry:** many inexperienced sub-contractors agree that it is the absence of professional advisory and consultancy in the construction industry is a problem. Some of the construction organisation are not mindful of the existence of consultants and professional advisors in the construction field whilst others referred to a lack of finance and therefore could not access professional assistance (Anbessie, 2017).
9) **Lack of capital equipment**: many of the emerging contractors agreed that the absence of capital and equipment is a big problem and for them as firms have little access to scaffolding, wheelbarrows, vehicles and other equipment needed for construction. The issue is made worse by the fact that they cannot access bank loans to buy the necessary equipment (Ncwadi and Dangalazana, 2005).

10) **Poor cash flow**: emerging contractors also mention that cash flow is a major problem facing their businesses and hampering growth. emerging sub-contractors often don't have running funds but they still have to wait until the construction of a unit is fully completed before they could be paid (*ibid*).

The selection of sub-contractors is an important task in the procurement process of a construction project. There are various methods and techniques that are considered before the finalisation of a sub-contractor is made.

2.15 The selection of Sub-contractors

Sub-contractor selection is the procedure of collecting data on a sub-contractor in order to go through to make the best choice, where the best choice represents the contractor best that is suited for a specific project (De Araujo, Mota, 2015).

Sub-contracting has become a prominent feature of the construction industry (Modupe, Ayanleye, Achi, 2010). Modupe *etl* (2010) argues that sub-contractors can contribute to the total construction project value as much as 90%, hence, a lot of the construction work is being outsourced to sub-contractors(*ibid*). The method of selection of sub-contractors typically differs according to the requirements of the project, and contractual conditions (*ibid*). The more important and larger the contract, the greater attention to detail is likely to be paid on the selection of sub-contractors (De Araujo, Mota, 2015). The criteria to quality are therefore used to assess information provided by a supplier/sub-contractor (Taruna, Bhatt, Bhavsar, 2016). The process allows the main-contractor to reach an informed opinion about the capacity of the proposed sub-contractor to successfully deliver a project. selecting sub-contractor is a critical procedure in construction projects. Numerous influences need to be taken into account when selecting sub-contractors and improper selection of sub-contractors could lead to problems in construction stage such as quality (Marzouk, Kherbawy, Khalifa, 2012).

In competitive tendering, estimators often largely rely on sub-contractor's bids to arrive at a final tender sum which is submitted to clients. Sub-contractor selection starts off with making the decisions of the sub-contracting the scope and scale, the project objective, policies and strategy. From here on forward the criteria and methods for the analysis of potential sub-contractors are created (*ibid*). First, the level of outsourcing is determined. Outsourcing or sub-contracting in this case, is an action that mean contracting a set of processes or smaller parts of the work to a sub-contractor (Biketi, Titusakivaa, Munala, 2017). The selection criteria according to Taruna (2016:58), "*usually includes: price, experience/skill, quality, and cooperation. The selection of sub-contractors regularly encounters problems, like the selection of incompetent subcontractors, difficulty in the management of sub-contractors and out of control of budget and quotation system. It is therefore, important for construction*

companies to control the sub-contractor selection process and make sure that it is conducted in fair and objective manner" (Taruna, Bhatt, Bhavsar, 2016).

The selection of a sub-contractor is a critical factor as this will inevitably have an effect on the proceedings of a construction process, and as a result, a number of factors need to be considered when selecting a sub-contractor as discussed below:

2.15.1 Experience

Sub-contractors are employed to conduct certain tasks in a construction project and, they must have good technical knows how in order to perform the required tasks (Taruna, Bhatt, Bhavsar, 2016); Technical know-how is awareness of the technical information about methods essential to performing certain tasks, and the knowledge of procedures and judgmental criteria necessary for efficient or correct actions on the job (Brynjarsdottr, 2016). According to Brynjarsdott (2016:), "*technical knowledge is an understanding of complex fundamentals which are needed to effectively complete tasks related with a given profession*".

2.15.2 Technical ability

Technical ability refers to the relevant specialisation employees that the contracting organisation possesses (Hartman, Ling, Tan, 2009). Paaiso, (2011:30) described technical ability of personnel as the accessibility and number of supervisors and skilled craftsmen as well as qualifications and relevant expertise of employees. According to Ajayi *etl* (2010:57), the selection of sub-contractors is grounded on a combined valuation of a variety of criteria including past performance, suitable experience.

2.15.3 Quality

Further to having the experience to perform a task, the quality of the work done is a critical predecessor to the entire performance of a project (Taruna, Bhatt, Bharvsar, 2016). Quality is the degree to which sub-contractors bring goods or services that conform to project specifications (Eldin, 2011). Experience does constitute to the quality of the finished product, as there are other determining factors as to reviewing if the final product delivered by the sub-contractor meets project needs such as a good working environment, quality planning and control, and attitude of employees (Brynjarsdottir, 2016). Quality may possibly comprise four major aspects in terms of project delivery and those include:

- Technical quality- technical quality may be viewed as a measure of the quality of a building at the technical level, that is, the components, the fittings, and finishes of quality materials, (Sunindijo, Zou, 2011).
- Functional quality- functional quality is defined as the degree to which the building conforms to the objectives which it was intended for (Mohamed, Anouche, 2018) and

- Architectural quality- architectural quality is a measure of the quality of the building in architectural and aesthetic terms (Taruna, Bhatt, Bharvsar, 2016).

Main-contractors often award contracts to sub-contractors that can demonstrate or show good technical abilities, workmanship quality and show good site management and supervision ability and to ensure good product quality (De Araujo, Mota, 2015). Unquestionably, good previous work performance does not necessarily stand as guarantee for future performance; however it does increase chances to work with the main-contractor. Past behaviour and/or past performance is the best indicator for producing quality work (*ibid*).

2.15.4 Cooperation

There are underlying difficulties in the relationships of main contractors and sub-contractors and bad communication among the various parties is amongst one of them (Marzouk, Kherbawy and Khalifa, 2013). Since sub-contracted work has needs to be completed by building relationships with principle contractors, the cooperativeness of sub-contractor or the extent to which sub-contractors fulfil their contract agreement, solve and prevent problems is important for the operational efficiency of construction projects (Hartman, Yng Ling, Tan, 2009). Principle contractors are more likely to be willing to select a sub-contractor that shows a confident attitude, quick response and commitment to their requirements (*ibid*)., The cooperativeness of sub-contractors is evaluated like the quality criterion which is on the basis of the principle contractor own experience with the sub-contractors (Hartman, Yean Ling and Tan, 2009).

2.15.5 Financial stability

To assess the performances of organisations, reading and reviewing the financial data of an organisation like financial statements and ratios derived from them give a better understanding of the position of a company (Brynjarsdottir, 2016). Information containing the finances of an organisation gives a good impression of the overall well-being of an organisation and it allows a principle contractor to forecast potential future problems or opportunities (Taruna, Bhatt, Bhavsar, 2016). If a contractor does not have satisfactory financial strength, difficulties like bankruptcy could hamper advancement of the construction period (Doloi, 2011). It is the financial position that is most significant in assessing the performance of a sub-contractor. Investigation and studies assessing the apparent influence of several decision criterions on project accomplishment among professionals of the construction industry show that stability in the finances of an organisation is observed to have a noteworthy impact on the success of a project (Vilasini, Neitzert, Rotimi, Windapo, 2012). However, financial information can be manipulated, more so with smaller organisations, as they can hide bad financial statements from stakeholders (Brynjarsdottir, 2016). Financial steadiness can be assessed in many ways and features

that are used to represent the criteria differ between studies, i.e., yearly turnover, working and operating capitals and various financial ratios calculated from financial statements (*ibid*).

2.16 Challenges that main contractors encounter when working with inexperienced sub-contractors

Often inexperienced sub-contractors come with weak management practices and that is the start of the problem. Many sub-contractors have poor management practices, particularly with cash flow management. (Yoke-Lian, Hassim, Muniandy, Teik-Hua, 2012). Main-contractors point out that there are clear differences between the specialist who are a more established sub-contractor who carry out trades such as concrete and tiling and the generalist sub-contractor (Murray, Appiah-Baiden, 2010). The more specialised sub-contractors often have well-established business management systems in which that is something that shows to be lacking amongst inexperienced sub-contractors. Rajput and Agarwal (2013), mentioned that *"According to the view point of main contractors', poor quality in construction quality work was classified as the first aspect in working with sub-contractors and. Non adherence to the conditions of contract was ranked in second position*" (Rajput, Agarwal, 2013). The sluggishness of construction projects has become a highly critical factor in the construction industry, because the total size of projects lagging behind has caused heavy losses in the economy (Al-Tmeemy, 2017).

Sub-contractors are very critical and important aspect to the successful completion of most construction projects, and yet the many issues that are involved in the sub-contracting practice are rarely acknowledged (Ardit, Chotibhongs, 2015). Sub-contractor related difficulties are regarded as one of the main risks of construction projects on a worldwide basis (Yoke-Lian, Hassim, Muniandy, Teik-Hua, 2012). The problems that have been identified when it comes to using to using inexperienced sub-contractors vary, but all these problems are a contributing factor to delays in the construction program. Delays in the sub-contractor performance are found to be due to a lack of skills as well the failure to coordinate their works (*ibid*). AL-Tmeemy, (2017) stated that "*lack of construction quality is ranked in the first which leads to issues between the contractor and sub-contractor*" (Al-Tmeemy, 2017). Some of the other difficulties that sub-contractors face which ultimately affect their selection as well the progress of the works includes:

- **lack of capital**: on the financial side, sub-contractors report that a lack in initial funding, the inability to repay debt and conflict with investors are the key attributes that contribute to failure (Thwala, 2012).
- **poor management:** studies suggest that the failure of sub-contractors to meet the main-contractors' expectations is a consequence of poor management because all businesses function under the discretion of managers to some extent and they are affected by operational practices (Thwala, 2012).

- **financial management training**: According to Thwala (2012:26), managers of failing sub-contractors are often in financial distress and had little knowledge in the areas of cashflow analysis, inventory control and market segmentation (Murray, Appiah-Baiden, 2010).

The three most important effects that inexperienced sub-contractors bring over construction projects are time-overruns, budget over-runs and quality issues (Sunja, Jacob, 2013). Project failure affects a project negatively and it can cause major delays on time and also compromise quality. Main-contractors also point out that sub-contractors have bring insufficient workmen to site, and this a practice which hinders the works and fuel conflicts (Akintan and Moreledge, 2013).

2.16.1 The Black Economic Empowerment (BEE) status:

South Africa is a country that has a long history of the large majority of the population being at a disadvantaged position in engaging in business and general treatment per say. Since the beginning of the new democracy, changes have been made in order to try and remedy the damages created before the democracy. This meant that access to engaging in business like in the construction sector was granted and with that more and more sub-contractors were able to part take in undertaking construction activities (CIDB, 2013). Due to these historical challenges, legislation has changed and what that meant for the construction industry was the entry of inexperienced sub-contractors coming into the market.

The Black Economic Empowerment (BEE) is a phenomenon that was introduced into South Africa in the 1990's by the government and private sector in order to give previously disadvantaged races an equal opportunity to take part in the South African economy (Tshetu, 2014). The BEE may be viewed as a specific government policy that is put in place in order to promote transformation and better the economic involvement of black people in the South African economy (Kruger, 2011). The abolition of poverty and entrenched inequality in South Africa is one of the main reasons for the initiating of the Black Economic Empowerment Act (BEEA), which was or/ is to serve as a socio-economic transformation strategy to redress the disparities of the past. BEE-SMMEs are, however, faced with many challenges (Koaho and Laryea, 2016). These include; lack of managerial skills, lack of finance, lack of market information, legal and administrative hindrances, low quality products, competition from large companies and a heavy regulatory burden and with main-contractors having to work with these sub-contractors find that they have to inherit these issues (*ibid*).

The quality of a sub-contractor's construction team directly affects and duration of the project. The BEE policy has had an impact on the construction industry and some contractors agree that they have had to select some contractors who are inexperienced so as to maintain special relationships or meet compliance (Langiman, 2017).

2.16.2 Weak management

Often inexperienced sub-contractors come with weak management practices and that is the start of the problem. Main-contractors point out that there are clear differences between the specialist who are usually more established sub-contractors who carry out trades such as concreting and tiling and the generalist subcontractor (Murray, Appiah-Baiden, 2010). The more specialised sub-contractors often have sophisticated and well-established business management systems in which that is something that shows to be lacking amongst inexperienced sub-contractors.

2.16.3 Inexperienced sub-contractors and delays

The problems that have been identified when it comes to using to using inexperienced sub-contractors vary, but all these problems are a contributing factor to delays in the construction program. Delays in the sub-contractor performance are found to be due to a lack of skills as well the failure to coordinate their works (Vimonsatit and Wong, 2012). Delays in construction are usually accountable for converting fruitful projects into bad or ailed projects. Issues around delays can be prevented by applying more effort into project planning and good project management as these criteria's are critical to the success factors of the construction project completion(*ibid*).

2.16.4 Time-overruns

This particular part which is time related, carries a lot of risk and so therefore flexibility in the critical activities is required to avoid delays (Taruna, Bhatt, Bhavsar, 2016). How the sub-contractor deals with the critical activities during the construction stage is important as this will either deliver the entire project on or off schedule (De Araujo, Mota, 2015). The flexibility available to a particular activity by which the schedule of the project can be affected needs to be taken care off (*ibid*). The sub-contractor must plan accordingly and accurately to prevent having to have delays in the critical stages of a project as failure to perform negatively impacts the relationship with the contractors.

2.16.5 Budget over-runs

The ability of a sub-contractor to finish a project within quoted cost is imperative. If sub-contractors fail to give the desired quality when as required, resources and operational costs increase and this would create disagreements and therefore affecting the relationship between the two parties (Talaware, Reddy, 2018). A sub-contractor needs to manage quality and costs, as well as manage their labour, material and machinery resources in co-ordination with project manager as planned.

One of the possible solutions to decrease costs of running a project in construction is the through recruiting good human resources, having material management systems within construction projects as it is viewed as the main reasons of cost overruns. Poor resource management really affects the relationship of main contractors and sub-contractors (Moore, Dagbui, Alijohan, 2017). furthermore,

good communication between the projects internal and external stakeholders is a vital task to delivering successful projects (*ibid*).

2.16.6 Inadequate workforce

Main-contractors also point out that sub-contractors tend to come with insufficient workforce to site, and this practice negatively affects the relationship between the contractors and it fuels conflict (Akintan and Moreledge, 2013). Sub-contractors often maintain that is due to their multi-job resource pressures from different construction sites, and sub-contractors have adopted the attitude of "the loudest (main contractor) gets sufficient resources today". This practice tends to leave them struggling to meet work programmes on sites resulting in delays (*ibid*).

2.16.7 Communication

The communication between a main-contractor and sub-contractor is very important and it very crucial that it remains proper throughout the duration of the project. The normal communication methods between the parties would often include face to face meetings, phone calls, emails etc (Hoezen, Reymen, Dewulf, 2006). If the communication amongst the two parties is disturbed, the parties may experience a project delay (*ibid*). Hoezen, Reymen and Dewulf (2006:2) state that "*The efficiency and effectiveness of the construction process strongly depend on the quality of communication*." Communication has been identified as a major problem between contractors and sub-contractors and it impacts on the time, quality and cost of the project (Adeyekun, 2019).

Construction projects that suffer from a lack in good communication reduce the ability to have an effective project plan (Robert, 2017). For an undisturbed exchange of information, a proper system of communication is essential as it can help to clear misunderstanding and allows stakeholders to receive feedback and properly understand the status of the project at any given time. Proper communication combined with co-ordination is vital in construction to avoid potential complications which may arise in the duration of a construction project (Langiman, 2017). Communication and good coordination drives many of the contract terms to acquire notice of claims and complete information on the cost and time impact at an early stage (*ibid*).

2.17 Factors affecting relationships between main-contractors and sub-contractors

Good relationships between main contractors and sub-contractor are necessary for smooth operations throughout a construction project. Reviewing the influences that impact the relationship of a main-contractor and a sub-contractor is important in the understanding of how different the entities work

together during a project. This also gives insight into how the process of sub-contractor selection is done.

Principle contractors should be incredibly cautious when they select the fitting sub-contractor based worker for a specific piece of the work or the whole undertaking and significant prerequisite for achievement in a contract based worker and sub-contractual worker relationship is trust (*ibid*). The level of trust and confidence increases with more successfully finished projects by sub-contractor while working under a particular main contractor and if the sub-contractor has been working for some years with main-contractor, the levels trust becomes better between main contractor and sub-contractors (Tawalare and Reddy, 2018). Furthermore, references from other contractors regarding quality of work carried out by sub-contractor can initiate the trust development (*ibid*). Other attributes that are considered in the selection of sub-contractors includes:

- Technical ability
- Ability to perform
- Financial resources (Marzouk, Kherbawy, Khalifa, 2013).

There are a number of factors that attribute to the understanding of the relationship between the main-contractor and sub-contractor which are described below:

2.17.1 Trust

Contractors mention that trust is key component to building a successful relationship with a sub-contractor are trust (Marzouk, Kherbawy, Khalifa, 2013). Trust is gained with the more projects completed successfully by sub-contractors under the specific principle and if the sub-contractor has been working for several years with main-contractor then trust develops between contractor and subcontractor (Tawalare and Reddy, 2018). Furthermore, reference from other contractor regarding quality of work carried out by subcontractor can initiate the trust development (*ibid*).

2.17.2 Planning

Accurate project planning of work provides a foundation, against which proactive control and re-active control can be carried out to guarantee on time completion of the work and good technical abilities of contractor (Talaware, Reddy, 2018). A contractor can plan or engage with sub-contractor for accurate planning of works especially if they have worked together on previous projects (*ibid*)

2.17.3 Cost management

The ability of a sub-contractor to finish the work within cost is critical to the success of the project. If sub-contractor does not handover work at the desired quality, time and budget, disputes arise and this effectively impacts the relationship between the contractors (Talaware, Reddy, 2018). To have good

quality and not overrun the budget, sub-contractors need to manage their resources, material and machinery in co-ordination with the main managers.

Main-contractors need to be extremely careful when they select the appropriate sub-contractor for some part of the works or the entire project and major requirement for success in a contractor and sub-contractor relationship is trust (*ibid*). Trust factor increases with the amount projects completed successfully by a sub-contractor under the particular main-contractor and if a sub-contractor has been working for several years with the main-contractor the level of trust develops between contractor and subcontractor. References from other contractors concerning quality of work carried out by a particular sub-contractor can initiate the trust development (Rajput, Agarwal, 2013). Realistic planning of the work provides a base, against which pro-active control and re-active control can be carried out to ensure timely completions of the work and technical capability of contractor (*ibid*).

2.17.4 Quality factors

Quality is among one the other factors that constitute to the selection of a sub-contractor as well as competence in the management of resources as failure to complete the project with the correct specification could essentially be costly (Ajayi, Ayanleye, Achi and Johnson, 2010). Quality has an essential role to play in governing the sub-contractor's reliability, therefore upsetting the relations between the principle contractor and sub-contractor (*ibid*). It is essential to verify the earlier work quality of sub-contractors. This is possible by referencing from old clients of sub-contractors as well as the sites previously completed can be visited by project manager before allotment of work. Similarly, ability of sub-contractor to complete the work within quoted cost is also important. The completion of work within cost is governed by how effectively a sub-contractor handle their resources and the resources provided by main-contractor effectively (Paaiso, 2011).

2.17.5 Time related factors

This particular part which is time related, carries a lot of risk and so therefore flexibility in the critical activities is required to avoid delays (Taruna, Bhatt, Bhavsar, 2016). How the sub-contractor deals with the critical activities whilst in the construction stage is imperative as this determines either deliver the entire project on or off schedule (De Araujo, Mota, 2015). Sub-contractor need plan accurately so as to avoid delays in critical activities as failure to do so will have a negative effect on the relationship of contractors.

Sub-contractors have an important role to play in the process of a procuring a part of the construction projects and with construction being complex in its nature, the selection of sub-contractors becomes an important as that will determine the rate of success of a project.

2.18 Increasing sub-contractor performance

2.18.1 Views by main-contractor

The principle contractor's human resources are those who are responsible for ensuring that productive work continues and they mostly focus on monitoring progress of production, cost controlling and quality controlling (Cheng, Wu, 2012). Most of them are not too sensitive to the cost implication in making decisions because they have the perception that it is the responsibility of the management to control the profit of a project and also normally, they do not have the relevant costing information in hand for making the judgement. So, their scoring pattern on the critical success factors will be a bit different with that of the site management (*ibid*). the views of the main contractor are listed below as: buildability; coordination; Incentive and feedback channel; Acceptance of new ideas.

Buildability: as a result of tight programmes in the industry, both sub-contractor and foremen need to work together carry out works with very little time to digest and understand the construction information. Designs that are easy to understand make for ease of buildability as the time for understanding and learning time is decreased therefore potentially improving quality as rework are reduced (Andrey, 2010). Buildability may be viewed as degree to which the design of buildings facilities eases of construction, subject to the overall requirement for the completed building.

Approval process: Incompletion of the approval process on the shop drawings and test reports are some of the excuses sub-contractors make for failing or delaying to initiate certain works. A clear image on the latest approval status can help the foreman to observe the work of a sub-contractor.

Acceptance of new ideas: With the introduction of the new construction methods, materials and management concept, sub-contractors have to upgrade their technical knowledge. Sometimes it may take a long time to explain the new construction methods to the sub-contractors as they are always reluctant to change (Jin, Feng, Hardie, Saha, 2009).

Incentives and feedback channels: Motivation plans at the principle contractor and management level has shown to be helpful to the production on a project, as well as reducing the projects budget and length. Once sub-contractors are exposed to motivation programs regularly, a company team image emerges instead of a visible division between the main-contractor's management and the sub-contractors work force. Furthermore, communication channels start to open and thus allowing regular feedback and two-way communications (Jin, Feng, Hardie, Saha, 2009). Using financial incentives in construction projects is key for bettering the built environment outcomes and, providing financial incentives are used with the aim of limiting contract costs and minimising the duration of the contract (*ibid*).

2.19 Chapter summary

The literature review gives a brief overview of the nature of the construction industry. The roles of the constructor sector are discussed as well the factors affecting the construction industry are investigated and explored. In gaining more knowledge to the study at hand, which is to understand the challenges that a main-contractor faces in working with inexperienced sub-contractors, the understanding of what a main-contractor in construction is and also an understanding of their responsibilities was necessary.

The study mainly enquires two main parties or entities, that being main-contractors and sub-contractors, and having uncovered the knowledge around main-contractors, information pertaining to sub-contractors was also investigated. This chapter further goes into detailing how sub-contractors are selected to taking part in a construction project and the study then discusses the issues main-contractors face when working with inexperienced sub-contractors.

Chapter two of the study provides an overall description of the challenges that principle contractors face when working with inexperienced sub-contractors. Chapter three of the study explains the methodology adopted for the study.

Chapter 3: Research Methodology

3.1 Introduction

This part of the study discusses the methods, procedures and tools that were used in the process of conducting the research is explained and hence this section therefore presents the philosophical point of the research, framework of the study, data collection and data analysis. The primary aim of this chapter is to outline the research methodology of the study. This chapter begins by explaining the brief overview of what research methodology is and thereafter details the processes that were followed in conducting the study. Data collection tools and data analysis methods are clearly detailed and laid out in this part of the study. The chapter concludes by discussing reliability, validity and ethics.

3.2 Research methodology overview

Research is described as a reasonable and methodical exploration for new and useful information regarding a specific topic (Rajaesekar, 2013). Research is also an enquiry of getting solutions to social and scientific problems through objective and systematic analysis (*ibid*). It is essentially the search for knowledge.

Methodology is something that is described as a systematic and theoretical analysis of various methods used on a particular field of study (Igwenagu, 2016). The methodology consists of the theoretical analysis of the techniques and principles associated with a branch of knowledge (*ibid*). The methodology often encompasses concepts such as paradigms, qualitative or quantitative techniques. Research methodology is essentially a theory of how an inquiry to information should proceed. It involves analysis of the assumptions, principles and procedures in a particular approach to inquiry (Kumar 2011).

Research design may be defined as a plan for a study, providing the overall framework for collecting data (Islamia, 2016). The design of the research determined what data is needed, which methods are going used to gather and analyse this data, and the data will answer the research questions (van Wyk, 2019).

The study hereby being investigated includes a detailed literature review which seeks to gather more information based on previous and existing knowledge. The literature review contains details on the challenges that main-contractors encounter when working with inexperienced sub-contractors, as well the challenges that sub-contractors deal with. This chapter looks at the method of approach that the researcher used to conduct the study.

3.3 Paradigms

To understand research paradigms is very important in a researcher's journey. Elshafie, (2013: 4), describes paradigms as *"the belief system or world view which impacts the researcher's choice of epistemology, ontology, and methodology of the research.* As researchers, it is essential to be able to comprehend and express beliefs about the nature of reality, what can be known about reality and how we this knowledge can be collected and assessed (Rehman, Alharthi, 2016). Perera (2018:4) states that "*a research paradigm is a set of beliefs and agreements that is common between scientist on how problems should be understood and addressed*". This is the way of perceiving knowledge, or thinking, or school of thought which informs the meaning of research data (Kivunja and Kuyini, 2017). Kivunia and Kuyini (2017:26) says "*that a research paradigm inherently reflects the researcher's beliefs about the world that s/he lives in and wants to live in. It constitutes the abstract beliefs and principles that shape how a researcher sees the world and how he/she interprets and acts within that world*".

A paradigm comprises of elements, namely, epistemology, ontology, methodology (Rehman, Alharthi, 2016).

1) **Epistemology**: epistemologists look to recognise the defining elements and components of knowledge, the theory of knowledge, the philosophical study of the nature, the origin and the scope of knowledge (Moser, 2013:12). Epistemology refers to the theory of knowledge (Stroll and Matinich, 2020).
2) **Ontology**: Researchers make and have assumptions of reality, what is known about it and how it exists (Rehman and Alharthi, 2013). Ontology is the branch of philosophy which is concerned with the assumptions that we make in to believe that something makes sense (Kuyini and Kivunja, 2017).
3) **Methodology**: this is theoretically informed approach to the production of information because it refers to the study and analysis of data analysis techniques (Rehman, 2016). This is the strategy that enlightens one's choice of research methods (*ibid*). It is mostly concerned with the how a research should be conducted and it guides the researchers to deciding the type of data that is needed for a study and what data collection tools are most suitable for the purpose of the study (Elshafie, 2013).

This research study made use of the pragmatism paradigm.

Pragmatism: is considered as a viewpoint of common sense as it focuses on human inquiry as the focal point. This investigation is seen as an on-going process that recognises the qualitative nature of human experience as problematic situations emerge and are recognised (Haack, 2009). Pragmatism is constructed on the idea that researchers must use methodological or philosophical approaches that work best for a particular research problem being investigated and it is usually connected with mixed-methods of research (Walsh, Christine, Kaushik, 2019).

The adopted philosophical approach for this research study was pragmatism, as it is a philosophy that is deemed to be appropriate for this study when considering the aims and objectives of the study. Pragmatism uses human inquiry which acknowledges the qualitative nature of human experiences and this philosophy therefore lies in line with the desired outcomes of the research and its application is appropriate considering the fact the method of data collection is mixed-method and the pragmatism philosophy is often associated with mixed-methods of data collection.

3.4 Research Methods

There common research methods are quantitative, qualitative, and mixed methods research, which are discussed below.

3.4.1 Quantitative research

Quantitative research method deals with quantifying and analysing variables to get results. It includes the utilisation and examination of numerical data using statistical techniques to answer questions like, *how many, how much, what, who where, when, and how* (Apuke, 2017: 17). Quantitative research is especially useful when carrying out a large-scale assessment or baseline surveys (Gentles, Charles, Ploeg, McKibbon, 2015). The benefit of this research approach is the use of statistical data as a tool for saving time and resources (*ibid*). Furthermore, the use of scientific methods for data collection and analysis make generalisation possible with this type of approach (Delice, 2002). The data collection tool normally associated with quantitative research is questionnaires (*ibid*).

3.4.2 Qualitative research

The definition of qualitative research is given by Rahman (2016) as any kind of research which produces findings not arrived at by statistical procedures. Qualitative research is concerned with getting to understand human experiences (Almalki, 2016). The core nature of qualitative research is it observes how people make sense of events from their real-life experiences in their minds and as well as in their words (Cropley, 2019). Qualitative research is grounded on the idea that reality is subjective. This kind of research is mostly about studying people's, behaviours, emotions, lived experiences, lives and feelings and it is also about, social movements, organisational functioning, cultural phenomena and relations between nations (Cropley, 2019). Qualitative researchers see the social world as being dynamic rather than being static (Delice, 2002). This kind of research method collect and gives data that is thick and well detailed with the participant's experiences, feelings and opinions (Gentles, Charles, Ploeg, McKibbon, 2015). Furthermore, in the process of collecting data, the researcher interacts with the participants physically while collecting information through interviews and through that, data collection is subjective and detailed (Rahman, 2016).

However, qualitative research has some limitations in its application. Some of these limitations include that qualitative research methods occasionally leave out contextual sensitivities, and emphases more on experiences and meaning (Almaki, 2016). Also, in terms of research methods, small sample sizes raise the issue of generalisation to the entire population of the research study. Rahman (2017:105) stated that "*because to the small sample size the study results do not wish to claim wider generalisation to other contexts*". The most common type of data collection associated with this type of research method is interviews.

3.4.3 Mixed method

Mixed method research is one which concentrates on gathering, studying, and mixing the qualitative and quantitative data into a single study (Bian, 2011). Its grounding is that using qualitative and quantitative approaches simultaneously, gives of better understanding of the research problems than either approach alone (*ibid*). Almalki (2016: 291) describes mixed methods research as "*empirical research that involves the collection and analysis of both qualitative and quantitative data*". Mixed methods research is an approach to knowledge that attempts to consider multiple viewpoints, perspectives, and standpoints (Baran, Jones, 2016).

This method was selected for this study because it produces two sets of data, where results can be explained on a deeper context (Doyle, Brady, Dublin, 2009). A mixed method approach in research should assist to reduce bias information being given by the researcher, and therefore allowing for documentation to be better analysed and measured (*ibid*).

This research study sought to get an in-depth understanding of the issues that a main-contractor faced when working with inexperienced sub-contractors, by making use of both quantitative and qualitative data known as mixed-method data collection tools. This research therefore used of both interviews and survey questionnaires. This was considered the appropriate method because acquiring data that is unbiased and detailed to a large extent, making use of a mixed method research style can improve the quality of the data collected.

Concurrent triangulation strategy was used to simultaneously analyse the two sets of data. Concurrent triangulation strategy was used in this study so as to avoid getting biased data and as a result two sets of data were collected (qualitative and quantitative) and the concurrent triangulation strategy allowed for the data to be analysed simultaneously.

3.5 Data collection method

Data collection is the procedure of collecting and computing data on variable of interest, in a methodical way which allows one to answer the research question, assess outcomes and test hypotheses (Kabir, 2016). The targeted goal collecting data is to record evidence which leads to acquiring rich data analysis and allows for the construction of an undoubted and reliable reply to questions posed during the data collection (*ibid*). The process of data collection is an important stage in conducting research.

3.5.1 Questionnaires

Surveys questionnaires are a traditional way of doing research. They are predominantly useful for non-experimental descriptive designs that seek to describe reality (Mathers, Fox, Hun, 2007). A questionnaire is an established tool in the social sciences research platform for obtaining data on

participant's social characteristics, present and past behaviour, attitude and their belief and reasons for action relevant to the topic being explored (Bird, 2009).

A questionnaire is just a list of questions that are completed for a respondent to give their opinion. Furthermore, a questionnaire is the main avenue of collecting quantitative primary data. Questionnaires enable quantitative data to be collected in a standardised way so that the data are internally consistent and coherent for analysis (Rani, 2017). Questionnaires are made use of in the cases where resources are limited and as a questionnaire are inexpensive to create and control, the questionnaire saves time and protects the privacy of participants as participants tend to answer truthfully if their identity is concealed (*ibid*).

A common struggle with questionnaire design is that the respondents usually misunderstand questions and this difficulty has been recognised within the literature (Hilton, 2015). Questionnaires are kept consistent and so it not possible to explain any points in the questions that participants might misinterpret (Mathers, Fox, Hunn, 2009). This research study made use of questionnaires to gather quantitative data of the research as attached in Appendix B.

3.5.2 Interviews

Interviews are considered as an organised way of talking and listening to people and they can therefore be considered as another way of collecting data from individuals through conversation (Coughlan, 2009). Interviews are a tool that can be used to provide data that is rich and detailed as it provides flexibility to enquire into the topic of study and therefore acquire more data (*ibid*). The three major categories of interviews include:

1) **Structured interviews:** these types of interviews utilise an interview schedule that has structured questions which do not give room for drifting away from the topic at hand (Abawi, 2013). Structured interviews are based on the assumption that questions are not ambiguous in any manner and therefore it is clearly understandable to the interviewee (*ibid*).
2) **Semi-structured interviews:** this interview is one which is slightly different from the above in the sense that they are more flexible when compared to structured interviews (Coughlan, 2009). Even though they make use of an interview schedule, they allow for unanticipated responses to emerge (*ibid*).
3) **Unstructured interviews:** Unstructured interviews, sometimes referred to as open-ended interviews are methods that provide the most degree of flexibility and freedom on both interviewer and interviewee (Coughlan, 2009). This research method of data collection is more casual as compared to that mentioned above, as it has no need to follow a detailed interview guide. The interviewees are advised to speak freely and provide as much detail as possible.

Semi-structured interviews were used for this research. The guideline is attached in appendix B.

3.6 Sampling and population

Sampling has a highly significant role in any research study and careful attention needs to be put on who is included as participants in the design process (Mujere, 2016). A sample is group of objects or items and people, that are taken from a big population for a measurement and as a rule, the sample should be representative of the population to guarantee that one could generalise the findings from the research sample to the population as a whole (*ibid*). The purpose of sampling in research is to find representative samples to avoid bias (Phrasisombath, 2009).

Sampling methods are described as a technique, which a researcher uses to collect data (Phrasisombath, 2009). There are two main types of sampling methods which include:

1) **Probability sampling**: this type of sampling is generally accepted as the most accurate type of sampling; however, it is unsuitable for qualitative research (Taherdoost, 2016). Probability sampling essentially mean that each element in the population has an equivalent probability of being selected in a sample (*ibid*). this type of sampling has the greatest freedom from obtaining bias data but may also present the most expensive sample with regards to time (Taherdoost, 2016). Probability samples are inclusive of the following techniques:
   - Simple random sampling essentially means that every case of the population has an equal chance of inclusion in the sample (Taherdoost, 2016).
   - Stratified random sampling is when a population is separated into subgroups called strata's and a sample is randomly selected from each group. The subgroup is a natural set of items which could be built on gender, occupation, company size *etc.* and this kind of sampling is used when there are a lot of differences in a population (*ibid*).
   - Cluster sampling is a type of sampling whereby the entire population is put into separate groups and subsequently, a random sample is chosen from this sample (Shen, 2014). This type of sampling is especially useful to the type of research that can be said to be fragmented over a large geographical area.

2) **Non-probability sampling:** Non probability sampling is frequently related with qualitative research and case study research design (Phrasisombath, 2009). Non-probability sampling focuses on smaller samples and they are made to observe real life phenomena (*ibid*). This sampling technique utilises non-randomised methods to obtain the sample. As an alternative to randomisation, participants are chosen because of their ease of access. (Showkat and Parveen, 2017). Non-probability sampling is inclusive of the following techniques:

- **Quota sampling:** which is a method whereby participants are selected on the foundation of predetermined characteristics so that the total sample has the same distribution of characteristics as the wider population (Taderhoost, 2017).
- **Convenience sampling**: is a method where participants are selected because they are usually readily available. otherwise, this type of sampling tends to be a preferred type sampling method with students because it is cheap to run and it is a simpler option as compared to other methods of sampling (*ibid*).
- **Purposive sampling**: sometimes referred to as judgemental sampling is an approach whereby particular persons, setting or events are deliberately chosen in order to provide significant info that would not be obtainable from other choices. It is where the researcher includes participants in the sample as they believe that they would be suitable for inclusion (Etikan, Bala, 2017).

3.6.1 Sampling size for qualitative data

The aim of qualitative research approaches is to search for meaning, and answer the "how and why" question (Gentles, Charles, Ploeg, Mckibbon, 2015). Therefore, it is really about developing detail and thick data based on understanding. The methodology of qualitative research includes going through the sample until no new information is collectable and this is called the point of saturation (AgeUK, 2017). When qualitative methods of research are applied suitably, a small but diverse sample of people or situations will be adequate get to this point (*ibid*). It is possible to gather data from the entire population for a particular study within a stipulated time and this requires the researcher to select a sample as this saves time and is considered as the best option when the researcher is pressed for time (Kadan, 2016). The goal of sampling is to allow for practical means in which the data collection process can be carried out so as to achieve a good representation of the sampled population (*ibid*).

Qualitative research reaches its conclusion without using calculation and numbers are influenced by resources accessible and when saturation has been reached. A sample size is required to be large enough to sufficiently discuss and describe the phenomenon being investigated, and also address the research question (Gentles, 2015). However, large sample sizes risk having monotonous data (*ibid*). The aim for qualitative research should be the attaining saturation (*ibid*). According to Sim, Saunders Waterfield, Kingstone, (2018) a small sample size of 10 to no more than 30 participants is required.

3.6.2 Sampling size for quantitative data

The sample size should constitute a true demonstration of the target population. A list of contractors registered on the Master Builder Association of South Africa under general builders for the provinces of Western Cape indicated a number of 4 registered contractors, and KwaZulu-Natal indicating a total 177 registered contractors under residential and commercial buildings. A important objective in any

approximation problem is to get an estimator of a population parameter which will take care of the noticeable features of the population.

Breakdown of number of registered contractors

Table 3.1: table showing the number of registered contractors

Province	Number of Registered contractors
KwaZulu-Natal	177
Western Cape	44
Total	221

In order to determine the sample size for the population for following formulae was used (Kadan, 2016)

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{221}{1 + 221(0.05)^2}$$

$$n = 142$$

Where: n = sample size, N = population size and e = level of precision.

with a ±5% Precision Level (e = ±5%), the Confidence Level is 95%, the calculated sample size for this study is approximately **142**.

The table below shows the number of registered general building contractors in Durban and Cape Town. A hundred and seventy-seven (177) general building contractors are registered in Durban and when the value N value is used in the formula above, the required sample for the KwaZulu-Natal province is 122 and 40 for Cape Town.

Table 3.2: table showing the sampling of the study

Province	Number of registered general building contractors	Required sample
KwaZulu-Natal	177	122
Cape town	44	40
Total	221	162

The table above shows the number of participants required to take part in the quantitative part of the study.

3.6.3 Qualitative sampling method used

For this research study, the purposive sampling method was employed for the qualitative data. Purposive sampling is a strategy whereby specific participants or events are purposely chosen to provide significant data that cannot be obtainable from other sources (Taherdoost, 2016). This is when the investigator includes participants in the sample because they believe they need to be included (*ibid*). Eight interviews were conducted with participants from both main-contractors and sub-contractors. The selection of the participants for this research was from contracts managers, site agents, quantity surveyors and production foremen. The participants invited to take part in the study were selected on the basis that they are most knowledgeable to give accurate data as their duties involves working with inexperienced sub-contractors from a contractual, costing and production point of view and as a result, they are to provide rich data into what the challenges involved in working with inexperienced sub-contractors. The qualitative data was collected over a period of six weeks. The study was conducted with participants from the two major Metro's in South Africa, Durban and Cape Town. The selection of these Metro's was based on the researcher having made contact with the participants previously as well referrals obtained from the participants while conducting the study. The participants were invited to take part in the study and upon their approval, data was collected. The qualitative data was collected by means of a semi-structured interview. The participants of this were notified through email as well as phone call. Upon the approval of participant, the set research questions were posed to the interviewee. In the process of the interview, the researcher made note of the interviewees answers and thereafter compiled them for the data analysis. eight participants were interviewed in total, with four of the participants coming from in Cape Town and the remaining four of the participants were from Durban.

3.6.4 Quantitative sampling method used

In collecting quantitative data, the researcher also made us use of stratified sampling,

Kadan (2016: 58) advises that questionnaires should only be ready for administration when it has undergone pre-testing. After the questions were prepared and arranged, a pilot trial of the questionnaire was done on the researcher‘s fellow graduate students to check the precision, consistency and relevance of the questions asked. Thereafter, the necessary alterations were made to streamline final version in accordance with the objectives of the study prior to formal administration of the questionnaire. For the quantitative data, the researcher notified the required participants and requested that they take part in completing the survey questionnaire. Upon the approval of this, the researcher issued an electronic link created through Google forms and thereafter the questionnaires were distributed through email to the relevant participants selected for this study.

The level of management required for this part of the data collection included, contract managers, production managers, site agents, foreman's (senior and junior), quantity surveyors. Furthermore, participants were obtainable through using the human resource department of companies to issue out

the survey questionnaire to the different branches of the organisation's offices and sites in the different provinces of South Africa, namely; KwaZulu-Natal and Western Cape. Again, these sample was selected based on these participants interact with sub-contractors that are considered to be inexperienced or emerging and therefore, they would be able to provide the data that is accurate and is based on their real-life experiences working with sub-contractors. A total of 162 survey questionnaires were issued out to participants online and a total of 70 responses were collected for the quantitative data collection. The response rate of the participants that completed the survey questionnaire is given the table below.

The table below shows response rate of the participants from the different provinces.

Table 3.3: table showing the response rate from the different provinces

Province	**Responses**
KwaZulu-Natal	41
Western cape	29
Total	70

The researcher understood the required sample was a total of 162 participants however, due to the current circumstances at the time of the data collection, the data collection was largely limited due to the global pandemic Corona-virus (Covid-19), and the national lock down that was imposed.

3.7 Data Analysis

Data analysis is defined as the procedure of putting order, structure, as well as meaning to the entire data that has been collected by the researcher (Kawulich, 2004). It may also be viewed as being an activity of making sense, of interpreting, and theorising data that signifies a search for general testimonials among categories of data (*ibid*). The purpose of carrying out a data analysis process is to allow the researcher to get useful information.

The data from the survey questionnaire was collected, compiled and analysed. In analysing the quantitative data, the researcher used the statistical package for the social sciences (SPSS V27). SPSS (V27) is a package of programmes that is used for manipulating, analysing and presenting data (Paura, Arhipova, 2015).

The qualitative data for this research was performed through semi-structured interviews. Qualitative data analysis is described as being the classification as well as the interpretation of linguistic material to make statements about implicit and explicit dimensions and structures of meaning-making in the material and what is represented in it (Flick, 2013). The aim of qualitative data analysis is to be able to

describe a phenomenon of some sort in great detail (*ibid*). NVivo (12) is a type of qualitative analysis and it is used to analyse classifications and presents themes that relate to the data (Lakeman, 2009).

NVivo (12) is data analysis software which uses software produced by QSR International. It is intended to capture qualitative data and it works with text-based multimedia information, where profound levels of analysis on large and small amounts of data (Zamawe, 2015). This software, is especially analysing data that had been collected through interviews text, (but not limited to) interviews, surveys, journal articles (*ibid*). Therefore, this software was most appropriate for the study.

3.8 Ethical consideration

Ethical issues are very significant matters in the primary research and also in secondary data sets because there are ethical issues relating to fair and unbiased selection of sources and analyses (Rahman, 2016). Below are the set of ethical issues that have been considered:

- The researcher applied for and was granted ethical permission through the University of KwaZulu-Natal Ethical Clearance Committee (attached in appendix A).
- The researcher promised to keep confidentiality and anonymity of the participants when they participated by showing no names of individuals.
- Participants were given the chance to refuse/decline to anything that might be provocative to them.
- The participation was voluntarily and no award was given to the participants for their participation in the study.
- The participants will be kept up to date regarding their participation in the study and as well the intentions of the study. Participants will be given a form of consent for the participation in the study.

3.9 Reliability and validity

3.9.1 Reliability

The term reliability in research is a term which defines the extent to which the data collection methods would produce reliable answers so as to determine the validity of the data collection instruments used (Kadan, 2016). The method often utilised to test reliability is the Cronbach's alpha coefficient. This study made use of the Cronbach's alpha coefficient which provided internal consistency among the variables. According to Kadan (2016:64). Cronbach's alpha coefficient is the most popular or rather most common measure of reliability in research. Drost, (2011:107) stated that a reliability of 0.7 or above is deemed acceptable.

3.9.2 Validity

Validity on the other hand, addresses the credibility of a research's findings (Ghazali, 2016). Validity essentially refers to the extent to which the functioning measures essentially reflect the variables they are set out to measure (*ibid*). This is accomplished by the presenting the chronological proof of events that occasioned the formulation of the research questions and objectives, through the realisation of the research data to the achieving the objectives. A detailed and vigorous research design was adopted to certify that the anticipated variables were measured.

The design of research the tools and the data assembled by means of research instruments, conglomerate to form the basis for concluding on the validity of research instruments. For the purpose of this study, the construct validity was used. According to Ghazali, (2016:149) construct validity refers to the extent to which the functioning measures essentially reflect the variables they are set out to measure.

Validity and reliability are important features of all research. Careful consideration to these aspects has the potential to make the difference between a good research and a poor research and can help to ensure that fellow scientists accept findings as credible and trustworthy. This is mostly vital in qualitative work, where the researcher's subjectivity can cloud the interpretation of the data, and where research findings are often questioned or viewed with scepticism by the scientific community (Bapir, 2012). A good qualitative study can help us to "comprehend a situation that would otherwise be confusing.

In conducting the qualitative study, two questions were put forward by the researcher:

1) What techniques were used to ensure the integrity and accuracy of findings?
2) What does the researcher bring to the study in terms of experience and qualifications?

These two questions are used for the credibility (validity and reliability) of the qualitative research (Tanveer, 2008).

In answering the credibility questions, the researcher made use of a semi-structured interview to gather qualitative data. The interviews were conducted with the relevant participants and each interview ran for duration of approximately 20 minutes. This ensured that the researcher collected rich data from the participants and thereby ensuring the credibility of the study.

3.10 Concurrent triangulation strategy

The mixed method research that was used for this research study was referred to as the concurrent triangulation strategy (CTS). The concurrent triangulation strategy is one which the investigator combines qualitative and quantitative research styles, tactics and ideas into a solitary single investigation (Wium, Louw, 2018). With CTS data is collected simultaneously and thereafter the

collected data was compared, making it possible to identify the differences and similarities in the two collected data sets (Saxe, Kadushin, Sasson, 2009). The purpose of making use of this study is to maximise validity and to reduce obtaining biased data from a single data set. The option of collecting two sets of data allows for more information to be explored and therefore maximising data collection.

What distinguishes the CTS is that it must have two data sets in the form of qualitative data and quantitative data (Almedia, 2018). Furthermore, the priority of the data collection approach is treated equally. The concurrent triangulation strategy essentially integrates the two data sets during the data analysis (*ibid*). The figure below illustrates the flow chart of the concurrent triangulation strategy.

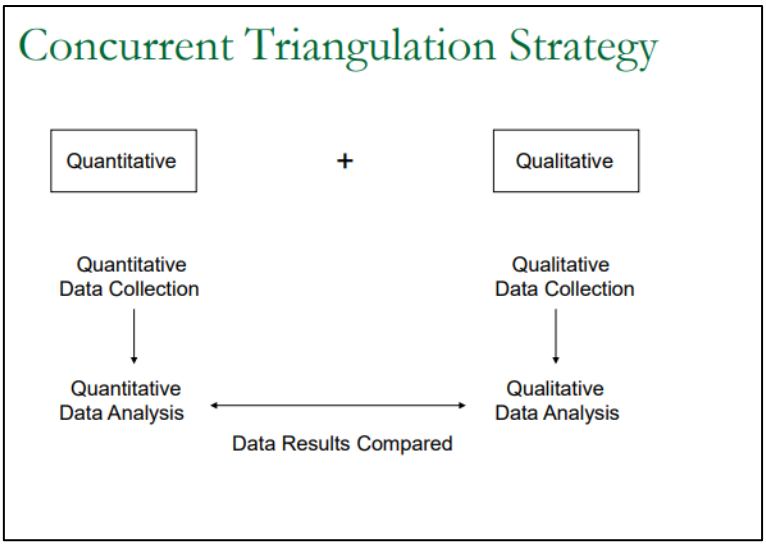

Figure 2: diagram illustrating the concurrent triangulation strategy (Terell, 2012: 267)

Using mixed methods, makes it possible to overcome the limitations of qualitative and quantitative methodologies, which allows the investigator to obtain thick data that would not be obtained using each method individually (Almedia, 2018). Triangulation permits one to recognise aspects of a phenomenon more precisely by approaching it from different angles and using different methods and techniques. Successful triangulation requires careful analysis of the type of information provided by each method, including its strengths and weaknesses (Terrell, 2012).

3.11 Chapter summary

Chapter three describes the processes taken in conducting this research study. This chapter initially starts off describing paradigms, the research methodology as well as the methods used for data collection. This study made use of a concurrent triangulation system of data collection. This is essentially a combination of quantitative and qualitative data collection tools. The survey questionnaire and interviews were used. Finally, this chapter concludes by discussing

ethics and the reliability and validity of the research study. The next chapter discusses the research model.

Chapter 4: Model for the improvement of emerging sub-contractor performance

4.1 Introduction

The goal of this chapter is to present a model to discuss and illustrate the proposed method that will be used to identify the issue main-contractors face when working with inexperienced sub-contractors.

4.2 Model

The term "model" basically describes an organisation of conditions and functions that yield recognised results, like classes of equilibria within the model (Goldfarb and Ratner, 2008:92). A model needs to have the follwing features in it, and it being:

1) A mapping feature,
2) A reduction feature- A model that reflects a relevant selection of the original's properties.
3) A practical feature- A model must to be usable in place of the original with respect to some purpose (Kuhne, 2004).

The construction industry renders a vital part in the economic growth of developing countries such as South Africa (Olukemi, Windapo, Cattel, 2013). This is also perceived through the building of infrastructure which is needed for expansion and growth of the economy, productivity of construction and the general well-being of the citisens (*ibid*). The growth of any economy is measured by the how much physical infrastructure is produced and so the construction industry has a potential to close the inequality gap in the country by generating employment and opportunities for jobs to skilled, semi-skilled and unskilled work force (Soils, 2008). The construction industry is widely varying, complex, and many factors influencing its projects outcome and that is why a specialised person are is required to carry such tasks. A construction contractor is an entity/organisation that is generally employed to

undertake works directly and oversee the overall project (Lidelow and Simu, 2015). A contractor is a permanent organisation designed to organise and manage projects (*ibid*).

Main-contractors are hired and made responsible for organising and managing the construction projects and in doing that, main-contractors utilise other entities called sub-contractors. Main-contractors request the services of sub-contractors to attain project objectives, including cost reductions, getting access to specialised services, and sharing risk (Choundry, 2012).

Sub-contractors are specialist in the execution of a specific job, they act as an agent of the production system of the main-contractor company in supplying materials, manpower, equipment, tools or designs (Yoke-Lian, Hassim, Muniandy, 2012). In most construction projects, a vital role is played by sub-contractors who are hired to perform specific tasks on a project (*ibid*). According to the CIDB (2018:1), "*sub-contracting is very prevalent in the South African construction industry, with up to 70% of building and 30% of civil construction projects subcontracted out*".

Through sub-contracting, the risks of the main-contractor are lessened as errors in estimating and or additional costs caused by delays or extra labour requirements can be absorbed by the sub-contractor (Thoams, 2003). However, despite all these benefits, the quality of work can suffer when incapable or inexperienced sub-contractors are employed (*ibid*). The relationship between the general contractor and subcontractors is one of the keys to any successful construction project (Enshassi, 2014). However, limited information is available on the actual working relationship that exists amongst principle contractors and emerging sub-contractors (*ibid*).

4.3 Conceptual model

4.3.1 Model framework to improve sub-contractor performance

Taking a structured approach to model development of the challenges main-contractors encounter when working with inexperienced sub-contractors, all the attributes that lead to the development of the problems were identified in the model in Figure 3.

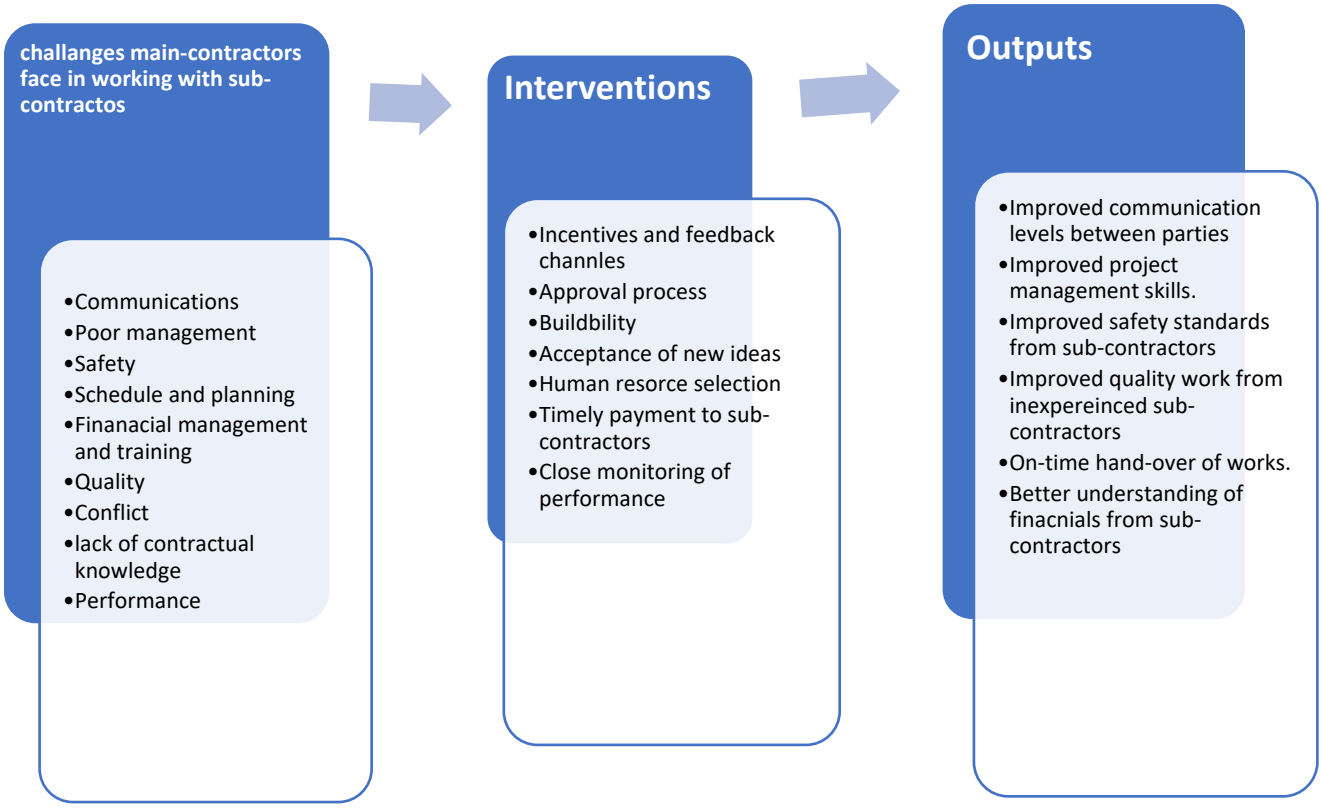

Figure 3: figure illustrating the conceptual model of the research study.

The major factors as identified through previous literature shows that the challenges main-contractors encounter when working with inexperienced sub-contractors include:

4.3.2 Communication

Respectable levels of communication will improve team work and lead to better project cooperation. Deprived communication can result in misinterpretations and delays. Communication is the exchanging of information to convey a message and good communication includes being able to convey a message so it is received and understood by the recipient (Adeykun, 2009). An operative system of communication system is necessary as it clears confusions. Decent communication followed with proper coordination is critical in construction to avoid any possible problems that may arise in any construction project (*ibid*). Problems of communication can bring inefficiencies such as improper planning and scheduling and absence of an appropriate information update system and that can ultimately bring about project failure (Gustaveo and Nicholas, 2009).

4.3.3 Poor management

According to Khalid (2019:4) "*construction delays and duration issues are frequently responsible of transforming productive ventures into loosing projects and these delays can be reduced by an increased pre- project planning and successful project management as they are one of the most critical success*

factors of the construction project accomplishment". The principle contractor's performance is highly dependent on sub-contractors. This is further reinforced by the statement which says "*that the capability of the main contractor and consultant to deliver the project within time, quality and cost largely depends on performance of subcontractors*" (Fabenie, Joshua, Adedeji, Ojelabi, 2018). Many researchers have found that the absence of proper communication systems in planning of construction projects makes for the failure to prepare tasks in a well organised and this deeply affect the performance of projects (Sweis, 2014).

4.3.4 Safety

Construction is among one of the world's most *hazardous* industry's (Muiruri and Mulinge, 2014:11) where fatal and non-fatal work-related injuries regularly as compared to other industries and this is caused by a lot of reasons such a: having high quantities of unskilled and temporary workers, complicated contractor system with big amount of sub-contractors, non-attendance to safety management system especially in small construction companies (Enshassi, Choundry, Mayer, Shoman, 2008). With higher numbers of sub-contracting companies on a site, the chances of accidents occurring become more frequent and so safety is therefore regarded as an essential concern to main-contractors as injuries and fatalities directly affect the project (*ibid*). Main contractors mention that working with sub-contractors puts on a lot of responsibility with regards to safety and it is even more critical when they lack proper experience of the industry.

4.3.5 Scheduling and planning

Planning includes the type of activities involved and how to perform those activities, while scheduling emphases on when the activities take place and who will be in charge (Winter, 2011). The purpose of planning is to safeguard a smooth project flow (*ibid*). Scheduling and planning started with the the architect, and later expands with the principle, the sub-contractor and the material suppliers. Co-ordination between the team is vital in conducting all these activities. Good construction planning and scheduling does not guarantee the success of the project however, it can be a good guideline for everyone (Masood, 2015). Poor project scheduling can also cause a conflict between the main contractor and the sub-contractor during the duration of the project. In a construction project, a delay is essentially a project slipping behind the planned schedule date (Winter, 2011). Faulty planning introduces many possibilities for failure of project and to the client/owner because delays stands for loss of revenue (in terms of lack of production facilities and space available for rent and/or reliance on present facilities). In most cases, delays are unfavourable for the contractor as well (Masood, 2015).

4.3.6 Financial management and training

Financial management is the use of a company's financial resources (Thomas, 2003). This includes the use of cash and other assets— such as equipment. Management of cash flows is of crucial importance

for contractors and sub-contractors as the difference between insolvency and survival could depend on how the company handles the movement of money in and out of the firm (Gundes and Atakul, 2019). Furthermore, it is stated that the key reason sub-contractors struggle financially is because main-contractors do not normally release payments promptly and this effectively causes conflict and project delays (Thomas, 2003).

4.3.7 Quality/technical competence

The selection of a sub-contractor for construction projects is anchored in the ability of the contractor to exhibit a set of skills. These set of skills may be defined as measurable attributes of the contractor (Ajayi,Ayankunle, Achi, 2010). Reviewing these set of skills may be viewed as the evaluation process that tend to unveil the competence of a contractor to deliver a quality project (*ibid*). Quality is described as meeting the aesthetic, functional requirements and legal requirements of a project (Arditi and (Gunaydin, 1997). The requirements vary, or they may be stated in terms of the end result required or as a detailed description of what is to be done, however expressed, quality is obtained if the stated requirements are adequate, and if the completed project conforms to the requirements (*ibid*). Quality of projects is the traditional and global measure of the performance of a project. The construction industry, similar any other production industry is faces difficulties that affect optimal performance and output of the endeavour. Recognising potential critical factors that affect the quality performance of small-scale contractors before the beginning of projects will guarantee client fulfilment at the completion of project (Oke, Aigbavboa, Dlamini, 2017).

The potential factors that affect quality performance identified among many other factors is the lack of experience sub-contractors (Oke, Aigbavboa, Dlamini, 2017). The failure of a sub-contractors creates unfavourable situations as this creates negative time and cost implications for the overall project (*ibid*). Increased sub-contractor performance with respects to quality is seen an indication of competence (Ismail, 2014).

4.3.8 Conflict

Conflict between a main contractor and sub-contractor can come as a result of numerous factors such as; conflicts and scheduling between the principle contractor and the sub-contractor due to non-adherence of the sub-contractor to the time schedule, limited experience of the sub-contractor in similar projects, scarcity in skilled labour with the sub-contractor and poor-quality work by the sub-contractor. (Mahamid, 2017). Emerging/inexperienced are contractors that are not fully familiar with working towards a construction program and therefore, they would often end up dragging the duration to complete a certain task (*ibid*).

4.3.9 Lack of contractual knowledge

Non-adherence of the sub-contractor to the conditions of the contract is another problem that main contractors tend to take as an insult as there was an agreement entered too (Oke, Aigbavboa, Dlamini, 2017). Jaffer, Abdul, Tharim and Shuib (2011:195) in their study revealed that the, amongst the main sources of construction disputes it is errors, defects and omissions in the contract documents which often create conflict between parties (Jaffer, Abdul, Tharim and Shuib, 2011). However, the large root causes of conflicts that are contractual problems and technical problems due to uncertainty and low experience from contractors (Mahamid, 2017).

4.3.10 Performance

The definition of a small-scale contractor/emerging/inexperienced contractor varies from country to country (Pupsari, 2005). However, the term small-scale or emerging contractor may be defined as one with limited capital investment, who may need financial and managerial support to effectively run his or her business (Kululanga, Morton, 2015).

The construction industry is dominated by small- and medium-scale contractors (SMCs) who face an emerging trend of unique challenges in the implementation of projects. Generally, SMCs tend to focus on quick fix solutions and such measures most often address symptoms of their performance challenges (Kululanga, Morton, 2015). The consequences of addressing symptoms have led some construction industries of developing countries into vicious cycles of undesirable level of quality of service and products (*ibid*).

4.4 Interventions

4.4.1 Incentives and feedback channels

Motivational theories have been recognised and used over 50 years and have been recognised as being one of the first to propose the theory of human motivation (Jin, Feng, Hardie, Saha, 2013). It is here where management of the main-contractor get the chance to encourage greater productivity in employees and sub-contractors, by providing extra motivation. In construction. The use of financial rewards in construction projects is perceived as a key to improving built environment outcomes.

4.4.2 Approval process

A site office is established on site to effectively support the needs of the subcontractors. Drawing get issued to sub-contractors from site office and are communicated to by main contractor to emerging sub-contractor. The sub-contractor is often issued with a checklist that require to be signed by both main contractor and sub-contractor to ensure that all the desired quality is achieved (Mirawati, Othman, Risywati, 2015). This approval is made to ensure that all standard procedures are conformed too and

effective channels of communications will be clearly defined and established to reduce any confusions (*ibid*).

4.4.3 Buildability

Through recognising the important characteristics of design, the intellectual concept of buildability can be conveyed in a distinct and tangible way for its improvements and execution for contractors and thus enabling design requirements to be easily coordinated and visualised by site staff (Wong, Lam, Chan, Wong, 2011). This will enable inexperienced and emerging contractor to adopt another construction details (*ibid*). In simple terms, buildability is mainly made within the design stage.

4.4.4 Human resource selection

Construction projects are encounter numerous problems on a day to day basis in their business and some of the difficulties that is taken into consideration is human resource management in the emergence of small-scale inexperienced sub-contractors (Othman, Idrus, Napiah, 2012). Although construction makes use of manpower more in its business activities as compared to other fields, its human resource management is still inadequate. The problem with human resource management in the construction of a sustainable development project needs to be identified and methods for improvement need to be formulated for the success of the project and business.

4.4.5 Timely payments

Compensation to contactors or absence of it is a common reason for disputes in the construction industry (Amoako, 2011). Timeliness of payments affects sub-contractors, and getting delayed payments from their employers creates friction between the two parties (*ibid*). Sub-contractors are frequently paid late by main contractors because of pay-when-paid and pay-if-paid clauses in most contract agreements. The consequences of the of having sub-contractors being paid late are grave (Amoako, 2011). Payment, from a sub-contractor's viewpoint, is the most important aspect of any construction project (Hussin and Omran, 2009).

Advance or timely payments can help the sub-contractor to solve financing problem during commencement of constructions work, ease the financial burdens of the contractor, help the contractor to face the difficulty of special mobilisation of project and the smaller size contractor firm or the newer able to competitive with the mature contractor firm (Hussin and Omran, 2009).

4.4.6 Monitoring

The contractor needs to develop and implement a complaints procedure and ensure that sub-contractors also implement complaint procedures in order to resolve dissatisfaction of services by the client

(Maturana, Alarcon, Vrsalovic, 2004). A complaint procedure will address the quality issues, timeliness of services, and direct service worker complaints (*ibid*).

The importance of communication is crucial in any construction project and it also calls for the collaboration with the sub-contractor: "*The performance of specialist sub-contractors is critical in the success of our organisation and if support is increased, then the product quality and service quality will be measurably superior*" according to Maturana *et., al* (2004:11) and it will also reduce conflict. Therefore, sub-contractor on-site management needs constant instances for dialogue, where assessments of works can be discussed. Dialogue.

4.5 Outputs

4.5.1 Communication

Communication escalates the performance in a project. Balanced flow of information amid main principle contractors and sub-contractors is essential for a smooth implementation of the project activities and it results in improved team spirit, improved co-operation, makes for lesser claims and litigation and fewer disputes (Tawalare aand Reddy, 2018). The practice of "partnering" or communicating effectively has been identified as one of the most effective methods for allowing communication among project teams, furthermore, partnering makes for cooperative communication and mutually resolves conflicts at the lowest possible management level (*ibid*).

4.5.2 Management

Timely hand over of project deliverables, and within cost was the main concern for project managers and construction team. Organisation can benefit from using decent management frameworks or by increasing the efficiency of human effort in the organisation and especially so for smaller organisations (Badewi, 2016). With improved managed from an organisation, project success is acquired as the management team is more efficient (*ibid*). The main causes of project success are effective project control structure (Bawedi, 2016).

4.5.3 Quality

The performance of a contractor is responsible for either a successful project which replicates strong contractor skills and management or a failure that reflects the contractor's lack of experience and poor communication and management skills among the workers (Harif, 2010). An improved sub-contractor performance leads to an improved quality project, and thus the main-contractor is able to give the client satisfaction, which in turn creates a reputation for the contractor (*ibid*). With design that is simple and effective, buildability in emerging and inexperienced sub-contractors will see contractors improve on their quality performance in a work trade.

4.5.4 Health and safety

A study conducted by Strukova (2013:17) says that health and safety in small firms are supported by larger construction firms and established that on large projects sub-contractor's safety is influenced by the quality of the planning and coo-ordination efforts of the main-contractor and the degree of emphasis placed on safety by the main-contractor.

The tendency in recent years has been towards main-contractor's responsibility for the sub-contractor's performance in ensuring overall project safety (Enshassi, Choundry, Mayer, Shoman, 2008). The reasoning for this trend is that, on typical construction projects, it is important that safety be consistently emphasised by all contractors on the site and that the same safety and health policies and procedures are enforced across the site and with more emphasis on safety inexperienced sub-contractors will work under safer conditions. Sub-contractors will work safely with closer monitoring and safety awareness (*ibid*). Productivity thomas and Wan, (2012:305) state that industry reports have pointed out that a decline in construction quality and productivity could be attributed to the performance of sub-contractors who are entrusted to complete majority of the actual work.

4.5.5 On schedule project hand-over

Activities of handover may vary in accordance with the contractual arrangements and the specific project. Handover may be gradually staged (during project delivery), with each phase following the completion of an approved level of partial building works as stated in the construal document. Activities of handover can be grouped into the following stages:

- Pre-handover activities (including commissioning);
- Post-handover activities
- Practical completion;
- Final completion; Project close activities

Project success is measured in various methods by stakeholders and professionals of the built environment. Some professionals consider quality time and cost as the major targets, while other suggest that success is more complex than that (Chan, 2009). The research model interventions provide the opportunity of on-time project hand-over/delivery to be a more common output on construction projects.

4.5.6 Financial stability improvement

Crisis scenarios favour unprincipled behaviours in managers of the and mostly with main contractors. This is done for their own benefit, and sometimes they enforce conditions using their bargaining power and encourage market malpractices, e.g. contractors could finance projects based on deferred payments

of sub-contractors (Haito, Jinmenez, Cardooso and Pellicer, 2014): this then often creates an unfavourable condition for banks to lend out money to subcontractors for them finance our operation as subcontractors (*ibid*). Haito, Jinmenez, Cardooso and Pellicer (2014: 44) stated that "*being able to acquire credit is a key factor from the moment that sub-contractors must needs to pay for materials in advance, equipment and manpower and send manpower to site. Their period of recovrery is much longer than their payment period, especially since the workers' wages are paid within 30 days).* By assuming the additional financial cost, sub-contractors need additional financial support (Mohamed, Ahmed, Kherbawy and Khalifa, 2013). The problem is more serious when banks restrict their credit policies. Any dysfunction in the capital market may be amplified and subcontractors feel it deeply (*ibid*). With these interventions of the model of timely payments made to sub-contractors, inexperienced/emerging sub-contractors stand to improve their financial standing and be able to improve on their performance as the huge financial burden may be taken off.

4.6 Chapter summary

Chapter four of the research is the model chapter. This chapter begins by introducing the concept of what a model is and thereafter shows a diagram of the conceptual model of this research study. The model is then discussed in details by looking at all the components of the inputs, interventions and outputs in this chapter.

Chapter 5 – Data analysis

5.1 Introduction

Chapter shows the analyses of data from the survey questionnaire and semi-structure interviews conducted for this study. This chapter essentially highlights the background of the participants that took part in this study, and it also looks analyses the results from the field which are based on the study objectives. The data analyses of this study were undertaken using SPSS(V27) and Nvivo(V12) for analyses quantitative data and qualitative data, respectively. In analysing the data, descriptive statistics method was used which and represented data in the form of percentages and frequency distributions. The profile or background of respondents for the study was important as their level of knowledge and experience was relevant in determining the validity of the research findings.

The mean average of the challenges main contractors faces when working with inexperienced sub-contractors, the interventions taken by main contractors to assist emerging contractors in their growth and the actions that can still be taken to assist inexperienced sub-contractors in their growth were analysed.

5.2 Questionnaire

The questionnaire of this research study was directed and sent out to participants in two major states of South Africa, namely, KwaZulu-Natal, and the Western cape. The participants of the study were made up of professionals of in the construction industry namely, contracts managers, site agents, quantity surveyors, investors, client representatives, consultants, and foremen. The questionnaires sought to find the challenges that main contractors encounter when working with emerging or inexperienced sub-contractors.

5.2.1 Response rate for quantitative data

The questionnaire was sent out to a total of 162 participants using google forms, and a total of 70 responses were recorded for the quantitative data and this meant that the response rate was at 43%.

5.3 Demographics

Background information like as the gender, age group and ethnicity of the participants are shown in table 5.1 to 5.6 below. Seventy percent (70%) of the participants were male. More than half of the population were between ages 20 to 29 years old (60%). Thirty-six of the participants that took part in the survey have 1-5 years in working experience.

5.3.1 Gender

The participants that took part in this study are people that are either involved in the construction industry or have extensive knowledge in the field of construction. From the persons who voluntarily took part in participating in the study, by answering the questionnaire, 70% were males and 30% of the participants were females. The frequency of the participants was 49 for males and 21 for females out of the total 70 questionnaires that were responded to. This statistic shows that the construction is still largely a male dominated industry.

Table 5.1: table showing the participants gender

Gender	**Frequency**
Make	49
Female	21
Total	70

5.3.2 Age of participants

The researcher wanted to understand the average age of the participants taking part in the study to understand the perception of the challenges professionals face when working with inexperienced sub-contractors among different age groups. The range with regards to the age of the participants that took part in the study range from a minimum age of 24 years and a maximum of 65 years old. The average age among the entire participants of the study is 32 years old. The frequency of the participants shows that 60% (42 participants) of the of the respondents were in the ages between 20-29 years old and this followed by 21.42% (15 participants) who were between ages 30-39 years old. Only 14.28% of the respondents were in the ages between 40-49 (11 participants) years old, followed by the ages 50-59 years old where only 1 participant in this age responded and finally the ages between 60-69 years old only had two responses, which made up all the respondents.

Table 5.2: table showing the frequency distribution of the age of the participants in in the study.

Age	**Frequency**
20-29	42
30-39	15
40-49	11
50-59	1
60-69	1

5.3.3 Experience

Table 5.3 shows the number of years of experience of the respondents in their professional career in the construction industry. The study revealed that 51.43% of the respondent have been involved in the construction industry between 1-5 years, another 15,71% have had 6-10 years of experience in the industry. 10% of the respondents show that they have been in the industry for a period between 11-15 years, 7.14 % of the respondents have been working within then industry for a period between 16-20 years, 4.29% of the participants have 21-25 years of working experience and finally 4.29% of the participants have over 26 years' experience working in the construction industry. The average of the respondents showed to be eight years in the construction industry.

Table 5.1: table showing the work experience of the respondents

Years of experience	Frequency	Percentage (%)
1-5 years	36	51.43%
6-10 years	11	15.71%
11-15 years	7	10%
16-20 years	5	7.14%
21-25 years	3	4.29%
26-40 years	3	4.29%
Missing	5	7.14%
Total	65	100%

5.3.4 Employment status

Table 5.4 shows the work statuses of the participants that were involved or took part in this study. The data showed that 50% (50) of the respondents work as permanent employees and this was followed by employees working on contract who make 21.42% (15) of the respondents to the study. The rest of the participants are retired, directors, and apprentices. The type of employment affects the validity of the study since main-contractors and sub-contractors need to work together therefore making their data relevant to this study.

Table 5.2: *table showing the conditions of employment of participants*

Nature of employment	Frequency	Percentage (%)
Contract	15	21.42%
Director	1	1,42%
Full-time	50	50%
Apprentice	1	1,42%

Retired	3	4,29%
Total	70	100%

5.3.5 Type of organisation

The figure above displays the result of the type of organisations the participants of the study all represented. From the results obtained, a total number of 35 participants of the study worked for main contractor organisations, and 25 of the participants worked for organisations that take up constructions works as sub-contractors. This study investigates the challenges between main contractors and emerging sub-contractors/contractors, and as such the bulk of participants of the study all came from these organisations. A total of 9 participants represented consultancy organisation and 1 represented the investor type of firm.

Table 3.5: type of organisation participants represents

Type of organisation	**Frequency**	**Percentage**
Main-contractor	35	50%
Sub-contractor	25	35.71%
Consultant	9	12,86%
Investor	1	1.42%
Total	70	100%

Table 5.6 shows the race of the participants who part in the study and a total of 52 (71,29%) participants were African, 11 (12,71%) of the participants were coloured, 3 (4,28%) were Indian and 4 (5.71%) of the participants were white.

Table 5.6: table showing the race of participants

Race	African	52	71.29%
	Coloured	11	15.71%
	Indian	3	4.28%
	White	4	5.71%
	Total	70	100.0

Table 5.7 below, shows the number of participants that took part in the study from Durban and Cape Town. A total of forty-one participants answered the questionnaire were from Durban and twenty-nine from Cape Town.

Table 5.7: table showing the provinces participants work in

Province	KwaZulu-Natal	41	59.57%
	Western cape	29	41.43%
	Total	70	100.0

5.4 Data analysis

5.4.1 Reliability and Consistency

Reliability is a term that refers to the consistency of a measure and as a rule, a participant completing an instrument meant to measure motivation should have roughly the same responses each time the test is completed (Heale, Twycross, 2015). It is not possible to give an exact calculation of reliability however, an estimate of reliability can be achieved through different measures (*ibid*).

Cronbach's alpha (α) was established by Lee Cronbach in 1951 and it was to offer a measure of internal consistency of a test or scale and it is expressed as a number between 0 and 1 (Tavakol and Dennick, 2011). It tests reliability between items within the test (*ibid*). Cronbach's alpha is a coefficient of reliability (or consistency). The acceptable standard for reliability when using Cronbach's Alpha should be at least 0.700. Generally, a score of more than 0.7 is suitable. There is higher Cronbach's alpha if the data is normally distributed than if it is either positively or negatively skewed.

Cronbach's α is the most used test to determine internal consistency of an instrument and in this research study, the Cronbach's alpha was used. The Cronbach's α result is a number between 0 and 1. An acceptable reliability score is one that is 0.7 and higher (Hajjar, 2018). Cronbach's Alpha examines if multiple questions and Likert scale surveys are reliable. In addition, these questions are measuring latent variables, unobservable variables for example, a conscientiousness of an individual to measure these in real life is extremely tough. Cronbach's Alpha tells if the examination designed is precisely measuring the interest's variable (*ibid*). A rule for the interpretation of Alpha for questions that are dichotomous for example questions with two probable answers or Likert scale questions is as follows:

Table 5.8: table showing the interpretation of internal consistency/reliability

Value	**internal consistency**
$\alpha \geq 0{,}9$	Excellent
$0{,}9 > \alpha \geq 0{,}8$	good
$0{,}8 > \alpha \geq 0{,}7$	Acceptable
$0{,}7 > \alpha \geq 0{,}6$	Questionable
$0{,}6 > \alpha \geq 0{,}5$	Poor
$0{,}5 > \alpha \geq$	Unacceptable

5.4.2 Corrected item total correlation

The item-total correlation test comes in psychometrics in the contexts where questions are given to a participant and where the problem is to make a useful single quantity for each individual that can be used to compare that individual with others in a given population (Field, 2013 & Tavakol and Dennick,

2011). In a reliable scale, all items should correlate with the total however if the values are less than the cut-off value 0.3 (BrckaLorenz, Chiang and Nelson Laird, 2013 & Field, 2013), it means that a particular item does not correlate very well with the average scale, and it may have to be deleted. If it is 0.3 and more, there is a very good correlation between items (Field, 2013). The mean inter-item correlation for a set of items should ideally be between 0.20 and 0.40, suggesting that while the items are reasonably homogenous, they do contain sufficiently unique variance so as to not be similar in form and relations with each other (Piedmont, 2014). Items with low correlation will have to be deleted because that means those items do not correlate very well with the overall scale (Field, 2006). However, in bigger samples, items with lower correlation may be accepted (Field, 2013).

5.4.3 KMO-Test and Bartlett's test of sphericity for the challenges main contractors face when working with inexperienced sub-contractors.

The adequacy of the sample is measured by using the Kaiser-Meye-Olkin (KMO) measure of sampling in SPSS (Hadi, Abdullah, Sentosa, 2016). The sampling is adequate or sufficient if the value of Kaiser Meyer Olkin (KMO) is larger than 0.5 Field. The table below describes the recommended values of KMO according to Pallant (2013):

Table 5.9: table showing KMO measure scales

KMO value	**Scale**
0.5-0.7	Mediocre
0.7-0.8	Good
0.8-0.9	Great
0.9 >	Superb

The value of KMO is 0.6 and above. Kaiser (1974) recommends a bare minimum of 0.5 and the value between 0.5 and 0.7 are mediocre, value between 0.7 and 0.8 are good, value between 0.8 and 0.9 are great and value between 0.9 and above are superb (Hadi, Abdullah, Sentosa, 2016).

The strength of the relationship in SPSS can be measured by a Bartlett Test of Sphericity. It is actually a measure of a multivariate normality of set of distribution. In order to establish if the data was suitable for factor analysis, the Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett's test of sphericity were computed (Kaiser, 1970, 1974; Bartlet 1995). The KMO represented in the table was computed for the entire questionnaire response. This result is illustrated in the tables below

5.4.4 Section A: challenges main contractors face when working with inexperienced sub-contractors.

Table 5.6 shows that the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO-test) value was 0,528 and thereby meeting the recommended value of 0.5 and the Barlett's test of sphericity reached statistical significance at p= 0.000.

Exploratory factor analysis (EFA) and principal components analysis (PCA) are methods that are used by investigators to represent a large number of relationships among normally distributed or scale variables in a simpler way. These approaches determine which, of a fairly large set of items, "hang together" as groups or are answered most similarly by the participants. (Hadi, Abdullah and Sentosa, 2016).

Table 5.10: table the KMO and Bartletts test of section A of the questionnaire results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.528
Bartlett's Test of Sphericity	Approx. Chi-Square	230.081
	df	153
	Sig.	.000

5.4.5 Factor analysis of the challenges that main contractors face when working with inexperienced sub-contractors.

Table 5.11 indicates the factor matrix of the challenges that main contractors face when working with inexperienced sub-contractors. For factor analysis, principle components extraction was used with Kaiser normalisation and a Promax rotation with a kappa of 4 (Pett, Lackey, and Sullivan, 2003). Small coefficients were suppressed with an absolute value below 0.5. The factors retained were based on the number of interpretable factors. The eigen-value-greater-than-one criteria yielded one factor. Therefore, a four-factor solution which comprised of nine out of the ten questions was favoured yielding eigen values greater than one. The results revealed the loadings of each of the items which were extracted through principal axis factoring. Out of the eighteen items, fourteen of the items loaded strongly on the component and so they were considered as factors influencing the co-variation among multiple observations. (>0.5) (Pallant, 2013). Item 1, 9, 16 and 18 was suppressed.

Table 5.11: tables showing the component matrix of section A of the questionnaire results

	Component Matrix[a]							
		Component						
		1	2	3	4	5	6	7
1	Inexperienced sub-contractors manage to meet contractor's quality criteria.	-.237	.015	-.440	-.079	-.222	.038	.579
2	The lack of initial capital and cash flow among new or inexperienced sub-contractor creates a new risk of project failure for the main-contractor.	.578	-.103	.146	-.131	.429	-.278	.324
3	Poor quality finish from an inexperienced sub-contractor is largely attributed to poor management and planning techniques from the sub-contractor.	.209	.372	.171	.454	.051	.253	.364
4	The lack of effective communication strategies from inexperienced sub-contractors creates time delays on construction projects.	.528	.143	.224	.077	-.292	.164	.156
5	Poor collaboration between main contractor and sub-contractor can be attributed to poor communication	.229	-.266	.627	-.161	-.048	.096	.216
6	Poor understanding of work and project failure from inexperienced sub-contractors is a consequence of poor communication, with the management structures of the main-contractor.	.073	-.500	.131	.054	.277	.557	-.185
7	Conflict often arises with inexperienced sub-contractors who demonstrate poor technical abilities.	.042	.589	-.057	.437	-.080	.100	-.377
8	Conflict between contractors creates tension and reduces the sharing of information which ultimately creates time and budget over-run of the project.	.397	-.658	-.166	.119	.173	.092	-.083
9	The lack of contractual knowledge among emerging sub-contractors tends to creates conflict in the production stages of the project.	.120	.270	.651	.296	-.113	-.010	.020
10	Late project delivery can be said to be attributed by sub-contractors' failure to meet the project schedule.	.611	-.053	-.232	.207	.119	.092	.101
11	When employing inexperienced sub-contractors, the reputation of a reputable main-contractor to deliver on time and within cost is often placed at risk.	.698	-.209	-.133	.198	-.018	-.008	-.262
12	Inexperienced sub-contractors tend to lack material resources and a material resource system and therefore end up delaying on the project schedule	.758	-.115	.005	-.036	-.354	-.152	-.032
13	Deceitful practices allow for the incompetent and inexperienced sub-contractors to be selected on government projects.	.426	.306	-.219	.089	.116	-.266	-.236
14	Main contractors are sometimes forced to working with inexperienced sub-contractors as a result of the strict BBBEE policies.	.167	.346	.093	-.119	.632	-.407	.052
15	Sub-contractors with limited experience in the nature of the construction industry fail to comply or meet with the required safety regulations.	.508	.222	-.488	-.105	-.105	.199	.119
16	Main contractors often penalise sub-contractors that fail to adhere to the safety regulation. This action tends to create conflict between the contractors.	-.120	.333	-.113	-.011	.507	.555	.060
17	Inexperienced sub-contractors are always susceptible to weak management structure	.448	.400	.035	-.558	-.092	.255	.100
18	Emerging/inexperienced sub-contractors do not have the necessary experience required to perform efficiently on complex projects.	.153	.238	.144	-.650	-.058	.163	-.384

5.4.6 Total variance explained for the challenges main contractors face in working with inexperienced sub-contractors

Table 5.12 shows the total variance explained by these factors. The extraction method used to produce the results is the principle component analysis. The principle component analysis technique, using the principle axis factoring showed value of the seven components which showed, 3.08, 1.994, 1.561, 1.40, 1.28, 1.21 and 1.14 of the variances and 64,91% of the total variance.

From the table, there seven different components of strengths exist and these components consist of similar items that investigate quality related factors with inexperienced sub-contractors, communication and financial difficulty of these organisation.

Table 5.12: table showing the total variance in section A of the questionnaire results

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.083	17.129	17.129	3.083	17.129	17.129
2	1.994	11.080	28.210	1.994	11.080	28.210
3	1.561	8.673	36.883	1.561	8.673	36.883
4	1.407	7.817	44.700	1.407	7.817	44.700
5	1.281	7.116	51.816	1.281	7.116	51.816
6	1.217	6.758	58.574	1.217	6.758	58.574
7	1.141	6.341	64.915	1.141	6.341	64.915
8	.970	5.391	70.306			
9	.835	4.639	74.945			
10	.792	4.400	79.345			
11	.679	3.774	83.120			
12	.653	3.629	86.749			
13	.612	3.403	90.152			
14	.506	2.811	92.963			
15	.421	2.340	95.303			
16	.335	1.860	97.163			
17	.290	1.609	98.772			
18	.221	1.228	100.000			

5.4.7 Descriptive statistics for the challenges that main contractors face when working with inexperienced sub-contractors.

Section A: the challenges that main contractors face when working with inexperienced sub-contractors.

The table below shows the results of the data analysis for section A of the survey questionnaire. Section A of the survey questionnaire essentially asks the challenges that main contractors face in working with inexperienced sub-contractors. The table shows the results of the participants.

Table 5.13: table showing the responses to section A of the questionnaire.

	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard deviation
1	Inexperienced sub-contractors manage to meet quality criteria	12.3%	27.4%	32.9%	26%	1.4%	2.76	1.053
2	The lack of initial capital and cash flow among new or inexperienced sub-contractors creates a new risk of project failure for the main contractor	5.5%	16.4%	26%	43.8%	8.2%	3.36	1.017
3	Poor quality finish from inexperienced sub-contractors is largely attributed to poor management and planning techniques from the sub-contractor	2.7%	5.5%	9.6%	53.4%	28.8 %	4.0	0.961
4	The lack of effective communication strategies from inexperienced sub-contractors creates time delays on construction projects	0%	8.2%	16.4%	46.6%	27.4 %	3.95	0.902
5	Poor collaboration between main contractor and sub-contractor can be attributed to poor communication	0%	2.7%	12.3%	61.6%	21.9 %	4.02	0.668
6	Poor understanding of work and project failure from inexperienced sub-contractors is a consequence of poor communication, with the management structures of the main-contractor.	2.7%	16.4%	34.2%	30.1%	16.4 %	3.41	1.052
7	Conflict often arises with inexperienced sub-contractors who demonstrate poor technical abilities	2.7%	5.35%	6.8%	39.7%	39.7 %	4.18	1.006
8	Conflict between contractors creates tension and reduces the sharing of information, which ultimately creates time and budget over-runs on the project	50.7%	28.8%	15.1%	20.5%	13.7 %	2.76	1.348
9	The lack of contractual knowledge among emerging sub-contractors tends to create conflict in the production stages of the project	4.1%	2.7%	16.4%	45.2%	31.5 %	4.00	0.945
10	Late project delivery can be said to be attributed by sub-contractors' failure to meet the project schedule	15.1%	27.4%	23.3%	26%	8.2%	2.91	1.199
11	When employing inexperienced sub-contractors, the reputation of a reputable main-contractor to deliver on time and within budget is placed at risk	6.8%	20.5%	24.7%	32.9%	12.3 %	3.27	1.131
12	Inexperienced sub-contractors tend to lack material resources and a material resource strategy and therefore end up delaying on the project schedule	2.7%	12.3%	45.2%	35.6%	4.1%	3.26	0865
13	Deceitful practices allow for the incompetent and inexperienced sub-contractors to be selected on government projects	1.4%	13.7%	27.4%	46.6%	11%	3.55	0.915
14	Main-contractors are sometimes forced to working with inexperienced sub-contractors as a result of the strict BBBEE policies	0%	5.5%	19.2%	57.5%	16.4 %	3.89	0.767
15	Sub-contractors with limited experience in the nature of the construction industry fail to comply or meet with the safety regulations	2.7%	12.3%	26%	45.2%	13.7 %	3.56	1.010
16	Main contractors often penalise sub-contractors that fail to adhere to the safety regulations and this action tends to create conflict between contractors	0%	5.5%	11%	64.4%	19.2 %	3.95	0.753
17	Inexperienced sub-contractors are always susceptible to weak management structures	0%	8.2%	12.3%	53.4%	26%	3.95	0.885
18	Emerging/inexperienced sub-contractors do not have the necessary experience required to perform efficiently on complex projects	0%	2.7%	16.4%	50.7%	30.1 %	4.41	0.742

5.5 Data analyses summary

5.5.1 Quality

Quality is intertwined with issues of technical performance, specifications, and achievement of functional objectives and it is the achievement against these criteria that will be most subject to variation in perception by multiple project stakeholders (Kumara, 2016). It is assumed that product quality and process quality are embedded in the functionality and technical performance in construction project context. quality, technical performance, and functionality are closely related and are considered important to the owner, designer, and contractor. In observing the data collected with reference to quality, the data revealed that inexperienced sub-contractors do not meet the expected levels of quality set by main contractor for construction projects. When participants were asked if poor planning and poor management is part to blame for inexperienced sub-contractor low quality performance, fifty-two (52%) of the participants replied by agreeing to that poor quality is a result of poor planning and management.

5.5.2 Communication

Communication is a key aspect in the success of every construction project and its importance cannot be overlooked. The practice of partnering has been identified as one of the most effective technique for enabling communication within and among project teams (Chileshe, 2011). It is further assumed that partnering makes cooperative communication and mutually resolves conflicts at the lowest possible management level (*ibid*). Communication is a challenge that main contractors face when working with inexperienced sub-contractors. Participatants responded with the majority of the participants agreeing that poor communication creates challenges such as time delays, poor collaboration and poor understanding of work when working with contractors that have limited experience on construction projects. Gustavo, Nicholas (2011:4), acknowledges that contractors often manage several sub-contractors and acknowledge that often this can be difficult and have suggested that a contractor should adopt partnering principles as this will benefit both parties in future and most importantly builders will be acquainted with the capabilities of the trade sub-contractor who are familiar with the work and method.

5.5.3 Conflict

Conflict is another key aspect main-contractors struggle with when working with inexperienced sub-contractors. Eight one per cent (82%) of the respondents responded by agreeing that conflict with inexperienced sub-contractors is created by that inexperienced sub-contractors demonstrate poor or low technical abilities in an industry that has tight profit margins. Participants also stated that inexperienced sub-contractors show low levels of contract knowledge and 76.7% of the respondents agreed that this creates conflict between the two contractors. Participants were also asked if this conflict created

between contractors can reduce the sharing of information, fifty percent (50,7%) of denied this as the scale shows that they disagree to that statement. This therefore tells that the task at hand which is to complete the project is still driven by the main-contractors regardless of the issues of conflict that arise with inexperienced sub-contractors.

5.5.4 Deceitful practices

Deceitful practices among other challenges that main contractors face when working inexperienced sub-contractors and the data collected also revealed that fifty-seven per cent (57,7%) of the respondents agreeing to that inexperienced sub-contractors sometimes get into construction through deceitful practices. Furthermore, the participants also agreed to that main contractors are sometimes forced to having to work with inexperienced sub-contractors due to strict BBBEE polices and this creates new challenges for main contracts. The health and safety of all employees in a work place is critical and needs to be critically scrutinised, especially in the construction industry. Participants were asked if inexperienced sub-contractors are able to comply with the set health and safety standards, and eight-three (83,3%) of the respondents disagreed and said that inexperienced do not manage to show acts of working safe.

The table below shows the Cronbach's alpha for the challenges that that main contractors encounter in working with inexperienced sub-contractors. The Cronbach's Alpha for section A can be seen in Table 5.10 below. The table shows that the Cronbach's Alpha for section is 0.584, which according to the reliability/internal consistency the Cronbach's alpha is poor.

Table 5.14: table showing the reliability statistics of section A

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.584	.576	18

Table 5.15: table showing the reliability statistics of section A when items deleted

Question	Statement	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
1	Inexperienced sub-contractors manage to meet contractors quality criteria.	-.194	.228	.634
2	The lack of initial capital and cash flow among new or inexperienced sub-contractor creates a new risk of project failure for the main-contractor.	.362	.421	.544
3	Poor quality finish from an inexperienced sub-contractor is largely attributed to poor management and planning techniques from the sub-contractor.	.207	.179	.570
4	The lack of effective communication strategies from inexperienced sub-contractors creates time delays on construction projects.	.320	.299	.553

5	Poor collaboration between main contractor and sub-contractor can be attributed to poor communication	.111	.301	.582
6	Poor understanding of work and project failure from inexperienced sub-contractors is a consequence of poor communication, with the management structures of the main-contractor.	.046	.255	.597
7	Conflict often arises with inexperienced sub-contractors who demonstrate poor technical abilities.	.028	.363	.598
8	Conflict between contractors creates tension and reduces the sharing of information which ultimately creates time and budget over-run of the project.	.188	.417	.577
9	The lack of contractual knowledge among emerging sub-contractors tends to creates conflict in the production stages of the project.	.095	.325	.587
10	Late project delivery can be said to be attributed by sub-contractors failure to meet the project schedule.	.464	.327	.518
11	When employing inexperienced sub-contractors, the reputation of a reputable main-contractor to deliver on time and within cost is often placed at risk.	.446	.482	.524
12	Inexperienced sub-contractors tend to lack material resources and a material resource systems and therefore end up delaying on the project schedule	.464	.576	.533
13	Deceitful practices allow for the incompetent and inexperienced sub-contractors to be selected on government projects.	.287	.265	.558
14	Main contractors are sometimes forced to working with inexperienced sub-contractors as a result of the strict BBBEE policies.	.114	.279	.582
15	Sub-contractors with limited experience in the nature of the construction industry fail to comply or meet with the required safety regulations.	.387	.456	.539
16	Main contractors often penalise sub-contractors that fail to adhere to the safety regulation. This action tends to create conflict between the contractors.	-.034	.259	.599
17	Inexperienced sub-contractors are always susceptible to weak management structure	.329	.449	.552
18	Emerging/inexperienced sub-contractors do not have the necessary experience required to perform efficiently on complex projects.	.079	.267	.586

Section (challenges main contractors face when working with inexperienced sub-contractors) had a value of Cronbach's alpha equal to 0.584 which is 'poor' as shown in table 5.16. According to Field (2006:3) "*if the deletion of an item increases Cronbach's alpha then this means that the deletion of that item improves reliability*". Therefore, item number 1 is deleted from value of Cronbaach's increases to 0,634 which is "*questionable*" but acceptable.

Table 5.16: table showing the reliability statistics of section A when item deleted

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.634	.623	17

5.5.5 Section B: interventions made by main contractors when working with inexperienced sub-contractors that seek to reduce the potential impact.

Table 5.17 shows the factor matrix of the interventions. Principle components extraction was used with Kaiser Meyer Olkin requirements are met with 0.591 being the measure of sampling adequacy.

Table 5.17: table showing the KMO and Bartletts test of section B of the questionnaire results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.591
Bartlett's Test of Sphericity	Approx. Chi-Square	290.458
	df	78
	Sig.	.000

Table 5.18 indicates the factor matrix of the interventions made by main contractors to limit the impact of working with inexperienced sub-contractors. For factor analysis, principle components extraction was used with Kaiser Normalisation and a Promax rotation with a kappa of 4 (Pett, Lackey, and Sullivan, 2003). Small coefficients were suppressed with an absolute value below 0.5. The factors retained were based on the number of interpretable factors. The eigen-value-greater-than-one criteria yielded one factor. Therefore, a four-factor solution which comprised of nine out of the ten questions was favoured yielding eigen values greater than one. The results revealed the loadings of each of the items which were extracted through principal axis factoring. Out of the thirteen items, ten of the items loaded strongly on the component and so they were considered as factors influencing the co-variation among multiple observations. (>0.5) (Pallant, 2013). Item 1, 2 and 6 was suppressed.

Table 5.18: table showing the component matrix of section B of the questionnaire results interventions made by main contractors to limit the impact of working with inexperienced sub-contractor

Component Matrix[a]					
Questions		Component			
		1	2	3	4
1	To increase sub-contractor performance, main-contractors assign area managers who monitor and conducts approval process upon handover.	-.043	.729	.462	.008
2	Main-contractors provide quality assurance documents to sub -contractors that require to be signed off and approved by contractor. This ensures that quality criteria are met.	.130	.761	.249	-.013
3	Main contractors offer on time/schedule related incentives to emerging/inexperienced sub-contractors upon satisfactory handover.	.737	-.184	.009	-.135
4	Main contractors offer quality related incentives to inexperienced sub-contractors upon satisfactory hand over.	.728	-.307	.045	-.270
5	Main contractors utilise Key Performance Indicators (KPI's) to assist emerging contractors monitor growth.	.638	-.139	.455	-.305
6	Information regarding the project is always clearly communicated and made in time for inexperienced to act in time.	.367	.077	-.309	.132

7	Main contractors make use of a performance appraisal criteria to assist emerging sub-contractors improve their workmanship progress.	.619	-.483	.253	.147
8	Main contractors make use of a performance appraisal criteria to assist emerging/inexperienced sub-contractors improve on their health and safety.	.577	-.089	.224	.561
9	Main-contractor organisations, thoroughly explain all the contractual terms and conditions for what will be the duration of the project.	.548	.168	-.481	.431
10	Payments to sub-contractors are always made in time so as to avoid labour unrest.	.401	.431	.299	.361
11	Main contractors make an effort into emphasising health and safety regulations to emerging/inexperienced sub-contractors.	.429	.436	-.556	-.058
12	Contractors try to keep a close relationship with the management team of inexperienced sub-contractors.	.581	.071	-.119	-.250
13	Consistent monitoring from the main contractor ensures that emerging/inexperienced sub-contractors adhere to all health and safety regulations.	.414	.505	-.154	-.436

Table 5.19 shows how much variance is explained by these factors. The PCA techniques using principal axis factoring showed four components emerging. Table 29 shows how much variance is explained by these factors.

Table 5.19: table showing the total variance explained for the interventions made by main contractors to limit the impact of working with inexperienced sub-contractor

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.504	26.951	26.951	3.504	26.951	26.951
2	2.169	16.685	43.636	2.169	16.685	43.636
3	1.362	10.477	54.113	1.362	10.477	54.113
4	1.109	8.533	62.646	1.109	8.533	62.646
5	.982	7.552	70.198			
6	.895	6.882	77.080			
7	.817	6.285	83.365			
8	.602	4.627	87.992			
9	.500	3.845	91.838			
10	.364	2.797	94.635			
11	.270	2.080	96.715			
12	.261	2.006	98.721			
13	.166	1.279	100.000			

Extraction Method: Principal Component Analysis.

Table 30: table showing the total variance of section B

Has there been any measure put in place by main-contractors that seek to reduce the impact of working with inexperienced sub-contractors? The data contained in the table above shows the total variance explained in the responses directed to answering the research question. The data above shows the four

different components of analysing the measures put in place by main contractors to limit their impact of having to work with inexperienced sub-contractors.

5.5.6 Descriptive statistics

Section B:

Has there been any measure put in place by main-contractors that seek to reduce the impact of working with inexperienced sub-contractors?

Table 5.20: Table showing responses to section B

	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard deviation
1	To increase sub-contractor performance, main-contractors assign area managers who monitor and conducts approval process upon handover.	1.4%	5.5%	16.4%	50.7%	26%	3.94	0.899
2	Main-contractors provide quality assurance documents to sub -contractors that require to be signed off and approved by contractor. This ensures that quality criteria are met.	1.4%	6.8%	16.4%	54.8%	20.5%	3.86	0.889
3	Main contractors offer on time/schedule related incentives to emerging/inexperienced sub-contractors upon satisfactory handover.	8.2%	41.1%	31.5%	13.7%	5.5%	2.69	1.015
4	Main contractors offer quality related incentives to inexperienced sub-contractors upon satisfactory hand over.	9.6%	41.1%	23.3%	17.8%	8.2%	2.76	1.135
5	Main contractors utilise Key Performance Indicators (KPI's) to assist emerging contractors monitor growth.	16.4 %	39.7%	26%	11%	5.5%	2.49	1.087
6	Information regarding the project is always clearly communicated and made in time for inexperienced to act in time.	1.4%	19.2%	23.3%	37%	19.2%	3.53	1.046
7	Main contractors make use of a performance appraisal criteria to assist emerging sub-contractors improve their workmanship progress.	1.4%	34.2%	27.4%	19.2%	5.5%	2.71	1.105
8	Main contractors make use of a performance appraisal criteria to assist emerging/inexperienced sub-contractors improve on their health and safety.	8.2%	26%	26%	27.4%	12.3%	3.10	1.194
9	Main-contractor organisations, thoroughly explain all the contractual terms and conditions for what will be the duration of the project.	1.4%	21.9%	32.9%	34.2%	9.6%	3.27	0.977
10	Payments to sub-contractors are always made in time so as to avoid labour unrest.	5.5%	28.8%	27.4%	26%	11%	3.10	1.092
11	Main contractors make an effort into emphasising health and safety regulations to emerging/inexperienced sub-contractors.	1.4%	5.5%	15.1%	52.1%	26%	3.93	0.873
12	Contractors try to keep a close relationship with the management team of inexperienced sub-contractors.	4.1%	9.6%	45.2%	30.1%	11%	3.36	0.948
13	Consistent monitoring from the main contractor ensures that emerging/inexperienced sub-contractors adhere to all health and safety regulations.	0%	2.7%	20.5%	47.9%	28.8%	4.04	0.788

The Cronbach's Alpha for section B can be seen in Table 5.21 below. The table shows that the Cronbach's Alpha for the second component is 0.751 which is greater than 0.7 thereby suggesting that the items have higher internal consistency in responses.

Table 5.21: table showing reliability study

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.751	.747	13

5.5.7 Quality sheets/sign-off sheets

In an effort to increase productivity rate, participants were asked what it is that established contractors do to achieve this. Participants were asked whether quality assurance documents and sign off sheets are issued to sub-contractors of a particular trade prior inception and after completion and 75,3% of the participants agreed to that main-contractors issue out quality assurance documents and this therefore increases productivity because their little need for reworks if items were completed correctly. 76,7% also mentioned that main contractors have area managers that assist and monitor the work done by sub-contractors.

5.5.8 Performance appraisal techniques

Performance appraisal techniques can be used to monitor to monitor the progress of an entity and individuals. In this study, participants were asked if there any incentives that are offered to sub-contractors with limited experience on satisfactory completion of a particular trade. Participants responded and 50,7% of the participants responded by disagreeing to that there are incentives obtained on completion of work. 23,3% of the responses remained neutral to this question and 26% agreed to that there can be incentives at times. This therefore means that in most instances, there are no incentives for satisfactory completion, however there are instances that contribute to incentives. However, participants were also asked if key potential indicators (KPI) are used in monitoring the growth of inexperienced sub-contractor, and the average responses showed that this is not utilised as respondents disagreed to the question. The data also showed that with regards to health and safety, KPI's are used.

5.5.9 Information sharing

Information is key for a project to run smoothly, and to this question, participants where asked if information is passed in time to inexperienced sub-contractors so that they are able to action the lates information of the project. The participants responded, with 56,2% of the participants agreeing to that information is always given in time.

5.5.10 Communication

Failure of construction project have been attributed to improper managerial principles at all project members, such as improper focus of the management system, by rewarding the wrong actions and the lack of communication of goals (Prince, 2010). The management of sub-contractors includes is of much importance to main contractor organisation as they effectively drive the construction process. Participants were again asked in the questionnaire if they are monitored in terms of the performance. The data showed that with regards to health and safety, inexperienced sub-contractors are heavily monitored as 78,1% of the participants agreed to this.

5.5.11 Section C: How can inexperienced sub-contractors accelerate their performance?

This section of the data analysis shows the responses to the research question of "How can sub-contractors with limited experience improve their standard of work to conform with the requirements of principal contractors?"

Table 5.22 presents the factor matrix of how sub-contractors with limited experience improve their standard of work so as to conform with the requirements of principal contractors. The Kaiser Meyer Olkin value for section C of the survey questionnaire is 0,669. This value falls above the recommended value of 0,6 and Barletts test of sphericity reached statistical significance at p=0.000 and thereby supporting factoring of the correlation matrix.

Table 5.22: table showing the KMO and Bartlestts test of section C of the questionnaire results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.669
Bartlett's Test of Sphericity	Approx. Chi-Square	111.263
	df	21
	Sig.	.000

Table 5.23 indicates the factor matrix of the interventions made by main contractors to limit the impact of working with inexperienced sub-contractors. For factor analysis, principle components extraction was used with Kaiser normalisation and a Promax rotation with a kappa of 4 (Pett, Lackey, and Sullivan, 2003). Small coefficients were suppressed with an absolute value below 0.5. The factors retained were based on the number of interpretable factors. The eigen-value-greater-than-one criteria yielded one factor. Therefore, a four-factor solution which comprised of nine out of the ten questions was favoured yielding eigen values greater than one. The results revealed the loadings of each of the items which were extracted through principal axis factoring. Out of six, one of the items loaded strongly on the component and so they were considered as factors influencing the co-variation among multiple observations. (>0.5) (Pallant, 2013). Item 4 was suppressed.

Table 5.23: table showing the component matrix of section C of the questionnaire results

	Component Matrix[a]			
		Component		
		1	2	3
1	Maintaining strong communication with main-contractors will see inexperienced/emerging sub-contractors improve on their time performance.	.679	-.551	-.068
2	Maintaining strong communication with main-contractors will see inexperienced/emerging subcontractor improve on their quality performance	.675	-.526	.178
3	Main contractor could assist inexperienced/emerging contractors by getting them involved in the traditional procurement process and not only use them as a way to improve cash flow	.663	-.165	.251
4	Main-contractors can assist inexperienced sub-contractors by not having a profit only attitude as this is not an effective mechanism to sustain sub-contractors with limited experience	.137	.513	.728
5	Main contractors shoud not transfer enormous risk to emerging/inexperienced sub-contractors as they have little or no capacity to bear much risk.	.646	.345	-.421
6	Main contractor terms/clauses with sub-contractor agreement tend to be too harsh and should be eased especially for emerging/inexperienced sub-contractors	.597	.519	-.419

Table 5.24 shows how much variance is explained by these factors. PCA techniques utilising principle axis factoring showed 2.65, 1,37 and 1,05 of the variances and 72,35% of the total variance.

Table 5.24: table showing total variance of section C of the questionnaire results

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.646	37.795	37.795	2.646	37.795	37.795
2	1.370	19.571	57.366	1.370	19.571	57.366
3	1.049	14.984	72.350	1.049	14.984	72.350
4	.749	10.698	83.048			
5	.470	6.708	89.756			
6	.394	5.624	95.379			
7	.323	4.621	100.000			
Extraction Method: Principal Component Analysis.						

5.5.12 Descriptive statistic how inexperienced sub-contractors can accelerate their performance

Table 5.25: table showing the descriptive statistics for section C

	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard deviation
1	Maintaining strong communication with main-contractors will see inexperienced/emerging sub-contractors improve on their time performance.	33.0%	1%	25%	40%	1%	4.03	0.887
2	Maintaining strong communication with main-contractors will see inexperienced/emerging subcontractor improve on their quality performance						4.00	0.835
3	Main contractor could assist inexperienced/emerging contractors by getting them involved in the traditional procurement process and not only use them as a way to improve cash flow	1%	2%	1%	61.0%	34.0%	4.10	0.781
4	Main-contractors can assist inexperienced sub-contractors by not having a profit only attitude as this is not an effective mechanism to sustain sub-contractors with limited experience	2.7%	4.1%	19.2%	46.6%	27.4	3.90	0.956
5	Main contractors should not transfer enormous risk to emerging/inexperienced sub-contractors as they have little or no capacity to bear much risk.	1.49%	2.7%	13.7%	42.5%	39.7%	4.63	0.875
6	Main contractor terms/clauses with sub-contractor agreement tend to be too harsh and should be eased especially for emerging/inexperienced sub-contractors	0	9.6%	60.3%	27.4%	0%	4.18	0.601

The table above illustrates the descriptive statistics of section C of the survey questionnaire. In this part of the study, participants were asked how inexperienced sub-contractors can accelerate on their performance.

5.5.13 Communication

With respect to communication 73% of the participants agreed to saying that communication between the two entities will improve on the time performance of sub-contractors, while 25% of the participants remained neutral to this question. This therefore means that communication with other contractors especially the main contractor will accelerate the performance of emerging sub-contractors.

5.5.14 Quality improvement

Participants were asked if keeping strong communication will see an improvement in the quality standards of emerging sub-contractors. The participants responded to this with forty-nine percent of the participant remaining neutral to the question. However, twenty-three (23) of the participants responded by disagreeing to this statement as five percent 5.5% of the participants strongly disagree and eighteen percent (17.8%) of the participants disagreeing.

5.5.15 Involving inexperienced sub-contractors to the traditional procurement system

Participants were asked whether main contractors could possibly assist inexperienced/emerging sub-contractors through getting them involved in the traditional procurement process as this could expand their depths of knowledge. 61% percent of the participants all agreed to that inexperienced sub-contractors could get involved in the traditional procurement process. Another 34% of the participants strongly agree to the statement. The responses to this question show that a total 95% of the participants all agree to that inexperienced sub-contractors should get involved in the traditional procurement process.

5.5.16 Eased contract clauses towards inexperienced sub-contractors

Participants were asked they feel that main contractors should not have a profit only mind-set when working with inexperienced sub-contractors, 74% of the respondents replied by agreeing that main contractor should be more lenient to contractor's tat ae still emerging.

5.5.17 Transference of risk to inexperienced sub-contractors.

Participants were questioned on whether on whether they think that main contractors transfer too much risk to sub-contractors that are inexperienced and those that do not have the capacity to bear too much risk. 83% of the respondents, responded by agreeing to that main contractors should not transfer too much risk to inexperienced/emerging sub –contractors.

The Cronbach's Alpha for section C can be seen in Table 5 below. The table shows that the Cronbach's Alpha for the second component is 0.743 which is greater than 0.7 thereby suggesting that the items have higher internal consistency in responses.

Table 5.26: table showing the reliability statistics for section C

Reliability Statistics	
Cronbach's Alpha	N of Items
.743	6

5.6 Questionnaire summary

The questionnaire in this study was made up of three (3) different section, each observing different aspects that are related to the research objectives. The questionnaires were sent out to 162 participants of which 70 of the participants responded to the questionnaire.

This chapter begins by discussing the demographics of the respondents to the study. The demographics of the participants of the study was particularly important as it meant that more accurate data could be collected since the participants were selected with purpose. The data analysis of the research was collected and presented together with the reliability study of each section of the questionnaire. This chapter also described the Cronbach's alpha briefly and thereafter gave the obtained Cronbach's alpha for this particular study so as to test its internal consistency.

The questionnaire descriptive statistics and reliability were also discussed in this section of the data analysis chapter. The descriptive statistics and reliability were given for section A, B and C of the study and thereby covering the entire research quantitative data analysis.

5.7 Interview data analysis

For an unbiased data set, the data collection also made use of a qualitative data collection set in the form of interviews. In the process of collecting qualitative data, interviews were scheduled and held with professionals of the construction industry and participants ranged from contract managers, site agents, foreman's, quantity surveyors and consultants. In this section of the data analysis, the results of the qualitative data collection are analysed and produced based on the information collected from the participants that were involved in the study.

The qualitative data analysis is response was recorded at 67%. The researcher sent out twelve semi-structured interview invites to participants to which 8 of the interviews were held as the point of saturation had been met. The table below illustrated the demographics of the participants of the study.

Qualitative data was collected by way of interviews with participants from different locations mainly in Cape town and Durban. Physical one on one unstructured interviews were held in Cape town, with 6 of the interviewees. 75% of the interviewees were from Cape town and 25% from Durban. Furthermore, the level of management of which the interviewees were held consisted of:

- 1 contracts manager,
- 1 senior site agents,
- 3 site agents,
- 1 foreman,
- 1 General foreman
- 1 quantity surveyors.

The interviews with the participants took 20-30 minutes. In conducting the interviews, the researcher would ask the question and record the data manually on a manuscript.

In this part of the research, the qualitative data is discussed.

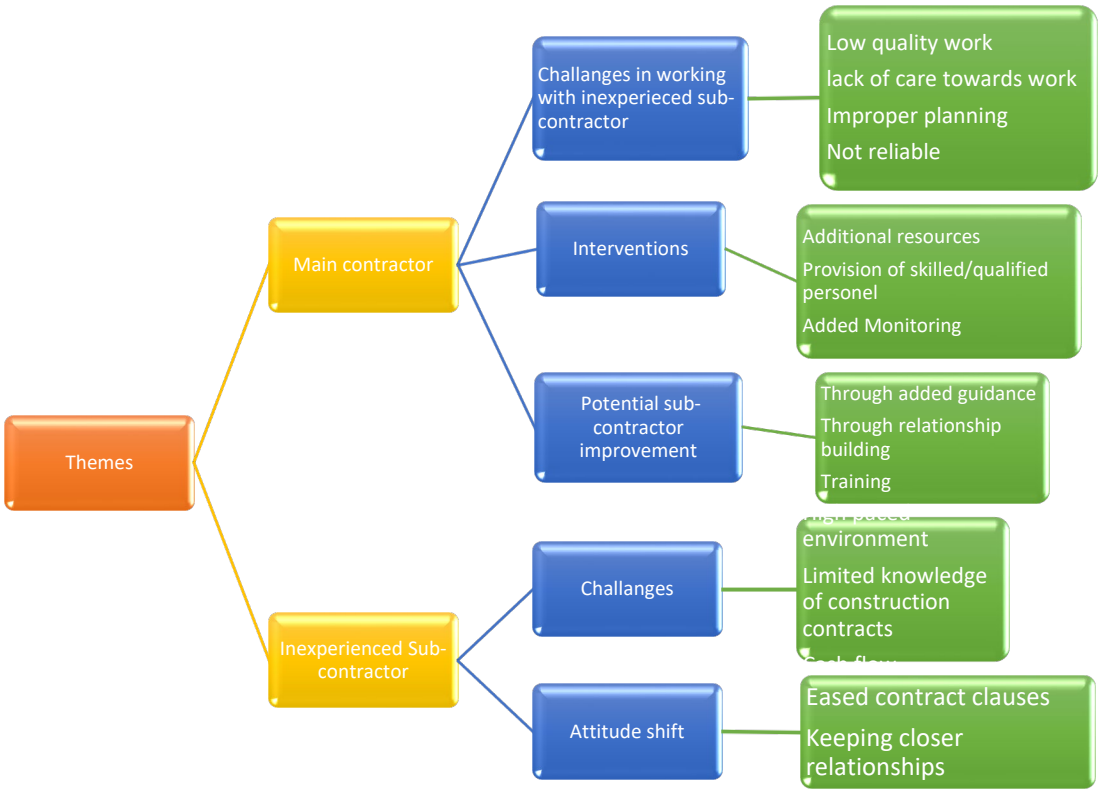

Figure 4:image illustrating themes emerged in interviews

The image illustrated represents a mind-map of the discussions that were held with the participants of the study. A series of semi-structured interviews were conducted with the participants that were invited and agreed to take part in the study. In this section of the data analysis, the qualitative data is discussed.

In the beginning of the interview, the participants of the interview were asked a question to which the majority of the responses were similar. Participants were asked to discuss from their perspective what their experience of working with sub-contractors has been like. In answering this a common theme was that it depended on the contractual obligations of the project between the client and main-contractor. This essentially meant that on projects that require good quality, good time performance and also have very strict late delivery penalties, it can be a disadvantage to work with inexperienced sub-contractors. According to the participant 1, 2, 4 and 7 inexperienced sub-contractors tend to have weak management personnel in their team and this another factor that really counts in the performance of an emerging sub-contractor. Participants number 3, a senior site agent stated that "*the mentality sub-contractors have is that, why should they one person who does not even do physical labour the salary of three labourers*?". The meaning from that statement pertains to the fact that directors of emerging sub-contractors do not feel the need to pay for good management and this is a hindrance on them to performance as it makes it more of a tedious process to work with incompetent management, according to participants of main contractor organisations. According to Vimonsatit and Wong (2012:33) "*the most important delay factors were contractor's improper planning, inadequate contractor experience*". Participants number 8, a general foreman, added that on projects where there have been provisions or allowance made for community emerging sub-contractors, then it is relatively easier to work with such contractors.
Essentially the overall sense of the participants is that working with inexperienced sub-contractors is a disadvantage and especially on projects that have seriously hefty penalties.

5.7.1 Quality

On the issue of quality and inexperienced sub-contractors, the participants were asked what their perspective is on this matter. Participants mentioned that inexperienced sub-contractors lack experience of working in a high paced environment and they lack management. What this creates is a lot of re-works and this subsequently affects time and cost. Cost are increased, as their needs to be money spent on additional resources and administration. However, three of the participants mentioned that the quality performance of an emerging sub-contractor can be managed by the main contractor. In conducting the interview, participant 6 of the interviewees said that "*sub-contractors should report works that they're not happy about to the main contractor instead of taking drastic actions which result to costs related damages*". This is a mechanism that would reduce the need for having to do re-work. Quality is often placed at steak when certain trades are done by inexperienced sub-contractors. This is due to the fact that emerging sub-contractors do not have the financial capacity

to employ skilled workers and managers and this affects overall project quality. The reason why quality becomes low on work trades is mainly because of the following:

- poor management,
- poor understanding of work,
- Shortage of skilled labour in the construction market.

5.7.2 Poor management/planning

Another issue with emerging sub-contractors is that not all of them go in with the intension of growing the organisation and have rather low management skills. This merely creates a problem for main-contractors as they have to engage with inexperienced sub-contractors and effectively creating conflict. Participant 1 also mentioned that "*inexperienced sub-contractors cost us a lot of time on construction project especially as delays from one sub-contractor holds up the subsequent trade*". Poor management commonly becomes directly linked time delays and quality related issues and this emphasised by participant 1 again as he stated that "t*hat inexperienced sub-contractors fail to perform on high pressure projects as they cannot meet the time deadlines due to the fact that they lack the understanding of what a deadline".* Participant 2 stated that "*it would be unfair to say that all inexperienced sub-contractors have poor management. Poor management does not only come from inexperienced sub-contractors, because it is people that manage a job and so poor management could come from both organisations*".

5.7.3 Lack of skilled labour

Having skilled labour on a construction project is extremely important as this can help avoid a lot reworks and save time and money on project. This is a theme that came about while conducting the interviews with the different participants and it became apparent that there is shortage of skilled labour with inexperienced sub-contractors.

Emerging sub-contractors lack skilled labour and good management according to participant 2. Windapo (2016:3) states that "*Skills shortage has been a persistent problem and a critical factor facing the South African construction industry*". Participant number 3, added that in South Africa, skilled labour is really short and this is because very few people go for training, companies do not want to pay high labour wages and few companies send their employees for skills training as they find this to be an unnecessary expense". Previous literature on the issue of skills shortage shows that the issue of shortage in skilled labour is prevalent in South Africa.

Participant 8 in the interviews made an example saying that "*there is a shortage in good labour, in many of our building projects there is a need to apply a skimming coat on top of a plastered wall. Had the walls been plastered smoothly, there wouldn't be a need to skim the walls however, there is very few organisation that have labour that can give a smooth one coat plaster*".

5.7.4 Health and safety

Health and safety are amongst one of the important considerations made for construction and because of that, it became necessary to question participants on inexperienced sub-contractor on the performance with regards to health and safety. With this regard, ideas were conflicting however the overall sense is that inexperienced sub-contractors do not always meet the safe working standards required, this was the comments made by 6 of the 8 participants of the study. Participants 6 mentioned that "*one of the challenges that face inexperienced sub-contractors is that they do not price for healthy and safety in their pricing and upon their selection to do works, they often fail to provide the correct personal protective equipment (ppe), and try to cut corners and because of the lack knowledge they work unsafely*". Valluru, Rae and Dekker (2020:11), in his study of the sub-contractor risk said that "*given the size of some of these organisations and the nature of contracts they are involved in, financial constraints are not uncommon and previous research does suggest that sub-contractors apply various cost-cutting measures in various areas to meet needs. The same constraints, coupled with the small size of these firms, leads to employees performing multiple tasks outside their expertise in areas that they are never fully prepared to perform.* This statement quoted, is a true reflection of what professionals of the construction believe to be true.

The main issues that the participants highlighted with regards to health and safety of inexperienced sub-contractors are that:

- "*Inexperienced sub-contractors lack knowledge of safe work acts*
- *Inexperienced sub-contractors show a lack of care towards health and safety*
- *They do not comply with the rules and regulation of health and safety act*".

They see health and safety as an unnecessary cost/expense.

However, 2 other participants mentioned that inexperienced sub-contractors take safety much into consideration as this will avoid penalties from the contractor and they believe that this will improve their chances of future work with the principle contractor.

Suggestions were made on how safety can be improved and participants highlighted that:

- communication of information needs to occur at all levels on complex sites to ensure safe operations, information on site-specific conditions,
- location of tools and equipment,
- points of contact in case of an emergency, *etc*., are all important when working on sites and should be communicated.

Participant 2 who took part in the interview also went on to say that "*the safety requirements differ on projects and that on large scale projects where safety is largely prioritised by the main-contractor and client and they essentially drive the safety on a construction site and in those instances, inexperienced sub-contractors clash and create conflict over items such as ppe, items that inexperienced sub-contractors feels should be provided by the main contractor, when this is not usually the case. However, on smaller projects that do not have much supervisions, contractors may get away with unsafe acts of work*". Further to that, the participant also mentioned that "*sub-contractors are paid based on their productivity and because sub-contractors are always productivity orientated, they do not place much emphasis on health and safety*".

Most of the participants agree that inexperienced sub-contractors are not knowledgeable enough about safety and they often do not plan for safety in the planning. An example made by one the participant 8 was that "*sometimes when sub-contractors need to plaster a wall, they will not build a scaffold and rather create unsafe platform to work from*". All the participants also agreed that unsafe working acts increases the chance for injury and serious injury/death could result in a visit from the Department of Labour which can have major implications on the continuation of the project.

5.7.5 Lack of care

Another theme that came up in the interviews is that inexperienced tend to show a lack of care towards health and safety, tools and equipment, work quality and keeping a construction site clean. What most of the participants agreed on is that inexperienced sub-contractors perform poorly with regards to safety and that inexperienced sub-contractors show a lack of care and do not prioritise health and safety in the way they go about doing work. Participant 3 also mentioned that "*inexperienced sub-contractors have a tendency of allowing their employees to behave inappropriately on construction site, by letting stay on site during lunch hours when which is not allowed as everyone should be in their stores*".

Participants 1, 2, 4, 5 and 8 all mentioned that inexperienced sub-contractors chase production and this often reflects badly on the work done as it is not up to standard. These participants say that the management of inexperienced sub-contractors do not apply much care or supervision over a particular work trade.

5.7.6 Not reliable

Most inexperienced sub-contractors do not understand that some projects have expensive delay penalties and when sub-contractors are most needed on the critical stages of the project, they do not put in the necessary efforts demanded by the project. One of the participants said that "*when we have a deadline to meet and the project is needs that all sub-contractors work on weekends and additional night hours, inexperienced sub-contractors don't usually commit to the project demands and the usually*

claim that they do not have the financial capacity to pay workers weekend and late night wages and this impacts the project in the critical stages". This further exemplifies the idea that inexperienced sub-contractors are unreliable and it makes it difficult to plan around them. Participants also mentioned how inexperienced sub-contractors are late on reporting issues or challenges that they encounter, this lack in communication makes it particularly difficult to action remedial works.

5.7.7 Providing additional resources

Another objective of the study was to find what actions main contractors make in trying to assist to inexperienced sub-contractors as well what other interventions are made in an effort to assist inexperienced/emerging sub-contractors. The responses from the participants again had similar themes, whereby 5 out the 8 participants said that main contractors do not do enough to assisting emerging contractor. "*Too many times we are too hard on Emerging sub-contractors, by assisting them and leading by example we will create an environment where we uplift them and educate as well*", this is a statement that was mentioned by one of the participants who agreed to that they do not make enough interventions towards assisting emerging sub-contractors.

At the same time, participants 1, 3 and 5 agreed on that, inexperienced sub-contractors do get help from main contractors. These participants mentioned that main contractors help emerging sub-contractors by sometimes having material such as sand and bricks purchased in bulk on their behalf on a situation where the emerging contractor would have failed due to financial constraints, however it must be mentioned that these funds are claimed back by the main contractor when paying the sub-contractor monthly claims. "*Having a good foreman benefits the emerging sub-contractor as they have close contact with them, the foreman of,the main contractor assists sub-contractor foreman/supervisor to help execute the works ensuring that subcontractors have good enough personnel on site and thereby minimising wastage and improving quality*". The main contractors also ensure the involvement of the sub-contractors when planning and scheduling the sub-contracted work. However, participant 4, 6, and 8 said that there is not enough effort made by main contractors to assist inexperienced sub-contractors. "*It is not our duty to help struggling sub-contractors, we work according to a program and that does not afford us time to provide guidance to other sub-contractors*", this is a statement made by participant 6.

5.7.8 Limited knowledge on construction contracts

Construction is a very large industry and, in this industry, an agreement between two more parties (contractor and client) is reached. This relationship is often governed by construction contracts.
During the interviews, two participants (1 and 4) mentioned that "*there is need for inexperienced or emerging sub-contractors to understand that contracts are made for a reason and that breaching the terms of contracts comes with penalties*". Participant 4 also further stated that "*emerging sub-*

contractors always seek to take the easy way out and that does not help in this industry as things catch up with you. It is very important for emerging sub-contractors to send their workers to training and courses that will give them better understanding of how construction contracts work in industry". However, participant 5 said that "*main contractors are at times too harsh on emerging sub-contractors because there is a lot, they do not have the knowledge nor capacity to challenge large scale contractors*".

5.8 Improving inexperienced sub-contractors

5.8.1 Planning as a key to success

Participants were asked how inexperienced sub-contractors can improve on their workmanship, the participants 3 answered by saying that "*counselling in the art of technical information flow, procurement lead times and site supervision will add value to the emerging contractor*". Participant 1 also emphasised that It is so important to study the design criteria and programs for maximum results.

All of the eight participants agreed that emerging sub-contractors could improve on their performance if they master the art of planning. Participant 7 mentioned that "*in construction, planning is critical for a smooth-running project. It is very important that emerging sub-contractors understand this because this will save us time on the construction program, it could help us identify problems or clashes sooner and it could avoid having to deal with penalties on a later stage*".

5.8.2 Relationship building with other contractors

Emerging sub-contractors should maintain a relatively close relationship with other contractors, as this is what has the potential to improve their performance. Participant number 8 mentioned that a potential way to improve emerging sub-contractor experience or performance would be to do "*Contract pairing with an experienced contractor of similar trade should help accelerate the learning process*". Participant 5 also said that "*for inexperienced sub-contractors to quickly gain knowledge, main-contractor should adopt an inexperienced sub-contractor as part of the sub-contractor development plan*".

5.9 Summary of the emerged themes

One of the questions this research study wanted to answer was the challenges that main-contractors say they mostly face when working with inexperienced sub-contractors. This was an important question as it had the opportunity to hold a lot of insight into one of the main issues of the study. Listed below are some of the main themes that came up during the interviews:

- Labour- usually lack skill and care

- They fail to understand the critical stages of the project
- Not easy to plan around emerging sub-contractors
- Lack of managerial skills
- Lack of good planning techniques
- Limited knowledge of construction contracts
- The need to provide extra supervision on health and safety

5.10 Triangulation

The term 'triangulation' originates in the field of navigation where a location is determined by using the angles from two known points (Heale, Forbes, 2013). Triangulation in research is the use of more than one approach to researching a question and the objective is to increase confidence in the findings through the confirmation of a proposition using two or more independent measures (*ibid*). Likewise, in the case of this research study, the concurrent triangulation strategy was tested as the research contained two sets of data in the form of quantitative data and qualitative data. The combination of findings from two or more rigorous approaches provided a more comprehensive picture of the results than either approach could do alone.

Table 5.28 shows the triangulation of the research study. The table contains the main points that were drawn out from the qualitative and quantitative data analysis. The table shows the research analysis for the three research questions for both quantitative and qualitative data.

Table 5.28: table showing the summarised data from quantitative and qualitative data for triangulation analysis

	Quantitative data analysis summary	**Qualitative data analysis summary**
Challenges observed by main contractors	Low quality Poor planning skills/management Low communication levels Health and safety risk Lack of understanding of construction contracts	Lack of good planning techniques Limited knowledge of construction contracts Lack of care towards work. Not easy to plan around them
Interventions made by made contractors	Quality sheets Performance appraisal techniques Communication of information Key potential indicators	A full-time foreman is on-site to attend to sub-contractors. Assistance with purchasing of material for sub-contractor.
Improving emerging/inexperienced sub-contractor work standards	Communication Early involvement in tender stage Manageable transfer of risk to inexperienced sub-contractors Easing contractual terms towards emerging sub-contractors.	Planning is most key to success Relationship building

The table above illustrates the main concepts derived in the data collection of both the qualitative data and quantitative data. the data collected in the two data sets showed the following similar results:

- Inexperienced sub-contractors demonstrate poor quality in their work
- Management of inexperienced sub-contractors demonstrate poor management
- There is a need for inexperienced sub-contractors to prioritise health and safety
- The provision of a full-time foreman acting on behalf of the main contractor, to ensure that work is done according to specification
- Planning and communication are important for the smooth flow of information
- Main contractors show a lack of support towards contractors that are emerging.

The diagram illustrated above shows the model after the data analysis has been conducted.

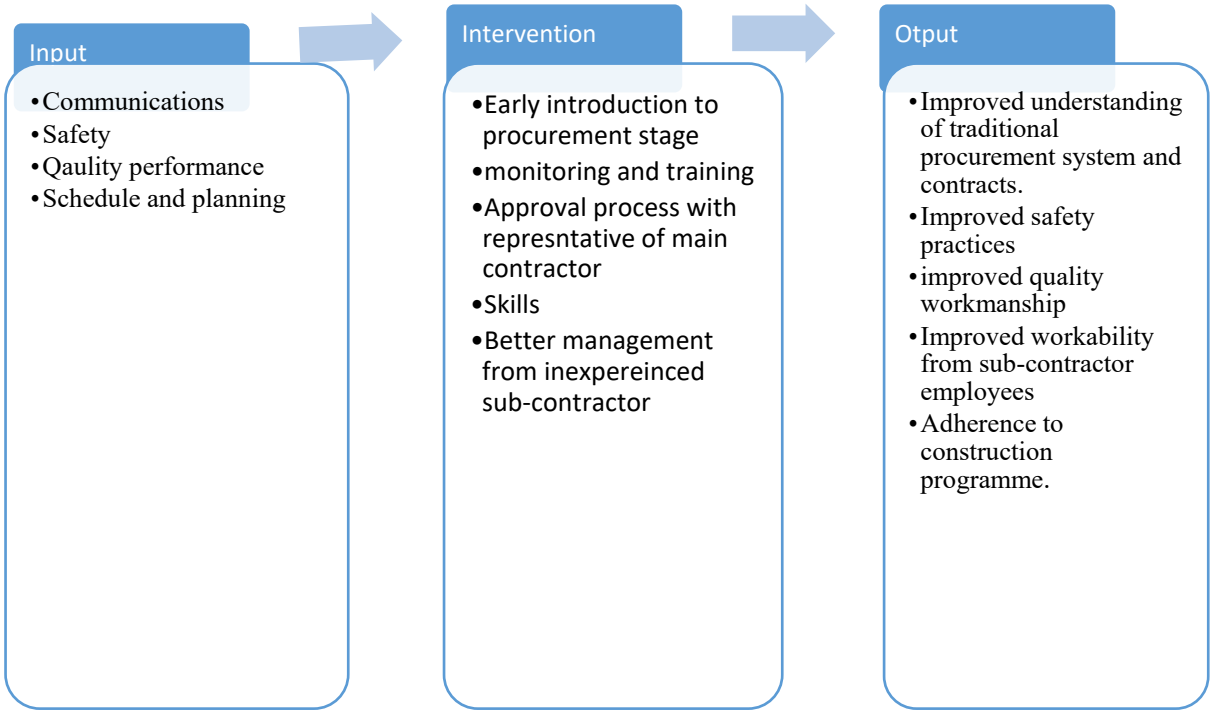

Figure 5:image showing the model after data analysis

The model is made up of three components, namely the inputs, intervention and outputs. In the model found in chapter four, the data shows the inputs which are the challenges main contractors face in working with inexperienced sub-contractors. The inputs before the data was analysed were drawn from the literature review and after conducting the analysis, the data model inputs changed and pointed out that communication, safety, quality performance and scheduling/planning are the challenges of working with inexperienced sub-contractors.

The interventions to the challenges, include close monitoring of works, conducting approval procedures and timely payments to sub-contractor act as means of limiting the impact of working with

inexperienced sub-contractors. The close monitoring of work and conducting the approval will reduce the risk of non-conformance.

The results from these interventions will mean that there will be an Improved understanding of traditional procurement system and contracts from emerging sub-contractors, Improved safety practices and improved quality workmanship.

5.11 Chapter summary

Chapter 5 of the study is the data analysis. This chapter starts by giving brief literature on what data analysis is and its significance. The chapter thereafter discusses the background information of the participants that took part in the study. The data analysis for the quantitative data is discussed in detail showing and also shows the results of the quantitative data. The qualitative data is also discussed in this chapter and the model for the improvement of inexperienced sub-contractor's performance is discussed.

Chapter 6: Conclusion and Recommendations

6.1 Introduction

This chapter contains that which is the final chapter of this research study. This chapter essentially introduces what is the end of the study, and in this chapter the researcher produces the conclusions and

provides recommendations to the problem. After an extensively detailed literature review, the researcher was able to collect some existing data related to the issue of contractors that are regarded as emerging/inexperienced.

6.2 Research problem

Sub-contractors play an extremely important role in the value chain of main contractors and as such their importance cannot be ignored. However, with construction being an extremely competitive industry newer organisations are always emerging to also compete in this industry, the threat of new and inexperienced sub-contractors emerges.

With main contractors relying so heavily on sub-contractors to perform certain trades, the potential to work with sub-contractors with limited experience exists and this creates a problem on the main contractor and the industry itself. emerging sub-contractors are highly susceptible to poor performances as they lack the necessary knowledge and experience to carry out complex works and this creates a lot of financial burdens on the main contractor.

The main aim of this is to identify what challenges main contractors face when they have to work with inexperienced sub-contractors. while doing so, the study also seeks to find if main contractors make any interventions in an effort to limit the potential impacts of working with inexperienced sub-contractors. finally, the research looks to see how inexperienced sub-contractors can accelerate their growth and performance in the construction industry.

6.3 Findings

Research question and objectives

Table 4.1: table showing the research question and objectives

Research question	Objective
Challenges that main contractors face in working with inexperienced sub-contractors	To determine what challenges main contractors face when working with inexperienced sub-contractors on construction projects.

6.3.1 Challenges that main contractors face in working with inexperienced sub-contractors

Literature on the challenges that main contractors face when working with inexperienced sub-contractor's sows that some of the challenges pertains to the lack of skilled labour. Skills shortage poses a greatest threat to the future of construction, and will continue as demand for construction work

increases (Utting, 2010). Main-contractors also do mention that inexperienced sub-contractors have a habit of bringing inadequate workmen to site, and this a practice hampers the flow of works. The poor performance of the South African construction industry is also largely influenced by misunderstanding, deprived workmanship with ineffectiveness of workers (*ibid*). Delays can be reduced by an increase in project planning and successful project management as they are one of the most critical success factors of the construction project accomplishment (Mzyece, Anikrah, 2012).

6.3.2 Questionnaire summary for the challenges main contractors when working with inexperienced sub-contractors.

One of the main aims of this research was to find out the challenges that main contractors face when they work with inexperienced sub-contractors. It was therefore crucial for the research to go into the depths of this of this question. A survey questionnaire was conducted through being sent out to different members of the construction industry between Durban and Cape town. This produced the following findings

Amongst perhaps one the most challenging aspects that main contractors face in working with inexperienced sub-contractors is that their quality does not necessarily match the expected quality criteria and because of that a lot of times it is found that their needs to be re-works done to remedy poor quality. The findings of the study also showed that the quality, technical performance, and functionality are closely related and are considered important to the owner, designer, and contractor. Sub-contractors are supposed to specialists in trades however with contractors that are emerging, meeting the standard quality criteria is not achieved by emerging contractors and this is one the challenges that main contractors face.

Participants mostly agreed that the level of communication from inexperienced and emerging sub-contractors does not make the experience of working with them any easier. The lack of communication in any venture creates a problem as well as hold ups and in an industry such as construction, sluggishness cannot be accepted according to the results. Communication issues leads to further challenges as this creates other challenges for main contractors such as poor collaboration, time delays and conflict. Participants also agreed that the lack of understanding of contracts and technical knowhow of inexperienced sub-contractors is another challenge that needs to be dealt with. Communication is a challenge that main contractors face when working with inexperienced sub-contractors. This shows in the data analysis as the majority of the participants agreeing that poor communication creates challenges such as:

- time delays,
- poor collaboration and
- poor understanding of work

Another that challenge to which respondents agreed on is the issue around deceitful practices. 57% percent of the participants agreed, saying that for main contractors, it is a challenge that they have to face. Participants also reacted strongly to that inexperienced sub-contractors are a safety risk as 83% of the respondents agreed to this as to being a challenge.

6.3.3 Interviews results summary

Interviews were conducted in the course of conducting this research study. The interviews of this research study produced results by way of manually scripting the responses given by participants.

The qualitative showed that that there are indeed challenges to working with inexperienced sub-contractor and some of these challenges include the issue around poor management. Participants mostly agreed that inexperienced sub-contractors need to improve on their level of competence on construction jobs as it is a high paced industry and being behind is not on any of the stakeholder's best interest. The interviews also showed that other challenges that main contractors face when working inexperienced/emerging sub-contractors is the issue of poor health and safety. In the interviews, the respondents responded very strongly towards health and safety, pointing out that emerging sub-contractors do not comply with health and safety acts. The participants mentioned that inexperienced sub-contractors do not necessarily price for health and safety and when it comes to the project they cut corners in the manner in which they conduct their work, placing the lives of workers at risk.

Inexperienced sub-contractors are said to be unreliable and reliability is a key factor in the construction industry. Most of the participants mentioned that emerging sub-contractors cannot be trusted especially in times when the project is at a critical and people are neede to stay in and work late to cover time and avoid delay penalties.

Table 6.2: table showing research question and objective

Research question	**Objective**
What measure/interventions are put in place by main-contractors that seek to reduce the impact of working with inexperienced sub-contractors?	To determine what efforts are made by main-contractors to assist inexperienced/emerging contractors to acquire the necessary experience to perform effectively in construction projects.

6.3.4 Interventions made by main contractors to limit the impacts of working with inexperienced sub-contractors.

A large involvement of sub-contractors is found in construction and this means that competition to get work is tight as pricing is considered first in construction. This has resulted in main contractors concentrating their effort, on managing construction site operations rather than employing direct labour to undertake construction work (Enshassi, 2013). Main contractors make utilise sign-off sheets and

quality assurance documents to emerging sub-contractors. The benefit of such document is that it protects the main contractor if work was not done according to specification. In cases where there is non-conformity in the works done by a sub-contractor, such documents can be used to determine if the proper procedures were followed prior doing the work. This does not only serve as an advantage to the main-contractors but also the sub-contractor who will be able to know if the particular trade may commence and how the finished product should look.

6.3.5 Findings of the questionnaire to the interventions made by main contractors to limit the impacts of working with inexperienced sub-contractors.

The second objective of this study was to see if the main contractors make or provide any interventions that seek to reduce impact of working with inexperienced sub-contractors. The results in the data analyses provided us with findings and it showed that main contractors make use of quality assurance documents to sub-contractors and this is used in the effort to ensure that all preparations needed before a particular is trade is performed. The quantitative data also showed that performance appraisal criteria are performed or rather emerging sub-contractors are not provided with feedback on their performance. The interviews also suggested that main contractors are in the business of making profit and if it does not have an incentive they would not engage in the activity. The data also showed that incentives are not given to sub-contractor on meeting the contractual obligations.

Information is always passed on in time for the sub-contractor to perform accordingly; this is what the respondents agree on in terms of the flow information from main contractor to sub-contractor. Furthermore, to assist inexperienced sub-contractor's main contractors assign a qualified person such as a foreman who is to assist and direct sub-contractors ensuring that the works are done accordingly.

On time payments and lots of emphasis is another one of the interventions that respondents agreed to in the questionnaires. On time payments ensures that the project continues without having financial battles between contractors. Health and safety are also closely monitored so as to ensure the improvement of inexperienced sub-contractors.

6.3.6 Interview results

Section B of the research study was aimed at pointing out the interventions or strategies made by main contractors in an effort to limit the impact of working with inexperienced sub-contractors.

The results of the interviews revealed that main contractors make use of qualified/skilled personnel such a foreman, who will be the closest contact to the inexperienced sub-contractor. Having the foreman means that emerging sub-contractors have a point of reference when they encounter challenges. Participants in the interviews also mentioned that having a foreman benefits the emerging sub-contractor. To assist emerging sub-contractors mentioned that emerging sub-contractors are sometimes

assisted, by having the main contractor purchase material on behalf of the sub-contractor so as to ensure that the project does not come to a hold. Participants also mentioned that on projects which are critical, there is an added team who will monitor the works of sub-contractors.

However, most of the participants said that they there is not enough effort made by main contractors to help emerging sub-contractors and that the main contractors are sometimes a bit too harsh on these contractors due to the fact that they know they have limited knowledge on the operation of the construction industry.

Table 6.3: table showing research question and objective

Research question	**objective**
How can sub-contractors with limited experience improve their standard of work to conform with the requirements of principal contractors?	To develop a model to improve inexperienced/emerging sub-contractor standard of work for the construction industry.

6.3.4 Questionnaire to develop a model to improve inexperienced/emerging sub-contractor standard of work for the construction industry.

Planning is a fundamental and challenging activity in the management and execution of construction projects which involves the choice of technology, the definition of work tasks, the estimation of required resources and the duration of individual tasks, and the identification of any interaction among the different work tasks". Working out a construction plan is a critical task when it comes to management of construction project as it determines the layout of how the construction project will be executed within the scheduled period of time to ensure cost and expenses is not exceeded while maintaining the specified quality. The inability of the contractor to complete the aforementioned works at any stage prior to practical delivery can be classified or categorized as an abandoned project (Akinradewo and Aigbavboa, 2019).

6.4 Findings to questionnaire for the model to develop inexperienced sub-contractors

The last objective of the study wanted to develop a model that will be suitable for inexperienced to accelerate their growth in work trades.

The results of the questionnaire showed that an improved level communication from inexperienced sub-contractors would help accelerate information. Participants also agreed that main contractors should get inexperienced sub-contractors involved in traditional procurement process as this will ensure better understanding of the construction for emerging sub-contractors.

6.4.1 Interviews

Section C was aimed at developing a model to improve inexperienced/emerging sub-contractor standard of work for the construction industry. During the process of conducting the interview certain themes emerged and for section C the one theme that came across very strongly was planning. Participants suggested that for inexperienced to improve on how they perform, it is important for them to master the art of planning. Planning is a very critical aspect in construction and it is extremely important for all participants to understand that as it saves time, money and gives of good quality. Furthermore, participants also emphasised the need for emerging sub-contractors to go for courses on construction contracts and also send workers to for skills training as this is the only way in which emerging sub-contractors can accelerate their growth. Keeping a close relationship with other contractors will come in for inexperienced sub-contractors. Only risk that is manageable for an inexperienced sub-contractor should be transferred according to the results and contractual obligations should be eased towards inexperienced sub-contractors.

6.5 Recommendations

The following are recommendations for further research:

1) Further research on the challenges can be conducted on all provinces
2) More sub-contractors should be included for future studies.
3) The need to adopt an emerging/inexperienced sub-contractor incubation

6.6 Chapter summary

This chapter is the final chapter of the research study and it essentially discusses the final findings and the researcher thereafter gives the recommendations to the research study. The research study was provided a detailed literature review around the topic of interest of the study. A research methodology also provided the road map to how the study was to be conducted. A mixed-method of data collection was used in the data collection process and qualitative data and quantitative data were analysed by Nvivo (V12) and SPSS (V27) respectively. Chapter 4 of the study introduces the model and chapter 5 the data analysis. After an extensive review and data analysis, the researcher was able to draw conclusions to the study.

It can be concluded that main contractors find it unfavourable to work with inexperienced sub-contractors, and that main contractors do not make considerable amounts of efforts towards assisting contractors that are emerging. However, through close relationship building, going for courses and taking labour to training will see a change in the positive direction for inexperienced/emerging sub-contractors. The research problem requires further investigative study as this will eliminate questions that may have not been answered due to limted knowledge around the topic of the study as wel as the

Covid-19 pandemic that limted data collection results. Hence the research question has been answered but to reach full conclusion, it will require further investigation.

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8.0 Appendixes

Ethical clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

07 October 2019

Mr Mcebo Mpucuko Mathenjwa (215051162)
School Of Engineering
Howard College

Dear Mr Mathenjwa,

Protocol reference number: HSSREC/00000517/2019
Project title: A review of the challenges faced by main contractors in working with inexperienced sub contractors

Full Approval – Expedited Application

This letter serves to notify you that your application received on 16 September 2019 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid for one year from 07 October 2019.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

Yours sincerely,

Dr Rosemary Sibanda (Chair)

/dd