BUQS4031: Research Report

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Abstract

Effective delivery of project that meet clients’ satisfaction is a fundamental to develop and sustain a health, profession and a competitive construction market. The aim of the research study is to investigate how construction project management tools and techniques can be effectively project managers to improve project performance in order to achieve client satisfaction. The paper addresses the challenges which the construction industry faces which results in project overrun, financial loss and overall performance of the project. These challenges are addressed through the effectiveness application of project management tools and techniques. This is mainly because project managers are the client's representative and they are key roles in delivering successful projects.

The study adopted the pragmatic research design philosophy; it uses mixed methods which is both qualitative and quantitative. Data collection will be conducted through a survey (questionnaire) and structured interviews as the strategy of the research. Cross-sectional time horizon is the most suitable horizon we can possibly use on this research because the research is being done on a particular time.

The study comprises of three limitations, Project management practices vary across countries. The limitation is that PMBOK has a universal application that needs to be contextualized. Client satisfaction is subjective, so difficult to measure. Therefore, in this research study it will be limited to the performance of the final product. The nature of the construction industry is fragmented and dynamic. This poses an unending challenge for the project managers. Overall, the study discusses the variables in relation to the objectives of the study.

Keywords: project management, project performance, measuring project performance, client satisfaction, measuring client satisfaction, PM’s tool and technique.
CHAPTER ONE-INTRODUCTION

1.1 Introduction
There is currently a big challenge in the construction industry facing project managers, and that is carrying out construction projects that perform effectively and ensuring that they are delivered to the clients’ satisfaction (Guerin, et al., 2012). The existing construction project management methods seem to be lagging behind on the necessary ways of effectively applying the construction project management tools and techniques. Not applying these tools and techniques effectively leads to poor performance. As a result, this makes it challenging for project managers to deliver projects that meet the client’s expectations. The research topic for this research area is; Effective application of the project management tools and techniques to improve project performance towards achieving client satisfaction. The literature does acknowledge that this is a worldwide problem, however for the convenience and validity of the study, the researchers will focus on the South African construction industry. The terms “construction project management” and “project management” are used interchangeably in the context of this study.

1.2 Background
Over the last decade the construction project management practice has faced a lot of challenges and criticisms due to the continuous poor performance and delivery of many projects (Thomas & Mengel, 2008). Project performance can be affected by poor project management due to the various tools and techniques a project manager applies during the process of a construction project, on which they may create an undesirable outcome for the project, especially to the client. With the advancing modern technology, large capitals, widely dispersed project participants, strict quality requirements, and building designs have advanced, and project sizes have grown bigger (Matheu. 2005). This has led to the construction industry being notorious for late completion, being out off budget, poor communication and scope creep, which proves that project managers are not effectively applying the tools and techniques designed to manage construction projects (Guerin, et al., 2012). This means that the existing project management practice is lagging behind on the necessary ways of effectively applying tools and techniques to manage construction projects. Thus, there is a sense of urgency and a great need for project managers and their organizations to improve on their management approach of construction projects in order to enhance the overall performance of projects. This will enrich the project
management practice in the construction industry and increase the quality of the output and improve client satisfaction.

Alias et al. (2014) argued that practices of different organisations in the construction industry do not always ensure that a project will be successful. A failure of delivering a successful project leads to client’s dissatisfaction. Traditionally, the main problems with project management practices have always come to planning, project Implementations, cost and time overruns and poor quality. Whereas, Livesey (2016) dealt with process problems in project management which also affects project performance rather than outcomes such as cost and time overrun. Livesey (2016) mentions problems when nature of project changes the scope coupled with changes to team membership. Scope changes are always encountered on construction project and have the capacity to sabotage project performance. The nature characteristic of projects springs out performance problems in the construction industry. This makes it challenging for project manager to manage the projects and at the same time satisfy the client. The temporally nature of projects result in uniqueness of projects and having a high degree of uncertainty which requires flexibility in project managers and other teams involved. Initiative for improving project performance and client satisfaction has been stressed on enhancing tools and techniques. The degree of sophistication of tools and techniques including the types and number of personnel involved will highly depend on the nature and complexity of the project (Alias et al., 2014)

Coopers (2014) discussed that the construction and material industry has had a drop in terms of performance over the past few years. The industry has continued to produce poor performances financially and as a result, this has placed the industry slight on a downward trend.
Figure 1.1 showing South Africa’s market capitalisation: JSE vs. Construction Material Index over the past few years (Price waterhouse Coopers, 2014).

From the diagram; it is clear that the industry has not performed well over the past recent years. Poor construction project management can also be to some extent considered to have had a contribution towards the overall underperforming of the industry. South Africa is a developing country, and infrastructure development is one of the country’s focuses. Therefore the need to effectively apply tools and techniques in project management practice to manage infrastructure projects is necessary. Currently, the South African Government has committed itself to public investment of about R847 billion on ongoing National Development Plan between 2015 and 2017 (Price water house Coopers, 2014), which is a good indication that the construction industry is growing despite its overall poor performance over the past years.

1.3 Research problem
The existing project management methods seem to be lagging behind on the necessary ways of effectively applying the construction project management tools and techniques. Not applying these tools and techniques effectively leads to poor performance. As a result, this makes it challenging for project managers to deliver projects that meet the client’s expectations.
1.4 Context of the research
The context of this research is on the application of project management tools and techniques and how they affect project performance towards delivering projects to the client’s satisfaction.

1.5 Consequence of the problem
Challenges in effectively applying project management tools and techniques to manage construction projects results to poor performance which eventually causes project overrun, affects the cost of the project which will lead to a financial loss, quality of the project being compromised which will be an inconvenience to the client. Due to this, the project manager’s reputation and that of his company will be affected. Client satisfaction is essential for survival of the company (Rahman et al, 2012). In terms of this research client satisfaction is defined as the comparison between an individual’s perception of an outcome and the expectations for that outcome.

Ryd, (2014)’s study showed that the clients prefer the construction companies with good image when it came to the companies they chose for their projects. Failure to deliver the project to the client’s satisfaction also affects the potential to build a long term relationship between the company and the client. One of the most encouraging findings on Ryd, (2014)’s research was the responding clients’ willingness to do possible repetitive works with the same contractors if they are fully satisfied.

1.6 Aim of the study
The aim of this research is to investigate how construction project management tools and techniques can be effectively applied by project managers to improve project performance in order to achieve client satisfaction.

1.7 Research objectives
The three objectives of this research include:

- Identifying what constitutes tools and techniques in project management;
- Investigating how the application of tools and techniques affects project performance; and
● Establishing how project performance impacts on client satisfaction.

1.8 Primary research question
How can project management tools and techniques be effectively applied to improve project performance towards achieving/meeting client satisfaction?

1.9 Research questions

● What are the existing project management tools and techniques?
● How does the application of tools and techniques affect project performance, beyond the triple-constraint outcome-focused on time, cost, and quality?
● Why is it important for project management organisations to ensure that they deliver projects that meet client satisfaction?
● Why is it the important to apply project management tools and techniques effectively?
● What role is project management playing on to client satisfaction, considering the subjective nature of satisfaction?
● What is the importance of continuously improving project management practices in the construction industry?
● How do clients’ past experiences influence their expectations on a specific project?
● What constitute a project success?

1.10 Research sub-questions

● How can Project management tools and techniques be effectively applied?
● To what extent does the application of tools and techniques improve project performance?
● What aspects can be improved on the currently existing project management approach in order to improve project performance?
● Which tools/techniques have been applied successfully on various construction projects?
● How can client satisfaction be assessed with regards to Project management?
● How important is it to monitor construction projects to ensure client satisfaction?
How can the level of client involvement on a project increase the likelihood of delivering the project according to their satisfaction?

1.11 Research scope
The effective application of Project management tools and techniques to improve project performance and further achieve client satisfaction in the construction industry.

1.12 Delineations
This research focuses on the construction project management tools and techniques and how they influence project performance and contribute towards client satisfaction in the construction industry.

1.13 Methodology
Integrative research review will be adopted. An Integrative research review is a distinct form of research that generates new knowledge about the topic being reviewed (Torraco, 2005). This method is a combination of both the qualitative and quantitative approach and it helps provide better and broader knowledge on the research area. This research methodology was chosen because of its ability to provide explicit detail on the study is going to be conducted. According to Callahan (2010) a good integrative literature review is a methodology that clearly outlines:
(i) Where the literature was found;
(ii) When research was conducted;
(iii) Who conducted the research?
(iv) How the literature was found;
(v) What number of articles appeared from each combination of keywords and the final count of included articles; and
(vi) Why some articles were chosen for inclusion over others.

Following the outline of the integrative literature review, the literature that will be sought in this study will be focused on the construction industry and it will be mostly that those published within the last five years (i.e. 2011-2015), as much as possible. In order to obtain additional data and information that is more relevant to the research area, specific journals such as listed below will be used.
The following key words for the research area are developed: (1) Construction Project Management, (2) Client satisfaction, (3) Project management tools and techniques (4) Construction project performance, and (5) South African construction industry to obtain relevant journals and channel the study to the research problem area. Key words were used to search for relevant journals articles and books from the Google Scholar search engine.

In addition, data for the research will be captured through the selection of construction contractors and consulting companies located around the Johannesburg region. These companies will be selected from data bases of construction industry development board (https://registers.cidb.org.za/PublicContractors/ContractorSearch) and the Green Building Council of South Africa list of registered companies (www.gbcsa.org.za/network/directories/member-list/). Emails to request for interviews will be sent to all the listed companies. The reason for sending requests to all the listed companies is so that we can get as much response as we can, these emails will also be accompanied by questionnaires. Large scale survey will be conducted which will incorporate at least 30 construction project participant equally drawn to include Architects, Engineers, Quantity surveyors, Construction and/or project managers and private clients. The respondents will be kept anonymous. The questionnaires constructed will be clear and straightforward in order for respondents to easily comprehend. In addition, questionnaires will be structured in an inoffensive manner. Important questions will be structured systematically from most important to less important. Structured Interviews will be conducted because the respondent gets to provide the needed information orally and face to face. In order to get the respondent to fully engage in the interview, factual questionnaire will be posed before controversial matters are introduced. Prior to the commencement of the interview, permission to record the interviews will be asked for from the respondents and notes will be taken. As a result, the data collected will also be of help to other developing countries beyond South Africa; they could use the data or conduct the same for their countries as well.
1.14 Assumptions

- Effective application of project management tool and techniques improves project performance (Kerzner, 2013)
- Effective application of project management tool and techniques improves a project manager’s competency (Kerzner, 2013)
- Project performance affects client’s satisfaction (Kärnä, 2014)
- Project management practices are interrelated to client satisfaction (Kärnä, 2014)
- There is direct link between project management practices and project success/ performance (Mir & Pinnington, 2014)
- Project success leads to client satisfaction (Kärnä, 2014)
- It is assumed that the researchers will find the effective ways of applying these tools and techniques through the literature and interviews that will be conducted throughout.

- The full application procedure suggested on the PMBOK is the standard measure of effective application of the project management tools and techniques (Rowley, 2013) and (PMBOK, 2013)

1.15 Limitations

- Project management practices vary across countries. The PMBOK has a universal application that needs to be contextualized.
- Client satisfaction is subjective. Therefore it will be difficult to measure. In this research study it will be limited to the performance of the final product.
- The nature of the construction industry is fragmented and dynamic. This poses an unending challenge for the project managers.
- Measuring the effectiveness of project management tools and techniques will be a challenge since it is subjective.
- The application of project management tools and techniques will be restricted to the PMBOK.
1.16 Ethical considerations
The respondents will be kept anonymous; they will be known to the researchers however their identity or anything that connects them to the information will not be displayed. The questionnaires constructed will be clear and straightforward in order for respondents to easily comprehend. In addition, questionnaires will be structured in an inoffensive manner.

- During the survey conduction of this research, the questions which will be posed to the respondents will be structured in a manner which is not offensive.
- The information which the survey respondents may provide for this research could possibly reflect badly on them and the company they work for.
- During the surveys, factors such as where we meet when obtaining data will be considered in order to make sure that the respondents are comfortable and mutual respect is maintained regardless of the gender and race.
- Information obtained from the respondents will be kept inaccessible and from the third party, information will kept on the drive with a password only know by the researchers.
- The research study will strictly adhere to the ethical procedures set out by the school of Construction Economics and Management of the Wits University.

1.17 Rationale and significance of the study
It is every project managers’ aim to deliver a project that is completely successful. However achieving this becomes a challenge when the effective ways of applying the project management tools and techniques are not fully adopted. The project is barely successful and performs poorly without the correct application of the required tools and techniques. Therefore, this creates a need for project managers to fully adopt effective ways of applying tools and techniques in project management practices so as to manage project effectively, improve project performance and thus fulfill clients’ needs, wants and expectations.

It is also to establish ways on how the PMBOK’s tools and techniques can be effectively exploited in construction projects to improve performance, which will help minimise; late completions, poor quality delivery, scope creep and client dissatisfaction. This will also ensure
that project managers deliver projects that perform effectively and efficiently to bring about client satisfaction.

High performing projects makes the best use of the client’s capital and enhance the project value. It also helps in Value engineering which aims at eliminating unnecessary cost associated with the project. Without clients, the construction industry ceases to exist, hence it is necessary to adapt with the changes and continue improving project performance in the construction industry.

**Report Structure**

This research report is arranged into five chapters.

Chapter 1 (Introduction)

Introduces the research topic, provides a background to project management tools and techniques, project performances and client satisfaction. It also goes into discussing the interrelation between these concepts. This chapter highlights the research aim and objectives and provides an overview of this study.

Chapter 2 (Literature Review)

On this chapter states the purpose of a literature review and considers the definition of tools and techniques, project management, project performance and client satisfaction. This chapter discusses the strategies of measuring client satisfaction and the application of the tools and techniques discussed on the PMBOK. The state of the South African construction industry market is discussed. Furthermore, the aspects of project management, project management tools and techniques, project performance and client satisfaction are explored in a deeper perspective in order to discuss and substantiate the research problem at hand.
Chapter 3 (Methodology)

Chapter describes the research design that will be undertaken to answer the research question and subsequent objectives of this study. The chapter further discusses the different research approaches and methods that can be used for data collection. Furthermore, it introduces the use of mixed methods for this study and reviews the reliability, validity and ethical issues that need to be considered. Lastly chapter 3 sets out the constraints inherent in this study, the research plan and resources required for the successful execution of this research study.

Chapter 4 (Data Analysis)

Here the researchers discuss how the findings and results collected from the questionnaires and structured interviews will be analysed and interpreted. This chapter will also evaluate and point out the different tools and techniques that are considered the most easy to apply and most likely to be effective when applied.

Chapter 5 (Conclusion)

Concludes this study by summarizing the findings, answering the research questions and it highlights the practical and theoretical implications. Additionally, it will discuss the limitations of this research and will recommend avenues for future research.
CHAPTER TWO - LITERATURE REVIEW

2.1 Definitions

2.1.1 Project management
Maserang (2002) defines project management as “the application of a collection of tools and techniques” to the best use of resources towards the accomplishing of the unique and one time task within a limited budget. The SACPCMP has defined Construction Project Management as the management of the physical construction process within the Built Environment from conception to completion, including management of related professional services.

According to the PMBOK (2013) guide “Project management is the application of knowledge, skills, tools and techniques to various project activities in order to meet project requirements”. Project management serves a significantly important role of ensuring that a project is carried out and coordinated effectively towards meeting the project requirement and achieving client satisfaction within the specified time, cost and quality. Project management involves 10 key Project management Knowledge areas which are set out in the PMBOK (2013) and these have proven to be significantly important during the process of managing a construction project. These key areas involve the following:

- Project Integration Management
- Project scope management
- Project Time management
- Project cost management
- Project quality management
- Project human resource management
- Project communication management
- Project risk management
- Project procurement management
- Stakeholder management

In addition to these knowledge areas the project manager also has to deal and focus on these managerial areas:
Claims Management:
PMI, (2007) “Claim management describes the processes required to prevent construction claims, to mitigate the effects of those that do occur, and to handle claims quickly and effectively.”

Project Risk Management
PMI,(2007; 95)“Risk management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project; most of these processes are updated throughout the project. The objectives of Project Risk Management are to increase the probability and impacts of positive events and decrease the probability and impacts of event adverse to projects objectives”

Project safety management
PMI,(2007)“Project management processes include all activities of the project sponsor/ owner and the performing organisation which determine safety policies, objectives, and responsibilities so the project is planned and executed in a manner that prevents accidents, which cause, or have the potential to cause, personal injury, fatalities, or property damage”

2.1.2 Project management tools and techniques
Tools in the PMBOK, 2014 are defined as something that is tangible, such as a template; it may also be a software programme used when doing a task to produce a product or obtain results. A technique according to the PMBOK (2014) is a systematic process that is adapted by the employed human resource to perform a task in order to produce a product or results. One thing common about these two concepts is that they are both used in order to produce a product or obtain results. Therefore our focus is based on the application of all the techniques and tools that the PMBOK layout to be use by project managers to produce the best.

2.1.3 Project performance
Project performance refers to the art of carrying out a given task for the fulfilment of the set out project objectives, in the case of the construction, for the fulfilment of the employer’s objectives.

Erickson (2011) argued that Project performance is not defined by short term focused iron triangle (time, cost and quality) it also includes environmental impact, work environment and
innovation. This is a crucial determination of project performance in terms of long term competitive advantage and for sustainable development. Environmental impacts comprises of amount energy usage, emission associated with the construction process and final product. Work environments deals with the health and safety in the construction process. A safe work environment is essential for a sustainable work environment. Innovation includes methods, materials and technologies in the final product.

2.1.4 Effectiveness

In the simplest terms, effectiveness means doing the right thing when differentiated from efficiency. Business dictionary defines it as the degree to which something is successful in producing a desired result. Schillinger, (2010) referred effectiveness to the intervention’s ability to do more good than harm for the target population in a real world setting.

2.1.5 Client satisfaction

Client satisfaction refers to when the employer’s perception of the services matches or exceeds their expectations. Various clients perceive services in their own unique ways; satisfaction is the client’s cumulative memory of many positive experiences (Ahmed, et. Al, 1995).

Cengiz (2010) defined Customer satisfaction as a highly personal assessment that is greatly influenced by individual expectations. Client satisfaction is based on the observation that customer satisfaction or dissatisfaction results from either the confirmation or disconfirmation of individual expectations regarding a service or product. Client satisfaction is an issue on every part of the world, including in the South African construction market.

2.2 Insight on South African construction market

Data taken from Timetric, (2016) gives an insight on what is going on in the construction industry market; it shows that the construction industry is going to be the second-fastest growing market over the forecast period. The construction industry is boosted by the government's plan to improving South Africa’s transport infrastructure (Timetric, 2016). Timetric, (2016) also found
that the focal point of the government is developing rail infrastructure across the country and investments in infrastructure construction will support economic growth. This is opens a path and shows that contributors to the market growth will be mostly from the public clients in South Africa. The construction market is expected to increase in importance over the forecast period. Strategies tested to reduce South Africa’s housing deficit will also boost the market growth over the next five years (Timetric, 2016).

This is a peak season for the South African construction industry and it could be the busiest (Timetric, 2016). This season can also come with a lot of pressure towards the project managers since they are expected to deliver on-time, on budget with no compromise on quality. Now with all of this pressure and several projects to focus on, is it possible for the client to be receiving full satisfaction on the end product? Is it possible for project managers to effectively apply project management tools and techniques to ensure that a project is not only about the main objectives of the project manager but also the performance of the project to meet the client’s satisfaction? Though South Africa is known for having such a fast growing construction market it is not known how well they are doing when it comes to clients’ satisfaction. Therefore it is of important to also look at the application of the project management tools and techniques when carrying out a construction.

2.3 Tools and techniques

Tools in the PMBOK, 2013 are defined as something that is tangible, such as a template; it may also be a software programme used when doing a task to produce a product or obtain results. A technique according to the PMBOK (2013) is a systematic process that is adapted by the employed human resource to perform a task in order to produce a product or results. One thing common about these two concepts is that they are both used in order to produce a product or obtain results. Therefore our focus is based on the application of all the techniques and tools that the PMBOK layout to be used by project managers to produce the best.
Construction projects are relatively unstable and dynamic in their nature, which makes it challenging enough to manage (Love et al., 2002), despite their size. Livesey (2016) stated that the need for Project Management Body of Knowledge Skills and team management skills is almost inevitable, however, the importance of these skills vary depending on the project size. The need for both these skills is considered to be of great importance as the project size increases. This goes to show that construction project managers do not attempt to fully apply the project management tools and techniques on projects unless the project is a mega project. Thus affecting the performance of the construction project and compromising the project delivery to the client’s satisfaction. Therefore project managers need to respond appropriately to change and the nature of projects by effectively and fully applying the project management tools and techniques provided in the PMBOK to help enhance the performance of projects and achieving the set out project requirements (Love et al., 2002).

Atkinson (1999) stated that project management continues to fail possibly because for many years project management success has been and is still restricted to the iron triangle of project which includes time, cost and quality. Atkinson (1999) believes that project managers may be committing a continuous error of and that is the reluctance of including additional success criteria. This has created an unrealistic view of project success, however if the focus of the project management success can be widened to other include other aspects from the key areas of project management, this will stretch the application of project management tools and techniques. As a result improve project performance towards achieving project objectives and client satisfaction.

Project Management Body of Knowledge covers a number of tools and techniques to be applied under each body of Knowledge. The researchers have gathered information on the different tools and techniques that the PMBOK introduces. The researchers’ assumption is that the application of tools and techniques suggested by the PMBOK is the standard application that the project managers have to adopt for the effective application of the tools and techniques. The tools and technique found on the PMBOK (2014) are discussed in detail for the reader to have an
understanding of how these tools and techniques are applied and where they should be applied. The PMBOK guide is the annotated standard since it contains both the what-to and the how-to information (Rose, 2013).

Expert judgment - this tool is recommended by the PMBOK for: planning schedule management, defining activities, estimating activity resources and estimating activity durations.

This tool is used on a lot of planning processes under each knowledge area of the PMBOK. For project management, an expert can be someone who is considered a subject matter expert or a consultant (Heldman, 2013). The subject matter expert has generalized knowledge about a subject, and the team member expert has specialized knowledge about a specific aspect of the project. Expert judgment is used for: Consulting those who have had enough encounters to know the ins and outs; pros and cons and how the schedule must be managed, The expert will know what resources were required on the previous projects, and how long it took to do the activities of that project. This is to also communicate with the people who have specialized knowledge of the project scope statement and the work breakdown structure (WBS), in order to take each work package and define tasks that are required to complete them (Rowley, 2013). Analytical techniques are usually used when there is strategic decision to be considered Roudias, (2015). In the planning phase, one has to make a choice on the estimating technique to use, whether to use a schedule compression technique i.e, fast tracking or crashing, and the risks of the project may affect the schedule.

Project stakeholders are affected by the project schedule, meetings are needed for the input of those stakeholders to be gathered, and ensure that every participating member of the team is informed about what is going on in order to prevent as many changes from occurring farther down the schedule line.

2.3.1 Decomposition, Rolling Wave Planning

Decomposition is a tool used to define activities. It is a manner of using the work breakdown structure, which has work packages in small unit of scope to be carried out, and translating those small units into tasks that are required to create work packages (PMBOK, 2014) and (Rowley,
Rolling Wave Planning is a technique of progressive elaboration; this technique is an aid for planning upcoming activities in greater detail and those that come on later in less detail (Stackpole, 2013).

### 2.3.2 Precedence Diagramming Method (PDM) and Dependency Determination

Dependency Determination is used to discover if tasks have mandatory or discretionary dependency, and internal or external dependency. Discretionary dependencies are built on best practices, but can be changed if compulsory for fast tracking or crashing, while mandatory dependencies have no such litheness (Jaskowski & Sobotka, 2012). External dependencies are out of the project team’s control whereas the internal dependencies are within the project team’s control (Sholarin & Awange, 2015).

### 2.3.3 Alternative Analysis, Published Estimating Data, Bottom-Up Estimating

These tools and techniques are used for estimating activity resources. The keyword that links all of these tools & techniques together is the word resources (Rowley, 2013). It is impossible to figure out the duration of an activity without knowing the quantity of resources available to carry out task. Alternative Analysis is an option for the different alternative resources that can be used to achieve the same activity. Published Estimating Data provides data on the unit costs of numerous resources that can be utilised on the project And Bottom-Up Estimating collects each estimate for the quantity of resources used for each activity required and create a work package (Rowley, 2013). These estimates are summed up to get the total amount of resources required to produce that work package.

### 2.3.4 Analogous Estimating, Parametric Estimating, Three-Point Estimating, Group Decision-Making Techniques, Reserve Analysis

The keyword that links all of these tools & techniques together is the word durations. Analogous Estimating and Parametric Estimating are based on historical data taken from previous projects, but analogous estimating is based on the production of the whole project whereas parametric estimating is based on a unit cost of doing the project (Rowley, 2013). Group Decision-Making Techniques are used to brainstorm with all of your team members as a group in order to improve
estimate accuracy (Trendowicz & Jeffery, 2014). Reserve Analysis is an alternative way in which risk management enters into time management. Based on analysis of possible risks that may disturb the schedule, it use Contingency Reserves in the form of time reserves. If risks that are anticipated at certain points in the project do not materialize, then those buffers can be absorbed and the schedule made shorter (Trendowicz & Jeffery, 2014) and (Rowley, 2013).

According to Rowley (2013) Schedule Network Analysis, Critical Path Method, Critical Chain Method, Resource Optimization Techniques, Modelling Techniques, Leads and Lags are tools and techniques used for developing and controlling the schedule. PMBOK (2013) describes Schedule Network Analysis as an all-inclusive term for techniques utilised for building the schedule model, and this comprises the next three techniques of the Critical Path Method, the Critical Chain Method, and Resource Optimization Techniques. The Critical Path Method decides which activities are going to be on the critical path of the project, this means if one of the activities on the path delay; the entire project will delay (Rowley, 2013). The Critical Chain Method adds barriers to prevent any interruptions along the critical path.

Resource Optimization Techniques takes into account the fact that, although it may take a certain amount of work periods to complete an activity; resources must be shared among projects. Finally, Leads & Lags are those activities which must start earlier or (leads) or later than (lags) their predecessor activities finish.

2.3.5 Schedule Compression

Here is where you need to investigate the techniques of fast-tracking (doing activities in parallel which were earlier planned to be done in sequence) and crashing (adding more resources to get the job done in less time). Rowley (2013) described crashing the opposite of resource optimization techniques like resource levelling, described in the previous paragraph. Fast-tracking reduces the time, but the offset is that increases the risk that the work done may be of lower quality and may have to be redone.
2.3.6 Project management software and scheduling tools

Take the resources and apply them to activities and to build the schedule model; Microsoft project and primavera are examples of such tools (Rowley, 2013).

Performance Reviews

These are the reviews of how the project is performing in actuality as opposed to how it is supposed to be going according to plan. If is not going according to plan, this will necessitate changes to the schedule (Rowley, 2013).

All the tools and techniques discussed are recommended by the PMBOK, 2014.

Overall, managing a project is a challenging task with many responsibilities at stake. Maserang (2002) discusses that there are many tools that are available to aid the accomplishing of task and process. Some of these tools require software from a computer, while others have to be practiced manually. No one tool addresses all project management needs. Maserang (2002) mentions Program Evaluation Review Technique (PERT) and Gantt Charts are two of the most commonly used project management practices. Clarke & Herman, (2012) argues that the resource breakdown structure includes personnel and tools. Work breakdown structure (WBS) is one of the techniques project management use to manage the construction project. WBS is a set of organised hierarchy of task.

CPM, Gantt charts and PERT are widely used tools in the practice of construction project management to control various processes in the construction phases. However, they could be useful for scheduling of the project but these tools do not manage the overall process of performance. For example, CPM can determine how change in time needed to complete one activity, as for preparing for the drawings, it may affect the overall completion time for the project. The construction project management practice has seen significant innovation over the years to try and make it a more established profession even though it still seems to be receiving criticism.
2.4 Innovation of Project Management

Why is it so important to develop the project management practice? Winter et.al (2006) discusses the need for innovation in project management and highlights urgency of improving practices in the construction industry due to the criticism the currently existing approaches are getting. The project management practices need to develop in relation to the continuously developing industry. In addition there is a significant need to for new approaches and thinking in areas such as project complexity, creation of value, conceptualisation of projects, and also in the development practitioner Winter et.al (2006). Therefore there is a need to extend and enrich the project management field beyond its current knowledgeable bases and connect it to the continuous improving construction markets and client satisfaction.

Hodgson (2002) discusses how the project management practice has expanded over the years as a profession, starting from the construction and engineering field and then spreading to the various sectors such as health-care, IT, education and media (Hodgson, 2002). It is however more dominant in the construction and engineering field. Therefore, since this profession has grown this wide what is the current state of project management in the construction industry today? Project management appears to have transformed to a certain extent over the years; nowadays most of the project work is being organised through programmes and utilisation of IT systems for efficient structuring and organisation of project processes (Hodgson, 2002). The field has advanced itself a universal toolkit of methods in various sectors to bring about a structure in projects by enabling control of discontinuous work processes, most importantly throughout the lifecycle of a project to try and ascertain that everything is still within the project scope and on time (Hodgson, 2002). Although the standardised systems in place need to be further reviewed and developed to be in line with the market shifts and deliver projects to client satisfaction. In addition, the main reason for slow growth within project management is that the profession/industry takes a very long time to fully adopt new ideas or technology into their stream, about twenty five years before it is fully adopted (Leach, 2014), this is normally due to the uncertainty of the outcome that the new technology can produce on the various projects the project managers get to work on; and project performance of a project plays a significant role on the execution of a project.
2.5 Project performance

Project Performance can be associated with poor project management due to the various tools and techniques a project manager applies during the process of a construction project, on which they may create an undesirable outcome for the project, especially to the client. Currently construction projects have become notorious for late completion, being out of budget, poor communication and scope creep. Cacamis et al., 2014 stipulated that most aspects that hinder effective project performance are connected with communication, information distribution, human issues and decision making. From these results, a conclusion was drawn that the project management processes are linked to factors that determine project performance. How important is it to monitor construction projects to ensure good project performance for client satisfaction. Joshi & Khandekar (2015)’s research study addressed that project delay factors that tend to affect project performance greatly, hence they need to be monitored because these delays mean that various project team participants such as the client, consultants, engineer and contractor will be affected differently and significantly by these delays. Failure to deliver the project on time due to poor project performance may mean less income for the client and for consultants these delays may mean more work to be done in a short time limit (Joshi & Khandekar, 2015). Therefore because of this tight schedule, the quality and safety of the work will be compromised and increase in costs in attempt to keep up with the schedule. This is mainly due to the fact that despite the various requirements, project managers still need to ensure the performance a project for client satisfaction.

2.5.1 How Project Performance affects Clients Satisfaction

Zhang & Fan (2013) argued that project performance has been an ongoing problem that greatly affects client satisfaction in the construction industry and it has been highlighted as a troublesome problem that plays a significant role in the failure of most projects. With that said can adding new approaches to the project management practice improve project performance? By making use of approaches such as emotional intelligence (EI) more actively in projects, project managers can then improve the performance of projects. Zhang & Fan (2013)’s findings highlighted that there is a great connection between emotional intelligence and project performance because a project manager’s EI contributes significantly on improving poor project performance of relatively large and complex projects. Factors of EI such as
emotional self-awareness, emotional self-control, cultural understanding and communication require more consideration because of the impact they have on a project and this can generally improve the poor performance of a project.

Egemen & Mohamed, (2005: pp.603) agreed that neglecting and not considering client satisfaction during the course of the project without any doubt had a contribution to poor performance, and failure seen on the construction practises, and technical issues are always connected with the dissatisfaction of clients. Thus bringing about a need to improve on project performance.

2.5.2 The Need to Improve Project Performance

Ika, (2009) discussed the need to introduce new additional construction project management approaches for good construction project performance in the construction industry. He addresses that despite the tools and techniques that currently exist in project management to help better the performance of a project. Many project results continue to disappoint the stakeholders due to their failure to be delivered within time, budget and set quality standards (Ika, 2009). Which brings about questions such as, what is the possible fault in the currently existing project management approach on applying the tools and techniques that causes poor project performance? The research questionnaires that were sent out and in-depth interviews conducted to acquire data from the various project participants and also through articles of project management studies. It was therefore found that the successful performance on a project could be a result of successful project management. However, poor project performance could not always be a result of poor project management, which means that a project’s performance can still be poor despite the successful traditional management of a project (Ika, 2009).

The increasing complexity of construction project can be the cause of poor performance for instance; in a complex project the application of standard tools and techniques may not be the solution to delivering a successful project might need the and project managers might need to go an extra mile (Ika, 2009). Therefore this could mean that the existing project management tools and techniques are failing to keep up with the change in the construction industry, hence
resulting to poor project performance. Factors that affect or hinder the performance of a project needs to be considered.

2.5.3 Factors Affecting Project Performance

Meng (2012) discusses the effects of poor relationship management on the performance of a project. Many construction projects perform poorly in terms of cost overrun, project time delays and quality delivery (Meng, 2012). Joshi & Khandekar (2015) discusses the delay factors that affect the progress of project performance and the urgency of the need to improve the performance of a project. Therefore, the urgency and need on fixing this is clear but in the context of our research, how can project management be structured to not only ensure good project performance but also to meet the client's’ expectations?

Improvement of project management organisational standards to develop project management and good project performance was addressed by Miklosik (2015) where he discussed the great need for project managers and organizations to improve on their project management practices in order to enhance the quality of the output and the satisfaction of the client. Currently construction projects have become notorious for late completion, being out of budget, poor communication and scope creep. From Joshi & Khandekar (2015)’s findings it appeared that many project managers focused on the management of time, costs and also quality yet the project still was likely to fail. Therefore there is a need for management to focus widely in managing a project, most importantly the management of relationships as this is essential in bringing about a more effective way of working and improving performance.

In addition showing acknowledgement and using incentives was also another important aspect that helps reinforce collaborative working which contributes to project performance (Joshi & Khandekar, 2015). This brings about questions such as what contributions do construction project management organisations have on the performance of construction project managers. Interviews conducted in a study by Miklosik (2015) on top managers of various organisations to get an in-depth information with regards to project management within these organisations’ projects he found that most companies have set standardized procedures in place that project managers are to follow and majority of the project managers think that they are doing
everything necessary to identify shortcomings and eradicate them in time. However projects continue to fail and project managers themselves were not satisfied by the performance of their projects. To avoid such unwanted failures, the project management body of knowledge provides elements to serve as a guide towards enhancing better project performance.

2.5.4. Project Management Body of Knowledge

Project management can influence project success; its practices need to be reviewed to be gauge how they are sufficient enough to improve project performance. Project Management Institute (PMI) initially documented nine body of knowledge in 1987 in an attempt to regulate the general project management practices and information. These knowledge areas are (Time, Integration, Cost, Procurement, Quality, Human Resource, Scope Communication, and Risk) in the Project Management Body of Knowledge guide (PMBOK Guide). For effective project management practices, processes within each knowledge need to be accomplished. For example, project risk management is way of responding to project risk that has been identified and analysed. Activities include risk identification, risk quantification, control and response development. Similarly project cost management comprises of processes that are required to certify that the project is completed within budget and consists of resource planning, cost estimating, budgeting and control. Overall there are various ways used in measuring project performance.

2.6. Measuring project performance

The selected parameters in measuring project performance include time, cost, quality, safety, contractual, communication, environment, and dispute resolution elements (reference). Takim & Akintoye (2002) identifies Key Performance Indicators (KPIs) as parameters for benchmarking projects in order to achieve a better performance of the project. The authors argued that most of the indicators for example time, cost, defects, client satisfaction with the product and service, productivity, profitability promote result oriented thinking, in contracts predictability of design cost and time safety can be regarded as process-oriented thinking. All of which may also be part of project management competency.
2.7. Project management competency

Hwang (2013: pp.273) supported that project management competence and aim at establishing criteria for a competency in project manager. There are two traditional approaches to distinguish project management competency, worker oriented and work oriented. Workers attributes includes knowledge, skills, personal traits and abilities and work on its own existing independently. Definable in terms of the technical requirements of work tasks Hwang (2013). Project management competency is acquired by combining the knowledge obtained during training, skills development and experience. Therefore, a project manager who is competent will be able to deliver projects that meet clients’ expectations. Mir, Pinnington (2014) argues that project success can be obtain by focusing on the individual variables (Independent variables are project management performance and depend variable are project success construct) for project management performance.

Emuze (2011) argued that there is a need to produce continuous improvement in the construction industry in developing countries like South Africa. Emuze (2011)’s study brings about questions such as what is the main focus area of improvement on construction project in South Africa to ensure improved project performance? On the findings it was revealed that in order for the performance of construction industry projects to improve in South Africa, it required an improvement in the competence of the project parties involved in a construction project to improve to also increase client satisfaction (Emuze 2011). Emuze, (2011) emphasized that there is a need to improve project performances in the construction industry and individual projects. This was/is more in particular to improvement in client satisfaction, on which it is greatly inked with project performance. Therefore improving the competence of construction project participants, especially project management practice by being more innovative can enhance the performance of a project, as a result bringing about successful deliveries of projects and a satisfied client. In addition attention also needs to be given to construction supply chain management which also falls under project management, because it incorporates all important activities such as procurement, scheduling, production, and information systems for communication purposes. Improved supply chain management may contribute toward the clients’ continuous demand for efficient construction projects execution and cost reduction.
on the overall project and also the quality of the final project delivery. Clients are also classified differently into the construction industry.

2.8. Classification of construction clients

Clients in the construction industry are heterogeneous and numerous attempts have been made to categorise them (Walker, 2015). Naoum (1994) categorise clients into on-going, on-off and one-off clients. Flanagan and Norman (1993) classified clients as being public and private. Morledge (1987) classified clients as primary and secondary developers. Walker (2015) cited Masterman and Gameson (1994) and argued on Morledge categories and extends into secondary experienced and primary experienced clients, secondary inexperienced, primary inexperienced. Walker (2015) indicated that clients need and preferences are not indicated by the classifications. Therefore, classification of clients such that their needs can be identified easily was researched as one of the basis for selecting contractor’s capabilities for meeting the needs of the clients. Chinyio (1998) discussed client's’ level of desire for the needs. Taking that into account and clients having similar preferences can be grouped in accordance with their desires and individual preference can be classified. When groups are identified, relationships ruling the preference of each group can be useful when evaluating bids. In conclusion the Chinyio (1998) indicated that the traditional classification of clients as individual, public and private is sufficient indicate of their needs.

There are different types of clients the construction industry around the world. Walker (2015) categorised clients into individual, corporate and public clients. Walker (2015) described Individual clients are both owner and occupier of the building. Corporate clients are different companies working together. While, Public client is the public organisations that raises funds through the public in order to carry the construction work. Walker (2015) described that where clients are both occupier and owner, the idea may seem to be straightforward but even in such circumstances it may not be. Establishing the purpose and function of the building gives guideline of who is the client in a project. The client’s satisfaction is also measured differently.
2.9. Measuring client’s satisfaction

Client satisfaction can be connected to both goods and services. It is also based on the customer’s experience from contracts with the organization and personal outcomes. Cengiz (2010) defined Customer satisfaction as a highly personal assessment that is greatly influenced by individual expectations. Cengiz (2010) then argued that some definitions are based on the observation that customer satisfaction or dissatisfaction results from either the confirmation or disconfirmation of individual expectations regarding a service or product. The reader might be asking themselves; how can client’s satisfaction be measured? Measuring customer satisfaction is beyond the constitution happy customer. In a general sense client satisfaction should be measured based on the assessment of the full product and service range, including issues of branding, product and price, distribution and service. However, Cengiz (2010) focused on narrow performance criteria, such as customer service performance.

Rahman et al., (2012)’s study client satisfaction with relation to service and quality and mentioned several measurement models; firstly, is that satisfaction can be measured through functionality quality which composed of five elements (tangibility, reliability, responsiveness, assurance, empathy). Rahman et al., (2012) model indicates the gaps of service quality of the companies which indicates five gaps during service expectation till the actual service delivery. The first gap is that the service provider does not know the customer’s expectations. Second gap is that the service provider does not realize the standard of service that the customer’s expect. The third gap is the specification of service that delivery of service. Lastly is the gap between customer’s expectations about the service and the prospected service quality and the model of satisfaction. Second method is the service quality and satisfaction which is his modification of service quality and service satisfaction model. This model deals with ten vital elements of advising which helps with measuring service quality and customer satisfaction of service entities. Another model which is developed in 1999 called the customer value and customer satisfaction model. The model deals with the behaviour of the customer taking any service (Rahman et al., 2012). The models indicate that perceived service quality is impacted by expected price and perceptions. Keep in mind the perceive client value and satisfaction are affected by the prospected service quality. Service quality model developed by Dabholker called antecedents and mediator model is another relevant model (Rahman, khan & Haque,
Carrying out construction projects that meet the client’s satisfaction is most significant.

### 2.10 Importance of clear client’s specifications

Consultants in the construction industry need to know what variables should be considered to improve client satisfaction. With the changing environment client purpose their projects to be environmental friendly. Project managers need to have knowledge and skills for greening construction. One interview done by the study of Hwang (2013) emphasized the importance of project manager understanding the expectations of the client, especially when the client wants to attain the certified green mark. To accomplish this, the client should specifically indicate the types for green technology to be used even though it can be challenge when the specified green technology is not available locally. Also, the level of risk that the client is willing to accept can be another challenge for the project manager (Hwang, 2013). It is also important for clients to get involved throughout the process of the project as this contributes to enhance their satisfaction.

### 2.11. Client’s involvement in the construction process

Thomson (2011) argued that client’s consciousness of needs tends to improve and evolve with the project. Clients’ needs and wants may vary and change during the course of the project and that may cause miscommunication. As a result the project manager and other professionals have difficulties following these developments. Korpela (2015) indicated that in order to improve construction process, a shift to a collaborative approach is needed. Knot-working is suggested as a method which can work for architects to possibly iterate their designs and combine each practitioner expertise. Korpela (2015) defined knot-working as a new way of working together as groups to come up with solutions for the critical tasks in the construction operation. The client must demand and encourage the collaborative of Knotworking in order for it function properly (Korpela, 2015)

On Egemen & Mohamed, (2005)’s research done on the construction market of the Northern Cyprus region, it was found that by that time clients had already started having more choices since more companies started contesting for the same market in an industry dominated by different client groups. Egemen & Mohamed, (2005) further stated that if clients are more knowledgeable and aware about what goes into the process of building they have more choices. This means that client satisfaction is very important since companies can easily lose customers
if they do not deliver projects that are not on the level of their expectations. Disappointments are a manifestation of expectations not met. Therefore if a client is not happy, it means the expectations were not met.

To the client the project scope is permanent; for the project manager and companies it is from one project to another project. This enlightens the need for the client to develop skills in-order to be able to support development in the construction sector (Ryd & Lindahl, 2006). (Granath and Alexander, 2006) alluded that if the client is not as professional as required, the logics of the consultants end up prevailing on the project and the client’s and end-user objectives not translated perfectly. One may argue that users cannot focus on deep and complicated construction issues instead of their day to day business. This is true, and the construction project management must improve communication and ways of interacting with the core business so that construction projects are delivered by the logic of user’s permanent organization rather than the project-by-project approach used by the construction industry (Lindahl & Ryd, 2006).

Egemen & Mohamed, (2005; 604), clients expect contractors to produce highest quality on each and every part they are required to do on the project. This means that, nowadays the identification of the clients’ hierarchy of needs is a very important prerequisite for a successful construction industry. Even though this statement is more linked to contractors more than project managers but one must keep in mind that for most procurement methods the contractor receives instruction from the project manager, on what to do when to do it and how. Therefore, if there is miscommunication between the client and the project manager or in any other way the hierarchy is structured, the client will always be the one that suffers the consequence of the miscommunication between the contractor and the project manager. What does this mean to us? It means that; for as much as we need to ensure that the clients are fully satisfied, for the expectations of the customer to be met communication within and between the project participants is important.

Egemen & Mohamed, (2005) found that the clients that responded on their research questionnaires expected much more than quality, project being finished on time and within budget. Some clients’ needs depended on emotional feelings (Egemen & Mohamed, 2005). This is proof that clients’ needs do not depend on the main objective of client satisfaction. Looking at current project management practices; can they provide for clients’ needs beyond
that the spectrum the board of knowledge provides? Value to clients is a very complicated and subjective issue, but it is recognised that quality in construction is a vital component of perceived value to clients (CIDB Report, 2011). Now, can ways to provide for these needs be innovated to keep clients satisfied. Some of the most important aspects throughout in the project include the objectives of the client.

2.12 Client Objectives
Client’s objectives are the most important features of any building on the construction of a project. The main need of the project will have arisen from the demand arising from clients organisation’s primary activates. The need is stimulated by the environment of the organisation, which will present opportunities to which they respond walker (2015). The response for environmental forces is the need to survive. Beyond this level the clients responds in order to expand driven by motivation. Some of the external forces influencing the need are economic, which drives the opportunity to profit. Walker (2015) indicated that survival is the basis objective of the clients which can be defined as maintaining client’s position relative to those of competition. Figure 1.2 summaries the weightings of client’s objectives, the balance of which may not be possible and compromises between conflicting factors are negotiated (Walker, 2015)

Figure 1.2
2.14 Value to construction client

Traditionally, project success has been focused on the triple constraints (time, cost, and quality). Recently, project success encompasses the provision of value to clients. This leads to question of how client perceived value. Kelly (2007) indicated that the perspective of value from a producer/constructor is function divided by cost whereas value to the buyer/clients is perceived as benefits divided by price.

\[
\begin{align*}
\text{Value} &= \text{Function/Cost} \\
\text{Producer} & \quad \quad \text{Value} = \text{Benefit/Price} \\
\text{Client} & 
\end{align*}
\]

Therefore, value is different from the perfective of a project management organisations and perspective of the clients. Value is enhanced when the same purpose/work are rendered at the lowest cost and price; mostly important is the desired work are provided for the same or lowest cost (Kelly, 2007). Value of clients can be anticipated from the selection of the construction teams. In South African construction industry, the contractor with the lowest price mostly wins the tender process which result in decrease of value. However, Wong et al (2000) indicates that there is change from the lowest price wins to multi criteria selection practices in the tendering process of selecting contractors. A project specific criterion (PSC) is essential to the client’s decision task. PSC indicates the components in deciding who is suitable for the project at hand. Wong et al (2000) emphasised the values as being the functions of contractor's’ positive characteristics (managerial, health, financial, human resource and past performance. Project management organisation should adopt value engineering to the projects. Value engineering is defined by Kelly (2007) as an organised approach to the provision of the necessary functions at the lowest cost.
2.15 Innovated methods to improve construction project management

Achieving effective PM will remain a challenge. Fernandes et al. (2015) reveals results that highlight the need for improving PM practice in companies/organisations. There are several strategies that could be used by organisations to innovate PM practises, he makes an example of how the implementation of methodologies varies and how different ways are adopted to be used for training and worker development but these also are different to one another; in the way they are structured and how they influence to the organisation.

Shi (2011) proposed the Value Adding Path Map (VAPM) as an attempt to present the best path possible to improve PM. His approach directs organisations from one step to step another on how to introduce and implement PM in a more effective manner. Shi (2011) argues that the coordination of the hard and soft PM system implementation creates great values for the organisation without having to invest too much on it. Even though Shi (2011)’s recommends the best way of implementing PM, it is unfortunate that there is no model that has been officially accepted. Viewing from a practical prospect, maturity models (models used by organisations in- order to understand their ability to undertake PM and help them structurally improve their PM) have a significant rate of indicators which makes it a challenge to direct organisations to improve PM. Literature on PM does cut us a slack of advice and organisations need guidance on the strategies they should focus on (Fernandos et al., 2015)

Fernandos et al., (2015) introduced project management improvement initiatives (PMII) and processes, behaviours, and procedures of working that are adopted for the aim at improving project management performance. Literature on PM seems to focus more on what to improve; how to build and sustain the improvements and hardly ever discuss how these changes can affect the target market of the organisation. The organisation may end up making changes without looking at the most valuable source of the organisation.

Effective PM is of vital importance for many companies to survive in an environment that is changing so fast and market at the same time there is not enough wisdom on how to improve PM practices while at the same time being careful to not compromise client satisfaction while
catching up with the market (Fernandos et al, 2015). Various approaches are used by projects manager in various countries, including south africa to be more specific toward enhancing project performance includes cultural norms

2.16. Application of South African cultural norms in project Management

Ugwu & Haupt (2007) argued that one of the challenges facing many construction project professionals, is understanding and translating the strategic objectives of sustainable construction; and the importance of how the application African aspects among the societies can help assist deliver projects successfully in developing countries like South Africa (Ugwu & Haupt, 2007). Which brings about questions such as how can the application of Ubuntu help improve the delivery of projects in South Africa? Developing countries like South Africa need immense infrastructure developments to help stimulate the country’s economic growth, therefore one of the findings from their study was that most construction professionals ranked Ubuntu as one of the most important aspects to consider when managing a project (Ugwu & Haupt, 2007). The concept of Ubuntu is of the most important qualities amongst the African societies on which it is believed to have a significant impact on the success of a project. This is because it mainly focuses on the spirit of sharing and cooperation (Ugwu & Haupt, 2007), therefore this can also be a factor to be considered in order to help in having an effective sustainable construction to enhance project performance in South Africa as it is a developing country with the potential to grow in terms of infrastructure.

2.17 Critical success factors of project management

Gates, (2010) defines critical success factors as “as the handful of key areas where an organization must perform well on a consistent basis to achieve its mission”. Project management discipline has developed over the past years as researchers have attempted to ascertain the factors that lead to project success and causes of project failure. Skills of Project management were developed from the requirement of construction to plan, control and manage complex projects Alias et al., 2014). There are hard and soft aspect which the construction
manager has to embrace (Livesey, 2016). Alias et al., (2014) defined the hard concept in terms of managing and controlling schedule, scope and cost. Whereas, Soft skill involves managing people (Livesey, 2016) which is different to those technical project management skills often referred to PMBoK skills. Project management is perceived as managing of change (Alias et al., 2014), and should consider themselves as change agents adding to the management character to pay attention on soft aspects. A competent project manager must be flexible in adopting hard and soft skills. Critical success factors (CSFs) are contributes to project management practice which highly influences project success. CSFs are variables that can have a massive impact on the success of the project when properly managed. Alias et al (2014) suggested that studies addressing CSFs have to look carefully on the impacts that are considered to be critical and find out is CSFs are related to success. The CSFs can be categorized into five groups. These factors consist of human-related factors, project procedures, project project-related factors, project management actions and external environment. Alias et al., (2014) indicated that variables within each category can influence a variable in others, and vice versa. Application of CSF in the project management can improve the practice and thus lead to meeting client’s expectations. Therefore there is a significant link between client satisfaction and project management.

2.18 Link between Client Satisfaction and Project Management

Construction Industry Development Board (CIDB), 2011 reported that in South Africa, client dissatisfaction is rated higher in the residential building sector, which is then followed by special works and non-residential building. To be more specific, low- and mid-income residential construction was ranked poor to average quality when came to quality achieved, while the quality of upper-income residential was ranked as average to good (CIDB, 2011). This is a report done from a research on public clients in South Africa (CIDB, 2011). Does this information mean that construction quality depends on the clients’ pockets? Is this because quality material in construction is expensive? And if that is the case and client satisfaction is our target: what means can be taken in-order to bring quality to those that do not seem to afford it? Appiah-Baiden, (2006) presumed that dissatisfaction experienced by user clients had negative effects for the South African building industry and its service providers, because if the industry yields
unsatisfactory results, clients might lose interest and not invest in it. Egemen & Mohamed, (2005) found that the clients that responded on their research questionnaires expected much more than quality, project being finished on time and within budget. Some clients’ needs depended on emotional feelings (Egemen & Mohamed, 2005). This is proof that clients’ needs do not depend on the main objective of client satisfaction. Looking at current project management practices; can they provide for clients’ needs beyond that the spectrum the board of knowledge.

In South Africa there is little literature on construction client satisfaction and it becomes an issue when one tries to link two concepts that have hardly been researched on in the past. However, looking at what we already have on South African Literature, the project manager is vested with the responsibility of delivering what the contract defines to the client and the end user. However, there is a need for new roles on behalf of the client in the construction sector in and throughout the project (Lindahl and Ryd, 2006). Lindahl and Ryd, (2006)’s findings pointed out the difficulty for construction projects to deliver the needs of end-users. The cause of this was considered to be lack of methods used to find out the demands of client. Goals need to be emphasised and made valid regularly and throughout projects. With this said; clients should have an active role to play in construction, which means that clients are expected to understand and know what has to go into construction project in order for it to be successful.

2.19 Currently existing method of project management and client satisfaction

Fewing (2013) discusses that in construction, more in particular with project management, there has been a method or standards that have been set in place and they have been in operation for some time even though they fail to deliver to desired result. Which brings about Are project managers doing enough to green the project management practice for client satisfaction? Information was collected through interviews, literature and surveys. In the findings, Fewing (2013) deducts that many project managers have become comfortable with the currently existing methods even though they have not been able to always produce the best value for the clients, therefore supports that there is a need to be more innovative in the construction industry by also highlighting that it is quite a challenge for project managers to deliver according to the targets set by the client with regards to time, cost and quality given the way projects have become more complex and also that when dealing with a project it is essential that project
managers look at both the efficiency of process and the effectiveness of the project (Fewing, 2013). Therefore construction project management needs to be innovated and improved through the integration of various managerial approaches, analysing the current used techniques in the traditional approach to ascertain the delivery of projects to the client’s satisfaction.

CHAPTER THREE-METHODOLOGY

3.1. Introduction

Rajasekar et al (2006) defines the research methods as different procedures and schemes in researches and research methodology as a systematic way of solving a problem. It is of a great importance to have this two on academic research. The chapter draws attention to methods on how data is going to be collected and analysed. Sanders et al (2009) discussed that the research design indicates the method design view and the reasoning or the choice whereas data collection goes more in detail on how specifically the data is collected. Data analysis can be defined as the process by which data is collected, inspected, filtered with the goal of refining the information to be used for a particular purpose (Statistics Canada, 2009). The chapter identifies the best approach to carry out the research in an academic manner. The research has to be of great quality in order to bring knowledge that is applicable outside of research. It is crucial to have an understanding on how data will be sorted out and analysed after the collection which helps in the quality of the study. It will assist researcher in answering the research questions which some knowledge exists but the empiric evidence is required to contribute to the body of knowledge.

This chapter will also define in detail the different philosophies, approaches, strategies, choices, time horizons and techniques and procedures found in each layer of the onion. This section will also reveal which ones will be adopted in this study, with an explanation of why they were chosen for this study.
3.2. Research design

Mixed methods research design is adopted on the study. Creswell et al, (2013) characterise mixed method design as combination of qualitative and quantitative data. It includes the analysis of both qualitative and quantitative data. The process through which both quantitative, qualitative data collection and analysis need to be conducted rigorously. By merging the data, connecting the data, the two forms of data are integrated in the design. This procedural process are included on the distinct mixed method design that also incorporate timing of data and emphasis for each database. Lastly, the book by Creswell (2013) discussed that the procedures can be informed by philosophical theory.

The figure below shows a table of different research designs from (Creswell, 2013).

Figure 3.1

<table>
<thead>
<tr>
<th>Qualitative</th>
<th>Quantitative</th>
<th>Mixed methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative research</td>
<td>Experimental design</td>
<td>Convergent</td>
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<tr>
<td>phenomenology</td>
<td>Non experiential designs,</td>
<td>Explanatory sequential</td>
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<td></td>
<td>Such as survey</td>
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<td>Grounded theory</td>
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<td>Exploratory sequential</td>
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<tr>
<td>ethnographies</td>
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<td>Transformative, embedded,</td>
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<td>or multiphase</td>
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<td>Case study</td>
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</table>
3.3 Nature of research design

Saunders et al (2009) classifies the research purpose used in research methods as exploratory, descriptive and explanatory. A research proposal can have more than one purpose. However, for the purpose of this research, the nature of the research design chosen will be that of explanatory studies. This is so that researchers can gain a better understanding on the project management tools and techniques different organisations use on different projects.

1. Explanatory studies are useful to asking questions to uncover what is happening and gain a better insight about the topic being studied. Ways in which exploratory research can be conducted is by means of reviewing literature, interviewing ‘experts’ on the topic, carrying out in-depth individual interviews, etc. Exploratory research may begin with a broad focus area and progressively narrow down as the research study progresses. Saunders et al, (2009)

2. Descriptive research is useful when an understanding of an “accurate profile of events, persons or situations” Saunders et al, (2009) is required. Descriptive research can be seen as an extension of explanatory research however a clear depiction of the phenomenon on how to collect data prior to actual data collection commences.

3. Explanatory research is useful when inquirers aim to “establish causal relationships between variables” Saunders et al, (2009). Explanatory research is critical when studies aim to analyse a given situation and or problem area in order to explain the relationship between variables.

3.4 Research philosophy

The research philosophy chosen for the study is pragmatic research philosophy. According to Saunders et al., (2009) pragmatism focuses on applying a practical approach integrating different perspective to help collect and interpret data. Pragmatic approach allows the researchers to use both quantitative and qualitative when collecting data. This approach was chosen because it enables researchers to obtain a variety of external views to best answer the research question (Saunders et al., 2009). In pragmatism different techniques can be used at the same time or one
after the other. According to Saunders et al., (2009), they might start with face-to-face interviews with several people or have a target group and then use the findings to construct a questionnaire to measure attitudes in a large scale sample with the aim of carrying out statistical analysis. This approach is best suited for this research study. This is because this study will have a target group which will be the construction and consultant companies based in the Johannesburg region. Using the companies on the target group, semi-structured questionnaires interviews which will be administered through face-to-face, telephonically and/or by email will be conducted with construction project manager. The information obtained will be used to contribute to the development of the various perspectives of the different construction project managers that have worked on different kinds of projects. These results will be analysed statistically towards achieving the research objectives. Therefore these findings will contribute towards an improved understanding of how to continuously improve project management practices.
3.5 Research approach

There are three types of research approaches namely deductive and inductive approach and abduction approach “mixed method”. For this research study abduction approach will be adopted.

Figure 3.2 Source: (Creswell, 2013)

This research approach (mixed method) which aims at gaining a holistic overview of the research problem area. This approach entails both qualitatively (inductive) and quantitatively (deductive) and will be executed in a parallel manner. This means that data for both will be collected roughly at the same time in order to provide a comprehensive analysis of the data collection. The overall interpretation information of the results will then get to be effectively integrated and explained (Creswell, 2013).
3.6 Research strategy

The research strategy intended to use is survey (questionnaires) and interviews. According to (Sanders et al. 2009) survey is associated with deductive research approach. It is mostly applied in answering who, what, where, how much and how type of a many questions. It tends to be used as descriptive and exploratory purpose. Survey is obtained by questionnaires which are administrated by the sample that are standardise and allowing for easy comparison. Furthermore, it is easy to explain and understand. Sanders et al (2009) discussed that a survey aid in collection of quantitative data which can be analysed quantitatively using descriptive and inferential statistics. On the other hand interview can range from formal to informal, structured to unstructured and can be one on one or involve groups. A semi-structured interview will be conducted. This type is similar to the questionnaire design discussed above. The purposes of interview are:

- to verify information gathered from different other sources
- to clarify point of information
- to have updated information
- to collect primary data

Companies from the Johannesburg region will be selected from databases of Construction Industry Development Board and Green Building Council of South Africa. Then emails will be sent to the companies on the selected database explaining the study and also requesting for interviews. The reason for sending requests to all the listed companies is so that researchers can get as much response as we can, these emails will also be accompanied by questionnaires to allow some companies to provide feedback on the questionnaires if they cannot arrange a meeting. Other practical strategies will be the researcher's’ effort to gain knowledge and understanding of the different companies before making contact, using suitable language, proving a clear account of purpose and type of access required and highlighting possible benefits to the companies.
3.7 Research Methodology choice

3.7.1 Integrative or mixed method

Mixed method research will be adopted for this research study. A mixed “Integrative” research method is a distinct form of research that generates new knowledge about the topic being reviewed (Torraco, 2005). This method is a combination of both the qualitative and quantitative approach and it helps provide better and broader knowledge on the research area. This research methodology would be adopted for this research study because of its ability to provide explicit detail on the study is going to be conducted and also its ability to enable the researchers to incorporate qualitative and quantitative data in order to provide a more comprehensive understanding of the research problem area (Creswell, 2013). According to Callahan (2010) a good integrative literature review as a methodology, clearly outlines a) where the literature was found, b) when research was conducted, c) who conducted the research, d) how the literature was found e) what number of articles appeared from each combination of keywords and the final count of included articles) why some articles were chosen for inclusion over others. Some of the qualitative data acquired will be quantized which means it will be converted to be analyzed statically into numerical codes (Creswell, 2013) and the other data will be analyzed qualitatively where on which overall this data will be will be used in this research study to provide a comprehensive understanding on the problem area and the study.

3.8. Research technique

There are various techniques that exist in research, however in leveling up with research objectives, this research study will focus on specific research techniques in the collection and analysis of data. Boundaries were first established to help focus and channel the process. Respondents were identified in line with the objectives of the study. Qualitative and quantitative data is to be collected through semi-structured questionnaires interviews which will be administered through face-to-face, telephonically and/or by email from the selected professional construction project manager in order to understand their perspective on project management tools and techniques in relation to project performance and client satisfaction. There are particular research respondents that have been I identified to help carry out the research study with regards to the collection of the required necessary data. Questionnaires will be structured in
an open-ended manner that will allow the respondents freedom to express their views in their response and in a manner that will enable them to provide the same feedback even when face-to-face meeting cannot be arranged. Face-to-face interviews will be recorded with the permission from the respondents and notes will be taken in the process where they will also then be brought together by the researchers to line them up and cross check with the recording, clip then analyses will be drawn from that.

3.9 Population
Polit & Hungler (1999: pg 278) defined population as an aggregate or of all subjects or members that conform to a set of specification. Saunders (2009: 212) defined population as “a full set of cases from which a sample is taken”. The population in this research study is the South African construction project managers of all races, gender status, socio-economic status and registered construction or Consultancy Company who have worked on several projects despite their nature. There are numerous kinds of projects in the construction industry which vary in nature; however they all abide by the standards set out in the PMBOK, including the tools and techniques to be specific. Within the context of South Africa, the study will focus of the construction project managers situated within the Johannesburg area.

With regards to the level of management and experience, the study will focus on any level management but preferably project managers who have worked different construction projects sizes. Some responses of these managers will differ to a certain extent due to the fact that the construction industry is dynamic and no one project is the same and so are the challenges that are experienced by project managers, whether it be managers from a contractor or consulting company. With this being said, the researchers understand that getting 30 project managers from consulting firms only will be slim, hence which is why both consultancy and contractor ones selected.
3.10 Sampling Plan

Polit & Hungler (1999: 95) agreed that sampling is referred to as “the process of selecting a portion of the population to represent the entire population”. There two different kinds of techniques/types available for sampling and these involve probability (representative) sampling and non-probability (judgmental sampling). The sampling technique adopted for this research study is the non-probability sampling; this is because of the convenience of the researchers considering that during the study they will be situated in Johannesburg and also to save money and time. This implies that not every element of the population will have an opportunity for being included in the sample.

3.10.1 Snowballing

A sampling technique of where it is difficult to identify members of the desired population is called Snowball (Sanders et al., 2009). When it is very difficult to make an initial contact with the desired population it is very difficult to gather information. Nevertheless, when a single contact is made with one member, he/she can refer the researchers and put in contact with others members from the same population.

3.10.2 Purposive sample

A purposive sample comprising of at least 30 construction project managers from both consulting and construction companies situated around the Johannesburg area. This readily accessible sample can also be referred to as the convenience sample as supported by LoiBiondo-Wood & Haber (1998:253). The researchers find it easier to obtain participants for the research study around the Johannesburg. However results might be bias because not every member of the population will get an opportunity to participate, therefore results might not be generalisable to the entire population. It is important to note that the participants will be selected on their willingness to participate in the research study and provide data.

Sampling plan adopted on this research study is snowball. Researchers need to select the most appropriate sampling techniques to enable the researcher to answer the research questions and objectives. The sampling frame of the research is list of construction and consultant companies.
in johannesburg, it will not be easy to make first contact with the Participants. Table 3.3 indicates the sampling plan and the variety of techniques used in research.

Figure 3.3

3.10.4. Sampling size

A general rule of thumb is always using the largest possible sample size. This is because the larger the sample size the more the representative the research study will be and the lesser the sample size, the less accurate the results could be because they are less likely to be representative of the population. Therefore in this research study a convenience sample of at least 30 respondents, of construction project managers is selected.
3.10.4.1 Sampling rationale

According to Polit & Hungler, sampling is helpful because

- It is more economical and at this state realistic to choose a sample of at least 30 construction project managers in the Johannesburg area, South Africa.
- It was unnecessary to collect from entire population of construction project managers, as the research study is focused on the understanding the perspective of the South African construction industry project managers.
- Convenience sampling could be regarded a rational choice in cases where it is not possible to identify all members of the population (De Vos, 1998: 191), more especially in the case of this research study given the time and other resource constraints.

3.11. Data collection

Data is referred to as the information obtained during the course and for the purpose of the research study supported (Polit & Hungler, 1999). In this research study data are to be collected by using semi-structured interviews. Semi-structured questionnaires interviews which will be administered through face-to-face, telephonically and/or by email from the selected professional construction project manager in order to understand their perspective on project management tools and techniques in relation to project performance and client satisfaction. The purpose of this is to contribute towards developing research questions answers (Creswell & Clark, 2011).

3.11.1 Interviews

Face-to-Face semi-structured interviews will be conducted in Johannesburg, South Africa at respective respondent’s office or preferable location that will be convenient to the researchers also. This is because in a semi-structured interview, the respondent gets to provide more detailed responses which can contain information that may contribute towards the research study. Phone interviews or online, by means of Skype, will be conducted on occasion where the respondents cannot provide a face-to-face interview to but are willing to provide and interview. Also by emails where willing participants cannot provide interviews face-to-face or telephonically but are willing to give feedback to questionnaires. In these interviews discussions will be ensured
through notes taking and audio-recording. Figure 3.4 illustrate the method of obtaining data from the field. The yellow highlight indicates how this research adopts the method of data collection.

![Diagram of interview methods](image)

**Figure 3.4 Forms of interviews (Saunders, 2009)**

3.11.2. Questionnaires

Saunders et al. (2009) defined Questionnaires as data collection techniques in which each respondent is asked to respond to and are used for descriptive and explanatory research.

According to Saunders et al., (2009) there are two types of questionnaires in research, the design of the two questionnaires differ according to how they are administered. The questionnaires could either be self-administered and interviewer-administered. Where on the self-administered the questionnaire gets to be completed by the respondent and these include: *internet and intranet-mediated questionnaires; postal questionnaires;* and *delivery and collation questionnaires*. The interviewer-administered include: *telephone questionnaire* and *structured interview*. Therefore in this research study both of these self and administered questionnaires will be adopted because they both entail parts on which will be applied for this research study. Questionnaires which will be administered by the interviewer will be conducted telephonically or through semi-structured interviews.

Researchers will carry out the interview in competent manner and according to Saunders et al. (2009) this includes skill such as:
Knowing how to open the interview

Using language that is appropriate

Questioning appropriately

Listening when the respondent is talking

Overall testing and summarizing of understanding

Knowing how to recognize and deal with difficult participants appropriately

And also recording data

Good manners, such as requesting for permission to record interview from the participant.

Advantages and disadvantages of audio-recording the interview.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affords the interviewer the comfort to focus on questioning and listening</td>
<td>May be destructing during the interview when researcher pays too much attention on the recorder</td>
</tr>
<tr>
<td>Allows for questions posed and responses provided in the interview to be recorded accurately.</td>
<td>May cause reluctance on the respondent’s responses and reduce reliability.</td>
</tr>
<tr>
<td>Allows the interviewer to re-listen to the interview when analysing data</td>
<td>May have technical problems</td>
</tr>
<tr>
<td>Helps in the provision of direct quotes</td>
<td>May be time consuming when transcribing the audio recording</td>
</tr>
<tr>
<td>Allows for audio evidence</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.5 Source (Saunders et al, 2009:341)

Self-administered questionnaires in this study will include mail questionnaires which will be sent to participants and those who are willing to participate but cannot arrange interview (face-to-face or telephonically) can answer them and send them back to researchers.

Both self-administered and interviewer-administered questionnaires will be adopted in this study. The selection of the questionnaires also took into consideration the resources available to researchers and this includes (Saunders et al, 2009):

- The time available to complete the collection of data
● The implication of finances of data collection
● Availability of researchers to collect data on the field

This research study will adopt the open-ended questionnaire structure based on Bryde’s (2003) Modelling project performance and the Livesey’s (2016) insights of project managers into the problems in project management, see annexure A. This research study will adopt and restructure the two mentioned above in order to align them to the research objectives of this study. These questionnaires will be adopted because they have been designed, tested and proven to be working and reliable in terms of their validity.

3.12. Time Horizons

For the purpose of fulfilment of the honours research, the researchers have a time constraint of one year. Therefore, the research will adopt a cross-sectional study. There are two types of research time horizons, longitudinal and cross-sectional studies. Longitudinal study is not associated to time constraints and the researcher has the ability to apply a measure of control over the variables (Saunders et al, 2009). While on the other hand, a cross-sectional study signifies a study that has time constraints and seeks to define a certain phenomenon (Saunders et al, 2009). The cross- sectional study employs the survey strategy, which enables the researchers to conduct interviews, questionnaires and observations required at a single time.

Saunders et al (2009; 317) discusses validity and reliability in terms of logical questions and answers that should make sense. Saunders et al (2009) further emphasised that the questions must be understood by the respondent in the manner that the researcher intended them to be understood and the answer given by the respondent must be understood by the researcher in the manner that is intended by the respondent.
3.13. Reliability
Reliability basically speaks of consistency. For a questionnaire to be valid it must first be reliable, but this on its own is not adequate. Researchers are concerned about a situation where the respondents may interpret the question in a manner not intended by the researchers. As a result, this might cause the question not to be valid since it will not answer the research question in a manner it had been intended to. One can conclude that reliability is concerned about the strength of the questionnaire, whether it will produce findings that are consistent even though it is applied at different times, under different conditions. To assess reliability, the researches will use internal consistency suggested by Saunders et al (2009; 373-374).

In using internal consistency reliability assessment; the researchers will co-relate the responses to each and every question with the responses to other questions in the questionnaires. Through using this method the researchers will be able to effectively measure the consistency across all the questions in the questionnaire.

3.14. Validity

Internal validity in relation to questionnaires refers to the ability of your questionnaire to measure what you intend it to measure (Saunders et al, 2009). This means that researchers are concerned about the reality of what they want to find through using their questionnaires. Researchers will look for other relevant evidence that will support the answers that will be found through using the questionnaire. The relevance of the evidence will be determined by nature of the research question and the researchers’ judgement.

Content validity refers to the extent to which the measurement questions in the questionnaire, provides enough exposure of the investigative questions (Saunders et al, 2009). One can judge exposure through explicit delineation of the research through the reviewed literature and another way of judging ‘enough exposure’ can be through having a number of individuals that will assess the essentiality, usefulness, and necessity of each measurement question. To save time and for convenience, the researchers will use literature to judge the content validity of the measurement questions.

Saunders et al (2009) defines Criterion-related validity as validity that is “Concerned with the ability of the questions to make accurate predictions”. This research is dealing with the
construction industry clients. Therefore, within our questionnaire there will be measurement questions to predict the behaviour of the clients if tools and techniques are applied effectively.

“**Construct validity** refers to the extent to which your measurement questions actually measure the presence of those constructs you intended them to measure” Saunders et al (2009). This type of validity seems to not fit the purpose of this type of research. This is because the researchers aim is not to find out any psychological aspects of the participants such as attitude scale, aptitude, personality testing as Saunders et al (2009) further elaborated on this type of validity.

**3.15. Ethical Considerations**

- For the purpose of this research the researchers will adhere to the University's Code of Conduct regarding data collection. The researchers will submit an application to the Human Research Ethics Committee (Non-Medical) of the University of Witwatersrand. Data will be collected once approval has been granted by the committee.
- Being granted permission to do the questionnaires and interview with the respondents is the most defining part of our research. This will mean that the respondents acknowledge the purpose and importance of the research. What will be left for the researchers is to ensure if the respondents are aware of the methods that will be used to collect the necessary data; if not aware the researcher should make sure that they fully understand.
- Before commencement of collecting data through interviews and questionnaires of potential participants. The researchers will ensure that potential participants volunteer to participate and their anonymity will be protected.
- The researchers will ensure the potential participant’s anonymity is protected and that they reserve the right to refuse to answer any questions in the interview if they feel it might incriminate them.
- The researchers will conduct themselves with honesty and integrity and treat the participants with dignity and sense of worth when collecting and analysing the data. Information obtained from the respondents will be kept inaccessible and from the third party, information will kept on the drive with a password only know by the researchers.
- In the event of a participant no longer wanting to participate on the research after the questionnaires and/or interviews have been conducted. The researchers make it their
duty/ liability to ensure that information gathered from that particular participant is not disclosed.

- Information gathered from the participant and the organisation will be kept confidential and identity will be protected.
- During the surveys, factors such as where we meet when obtaining data will be considered in order to make sure that the respondents are comfortable and mutual respect is maintained regardless of the gender and race.
- The researchers will not disclose company and any potential participants’ specific internal procedures and processes.
- The researchers will ensure that a suitable sample size is conducted on to gain a wide range and better perspective of the research problem from different potential respondents who have encountered different conditions. This will reduce the possibility of bias behaviour and judgement of and encourage an objective approach from the researchers (Greener, 2009).
- The researchers acknowledge the fact that the feedback received from potential participants might be subjective and, consequently, and sometimes not necessarily a true reflection of the reality in the construction industry.
- The researchers will not impose their own opinion on the research study.
- The researchers will maintain an objective manner in conducting the research and reporting the findings gathered from the study.
3.16 Brief summary of research design

This study approves of pragmatism philosophy in conducting research and uses the mixed methods approach. Data collection will be done through a survey (questionnaire) and structured interviews as the research strategy for data. This research study is constrained to one year therefore a cross-sectional time horizon is the most suitable horizon we can possibly use on this research; since it lets the researchers to conduct surveys and interviews at the same time. Figure 3.6 below illustrate the research design adopted for the study.

![Figure 3.6 Research design relationship](image)

The table below displays the three objectives that the researchers aim to achieve after collecting data for this research. The research strategy, techniques, population, sampling plan, data collection method, validity, reliability and ethical considerations are indicated for each objective.
<table>
<thead>
<tr>
<th>Research objectives</th>
<th>Research Strategy</th>
<th>Research Techniques</th>
<th>Population</th>
<th>Sampling Plan</th>
<th>Data Collection</th>
<th>Aspect of Reliability and Validity</th>
<th>Ethical Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify what constitutes tools and techniques in project management.</td>
<td>Literature Review</td>
<td>Qualitative</td>
<td>PMBOK as it provides different tools and techniques applied in different knowledge areas in project management</td>
<td>75% of literature will be recent (past five years).</td>
<td>Literature review using content analysis</td>
<td>Content validity</td>
<td>Ensure integrity and equality of literature review. Existing literature used in this study is treated accurately and fairly and avoid misrepresentation.</td>
</tr>
<tr>
<td>Investigate how the application of tools and techniques affects project performance.</td>
<td>Questionnaires, Interviews and Literature review</td>
<td>Qualitative and Quantitative</td>
<td>Literature that provides information on the application of different tools and techniques in construction project management. Perspective of different Project managers</td>
<td>75% of literature will be recent (past five years). Convenience sampling</td>
<td>Literature review using content analysis Structured interviews and questionnaires</td>
<td>Content and internal validity Internal consistency</td>
<td>Information gathered from the participant and the organisation will be kept confidential and identity will be protected. Ensure integrity and equality of literature review.</td>
</tr>
<tr>
<td>Establish how project performance impacts on client satisfaction.</td>
<td>Literature review and interviews</td>
<td>Qualitative and Quantitative</td>
<td>Literature that provides information on project performance and client satisfaction. Perspective of different Project managers around Johannesburg.</td>
<td>75% of literature will be recent (past five years). Convenience sampling</td>
<td>Literature review using content analysis and structured interviews, Content and internal validity and questionnaire, Internal consistency</td>
<td>Information gathered from the participant and the organisation will be kept confidential and identity will be protected. Ensure integrity and equality of literature review.</td>
<td></td>
</tr>
</tbody>
</table>
3.17. Project Plan

3.17.1 Resources Needed in Carrying Out the Project Plan

In order for the researchers to conduct they need different kinds of resources. So far these are the resources the researchers have used for collecting relevant information:

- **Books:**
  - Practical Research Methods by Willie Tan
  - Design and Conducting Mixed Methods Research by Creswell and Clark
  - Research Methods for Business Students by Saunders et al.

- **Google Scholar**
  - International Journal of Project Management
  - International Journal of Construction Project Management
  - Journal of Construction Engineering and Management
  - International Journal of Managing Projects in Business
  - Faculty of Engineering and Built Environment
  - International Journal of Quality and Reliability Management
  - Journal of Building and Environment

- **Government Publications**

- **Construction Industry Report by relevant bodies**

- **University of the Witwatersrand Database**

- **Conference Papers**
Other resources include:
- Transportation: For the researchers to get around and to go to the potential respondents offices to conduct interviews
- Computer and Internet: To type out the report, collect information, communicate with other group members, the supervisor, and send emails to the project management companies.
- Intellectual resources: Guidance from supervisor
- Costs include transport fee, printing and binding

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Milestones</th>
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<tbody>
<tr>
<td>A</td>
<td>Proposal Submission</td>
</tr>
<tr>
<td>B</td>
<td>Presentation</td>
</tr>
<tr>
<td>C</td>
<td>Start Contacting Project Managers that are willing to participate on the research</td>
</tr>
<tr>
<td>D</td>
<td>Finalise the Design of the questionnaire and interviews</td>
</tr>
<tr>
<td>E</td>
<td>Conduct Questionnaires Survey</td>
</tr>
<tr>
<td>F</td>
<td>Set Out Dates For Interviews with willing potential participants</td>
</tr>
<tr>
<td>G</td>
<td>Conduct Interviews with Project Management</td>
</tr>
<tr>
<td>H</td>
<td>Transcribe and Compile all the data that collected</td>
</tr>
<tr>
<td>I</td>
<td>Analyse, Categorise, filter the data collected to judge which one is relevant</td>
</tr>
<tr>
<td>J</td>
<td>Comment on findings based on data collected and relate and compared with theory</td>
</tr>
<tr>
<td>K</td>
<td>Formulate conclusions and recommendations</td>
</tr>
<tr>
<td>L</td>
<td>Compile final report</td>
</tr>
<tr>
<td>M</td>
<td>Submit Final Report</td>
</tr>
</tbody>
</table>
3.17.2. Constrains

One of the challenges the researchers were faced with during the conduction of this study is that there was little time for them to collect data. There they need to manage time wisely and ensure that enough data is collected for their study to be explicated concisely. This placed pressure on the researchers since there was also little time to gather, interpret and compile the final research document. The researchers will do their best and delegate the work in order to meet the deadlines.

Not all data collected from the questionnaires and interviews were considered relevant. Some were un-reliable and in-accurate because of the subjective views from different participants, this must be taken into consideration and is a constraint. Inaccurate results were discarded because did not help answer the research question. Therefore, the researchers had to take caution and understand what is at stake if careful measures are not taken in order to collect accurate data.

The inability of the respondent to understand the question asked by the researchers and also the inability of the researcher to understand the response of the respondent in a manner that had been intended; was a constraint. This was a very difficult situation to try mitigate. However, the researchers did their level best to make sure that the questions were structured in a manner and language understood clearly by the respondents; definitions of other concepts and words were provided for the respondents to understand clearly.

For the questionnaires the questions were made short and simple. This was because long questions in the questionnaire sheet could have been another reason for the respondents not to respond to the questions. This could have been another constraint and the researchers did their best to ensure that even though questions are short they still convey the same idea and carry the same weight.

Not all the variables to measure client satisfaction have been identified in this study, this is because there is a wide or broad range of variables used in measuring client satisfaction. The researchers had to ensure that the chosen method was the best one for this study and more convenient.
3.18. Executable Plan

Term Dates

Examinations Tuesday 24 May - Tuesday 21 June (20 days)

Winter Vacation/Study/Research Break Wednesday 22 June – Sunday 10 July (19 days)

Third teaching block Monday 11 July - Friday 26 August (34 days) Mid-term

Vacation/Study/Research break Saturday 27 August – Sunday 04 September (9 days)

Fourth teaching block Monday 05 September – Monday 31 October (45 days)

After the research proposal submission, the researchers prepared a well-structured and comprehensive presentation that will be presented on the sometime during the 2\(^{nd}\) or 3\(^{rd}\) block. The researchers will prepare the presentation power point before presenting it to the chosen panel.

The collected data will be used to give valid and reliable to answer empirical questions. Since the collected data will have to answer the research question, carefully structured questions must be asked. The structured questions will be a part of the questionnaires and for the interviews that will be conducted.

Data collection timeline

After writing June exams on the second week of 10 June 2016, we went on to start with the preparations for the application clearance on the third week as it was meant to be submitted by the 21\(^{st}\) of June 2016. After that we had to wait for feedback from the ethics committee before we could start with our data collection because we needed to obtain permission from the first to deem our research study ethical for data collection purposes. Our ethical clearance was considered on the 1st of July 2016 and approved on the 8th of July 2016 where we were given a go ahead to commence with our data collection.

Soon after receiving the ethical clearance, we went on to start sending out requests for participation from the various potential project participants from the 11th of July 2016 to the
16th Emails were sent out to the various potential participants and we were able to get some responses from various organizations who were willing to participate, however we could not get all the participants to carry out the collection within our convenient time frame.

Therefore from the mid July to the end of August we were planning to carry out our online and physical surveys, however things became very tight and we were not able to acquire enough data to actually substantiate our study. this led to us continuing with data collection until end of September where we had managed to acquire enough data to draw substantial analysis.

The “fees must fall protest” also had an impact on the researchers which affected us from meeting and having access to the resources we needed for our analysis and also meeting with our supervisor became very hard. As a result we had to meet off campus to discuss our approach and our data so this had an impact on our progress as we lost most of the first few weeks of October. However, on the last few weeks of October up to date, we went on to analyse data and the presentation of our findings in accordance to the data that we have acquired and we were able to draw a conclusion onto the study that we were carrying out.

due date for the final research document, final interim portfolio, final Group portfolio is to be submitted on the 31st of October 2016 with the presentation set to take place on the 17/18 and 21 of November.
This is what the researchers had to gather and filter questions:

- Every member had to read the proposal submitted so to be informed about what needs to be done to collect data.
- The researchers listed points to be formulated into questions based on the variables to measure effective application of tools and techniques, project performance and client satisfaction.
- Had group meetings where through discussions and brain storming; filter out the questions that will be used in the questionnaires and interviews
- The questions formulated were then categorized into qualitative or quantitative questions to develop the questionnaire

Qualitative data was summarised for the research so that the researchers identify which data was selected and used for the research study. The filtering process was based on the relevance of the data to the study. Qualitative content analysis is the research method adopted to analyse the data which is described fully on the next chapter.

3.19. SYNTHESIS AND CONCLUSION

Based on the literature studied and analysed the area of project management in the construction industry is predominantly affected by the continuous shift of the construction industry market. The industry is becoming more complex as projects are becoming larger, involve large capital investments, new technology, strict quality requirements and geographically dispersed project participants (evolution) while project managers have become comfortable with the current/traditional way of doing, yet this traditional/current way of project management keep failing to deliver projects to the clients ‘satisfaction. Therefore this study identifies the key areas that contribute to the continuous failure to deliver projects to the clients ‘satisfaction and the importance and need to continuously green/improve the project management practice in order to apply methods and techniques that that will continuously keep up with the continuously changing construction industry and also positively enhance project performance in order to successfully deliver construction project to the clients ‘satisfaction. In addition this will result in reduced the costs of a project, time delays, better quality delivery, and enhance the reputation of project management organizations and a satisfied client.
The literature indicates that, despite of advancement in project management process, tools and techniques, project success has not significantly increased. In spite of attempts in the Project management research to define project success and to assess it meaningfully many studies conclude that numerous projects do not meet their objectives and some fail altogether. Papke-Shields et al., (2010) conclude the study by supporting the link between the project management practices and increased in project success. With the increase in criteria to measure success of the project, PMs are responsible to make sure the projects delivers can still be gauged successful.

The literature suggests that managers should provide a framework by formalizing the service quality that will enhance their ability to meet client’s expectations. In brief, without obvious target set before measuring customer satisfaction, the process for measuring client satisfaction is not useful for researcher and organisations. Consequently client’s satisfaction measurement needs to have comprehensive objectives to reach. Measuring customer satisfaction must not be a once off process but an ongoing process that will consider the change in clients’ preferences and priorities that are sometimes affected by trends in the market. It is clear that incorporating all of the factors that affect client satisfaction will be a challenge in the South African construction industry, considering that fact that it has very little literature that addresses such issues. However considering the fact that it is a developing country with the potential to grow further in the construction sector, improving the project management practice will be beneficial.
CHAPTER 4- DATA ANALYSIS

4.1 Introduction

On this chapter the researchers explored the different tools available to analyse qualitative and quantitative data that has been collected. This has helped the researchers to discover a number of tools available but to also find the tools that are best suited to analyse the data collected from the participants through the semi-structured online and face-to-face surveys conducted. The survey results display the profiles of 20 participants. The results were summarised in figures and brief quotes below. The online and physical surveys were structured with an aim to answer the objectives, to achieve the aim of the study. The researchers have segregated the survey into sections; each section is represented by each objective of the research and the three variables which are: project management’ tools and techniques, project performance and client satisfaction. It was analysed and linked back to the literature of the study.

The objectives of study were to:

- Identify the Tools and Techniques used in Project Management Companies and their effectiveness
- Investigate how the application of tools and techniques affects project performance; and
- Establish how project performance using tools and techniques impacts on client satisfaction.

Researchers had to find out how the different companies/ organisations perform on their current and past projects. The aim for asking such question was to find out if the methods used and whether their tools and techniques are effective or not. Effective in this case would mean that they execute well performing projects that achieve client satisfaction within set of triple constraints and beyond. This included asking questions to find out what a project means for each participant and how they usually handle the execution of the project and what tools they use for
different tasks at different stages of their projects and why they handle such tasks the way they do.

### 4.2 Collection and Analysis

Data is a collection of variables or factual information. This information is obtained when assessing a certain research area. Data can be gathered using different tools like; literature, observations, interviews, surveys and questionnaires (Berthold and hand; 2008). Once the raw data has been collected, it must be effectively analysed for conclusions and recommendations to be drawn (Berthold and hand; 2008).

Analysing data in research is important as it describes and summarises the information that has been collected. It helps in identifying the relationships between the variables of analysis and channels to the recommendations and conclusions that can be drawn.

There are two forms of data that have been used to analyse and collect our data; qualitative and quantitative data. Qualitative data is a research method that analyses data using a narrative and descriptive form (Creswell, 2008). Its aim is more on understanding individuals and their experiences. Therefore, qualitative data in this study is analysed using content analysis.

Quantitative Data is a research method used in the analysis of numerical data (Creswell; 2008) and quantitative data in this study is evaluated using descriptive analysis.

### 4.3 Content Analysis

Content analysis is one of numerous research methods used to analyse and determine the presence of certain words or concepts within texts or recording tapes, research using qualitative content analysis. Under this method, researchers quantify and analyse the presence, meaning and relationships of such words and concepts, then make inferences about the messages and patterns within the text, the writer(s), participants and the time of which these are a part. Texts can be defined as books, interviews, discussions, speeches, conversations, or any occurrence of communicative language. To conduct a content analysis on any such text, the text is coded or broken down into manageable categories on a variety of levels – word, word sense, phrase,
sentence, or theme and then examined. There are three distinct approaches used in the analysis of data, which are conventional, directed, or summative. All three approaches are used to interpret meaning from the content of text data. Therefore directed content analysis approach is used in this research study because the goal of this approach is to validate or extend conceptually a theoretical framework or theory of this study.

4.3.1 Directed content analysis

Researchers designed a sampling plan to maximize the chance of recruiting participants at different stages. All participants were professionals working in the construction industry that have experience in project management on a variety of construction projects, but one third were selected as relatively small companies in project management, one third as relatively medium companies in the project management sector but had experience on project management, and one third were relatively large companies with a significant amount of experience in the project management and have been in practice for relatively long period. In addition, the sample was recruited for sufficient professional practice balance and to get a general wide range of perspective, specifically both on consultant and construction professionals. The target sample size was 30 participants. However, 20 participants were obtained in this study. Online and physical surveys were conducted with individuals using open-ended questions, such as “How does your organization ensure they deliver client satisfactory projects?” All physical surveys were audiotape-recorded and transcribed, and online surveys were carried out through Microsoft forms survey.

Researchers developed definitions of the variables and their relationship (Project Management, application of project management tools etc.) identified in the proposal model and also received the participants’ perspectives on the variables and their relationships. Researchers then reviewed all transcripts carefully, highlighting all text that appeared to describe a relationship and a pattern in the response and also the same thing with the surveys. All highlighted text was coded using the categories wherever possible. Text that could not be coded into one of these categories was coded with another label that captured the essence of the relationship in the variables. After coding, Researchers examined the data for each category to determine whether subcategories were needed for a category (e.g., impact of companies towards the professional project managers, the impact of companies towards the performance of a project). Data that could not be
coded into one of the categories derived from the theory were re-examined to describe different relationships within the variables. Finally, Researchers compared the extent to which the data were supportive to the theory discussed in the proposal versus how much represented different relationships responses. The report of study findings describes the incidence of codes representing the relationships suggested. Researchers summarized how the study validated the theory developed from the literature that supported it and what new perspectives were added.

4.4 Descriptive analysis/statistics
Nachamias & Guerrero (2010) divided the statically procedure into two categories: inferential and descriptive statistics. Zikmund (1994) defined a descriptive analysis as a form of conveying raw data in such a way that is easier to understand and interpret. The procedure assist in organize and describes the data which collected from a sample. There are variate that falls under descriptive analysis.

1) Qualitative or nominal- uses words or phrase to describe.

2) Quantitative- uses numbers to describe. It can be discrete and continuous.

3) Ordinal -it is an interim between qualitative and quantitative.

For the purpose of this research, ordinal analysis was adopted due to the fact that data is not numbers only but also qualitative and it is also ordered (e.g. much worse, worse, same, improved, much improved).

Discrete
Discrete will also be employed in analysing data in this study mainly due to the fact that it comprises of tables and bar chart as a representative. This will help analyse the data and represent in in a tabular and/or bar chart format to present the results better
4.5 Participant Profile

The first section of our questionnaire is based on generic questions to find out on the background of the organisation and its performance and the participant’s background and experience in the project management profession. One should note that these questions do not relate to the objectives and will have little to no impact on the analysis of our research. Asking these questions helped the researchers to have a better understanding when it came to how the participants were answering the questions. For example, if the participant does not have information or perhaps does not know the answer to the question the researchers could understand if she/he has been working with the company for a few months or has been a project manager for less than a year.

<table>
<thead>
<tr>
<th>Respondent code</th>
<th>How long have you worked as a project manager?</th>
<th>How long have you worked with this organisation?</th>
<th>What kind of projects have you worked on before?</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>2 yrs.</td>
<td>2yrs.</td>
<td>heavy industrial and engineering</td>
</tr>
<tr>
<td>R2</td>
<td>9 yrs.</td>
<td>9yrs.</td>
<td>institutional and commercial,</td>
</tr>
<tr>
<td>R3</td>
<td>5 yrs.</td>
<td>3yrs.</td>
<td>Engineering and Residential.</td>
</tr>
<tr>
<td>R4</td>
<td>3 yrs.</td>
<td>3 yrs.</td>
<td>Commercial and Residential.</td>
</tr>
<tr>
<td>R5</td>
<td>20 yrs.</td>
<td>20 yrs.</td>
<td>heavy industrial and engineering</td>
</tr>
<tr>
<td>R6</td>
<td>8 mo.</td>
<td>3yrs</td>
<td>commercial and institutional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>R7</td>
<td>7mo.</td>
<td>7mo.</td>
<td>institutional and commercial</td>
</tr>
<tr>
<td>R8</td>
<td>8mo.</td>
<td>8mo.</td>
<td>commercial</td>
</tr>
<tr>
<td>R9</td>
<td>2yrs.</td>
<td>4yrs.</td>
<td>institutional</td>
</tr>
<tr>
<td>R10</td>
<td>8mo.</td>
<td>8mo.</td>
<td>heavy industrial and engineering</td>
</tr>
<tr>
<td>R11</td>
<td>3yrs.</td>
<td>5yrs.</td>
<td>institutional and heavy industrial</td>
</tr>
<tr>
<td>R12</td>
<td>2yrs.</td>
<td>6yrs.</td>
<td>heavy industrial and engineering</td>
</tr>
<tr>
<td>R 13</td>
<td>2 yrs</td>
<td>2 yrs</td>
<td>heavy industrial and engineering</td>
</tr>
<tr>
<td>R 14</td>
<td>8mo.</td>
<td>8mo.</td>
<td>Residential.</td>
</tr>
<tr>
<td>R 15</td>
<td>8mo.</td>
<td>8mo.</td>
<td>commercial</td>
</tr>
<tr>
<td>R 16</td>
<td>5 yrs</td>
<td>7yrs</td>
<td>institutional and commercial</td>
</tr>
<tr>
<td>R 17</td>
<td>3 yrs</td>
<td>8yrs</td>
<td>institutional and commercial</td>
</tr>
<tr>
<td>R 18</td>
<td>8mo.</td>
<td>8mo.</td>
<td>commercial</td>
</tr>
<tr>
<td>R 19</td>
<td>5 yrs</td>
<td>3yrs</td>
<td>Commercial and Residential.</td>
</tr>
<tr>
<td>R20</td>
<td>2 yrs</td>
<td>3yrs</td>
<td>heavy industrial and engineering</td>
</tr>
</tbody>
</table>
4.6. This section looks into objective one which is the Identification of the Tools and Techniques used in Project Management Companies and their effectiveness.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Respondent</th>
<th>Quote from questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do you make sure that the tools and techniques applied in projects are applied effectively?</td>
<td>R1</td>
<td>“Communicating and ensuring that the project team understand the application of these tools and techniques”</td>
</tr>
<tr>
<td></td>
<td>R2</td>
<td>“…. [b]y adhering to the project milestone program and monitoring it.”</td>
</tr>
<tr>
<td></td>
<td>R3</td>
<td>“The projects are audited accordingly during the process, and monthly progress reports are done.”</td>
</tr>
</tbody>
</table>

Is there a formal process for selecting the tools and techniques to adopt in managing projects?

<table>
<thead>
<tr>
<th>Questions</th>
<th>Respondent</th>
<th>Quote from questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R1</td>
<td>“Yes, it is largely linked to the contract specifications/ client requirements as well as the type of project we have to undertake. This enables us to select the most suitable tools and technique for</td>
</tr>
<tr>
<td>R1</td>
<td>Do you think the set PMBOK guide on PM tools and techniques is possible to the project”</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>“No. The organisation I am in is still a small company that is slowly being introduced to project management and the benefits of project management”</td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td>No, it will be site specific”</td>
<td></td>
</tr>
<tr>
<td>R4</td>
<td>“Not sure”</td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>“Yes, by testing methods and giving regular feedback if they work or not. From the feedback which may be by a checklist or meeting. A meeting will be held where other different techniques will be put on the table for management to choose from.”</td>
<td></td>
</tr>
</tbody>
</table>
| R1   | “Experience always works more than the theory and guidelines, guidelines only work once they
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>apply in real project or one need experience more than the set tools?</td>
<td>are applied, Knowledge is needed and guidance is also needed but experience always takes preference”</td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>“you cannot use the manual all the time, one needs experience to be able to run a project knowing the guideline helps but experience is the best”</td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td>“Our company has its own PM tools and techniques that have been developed, the PM tools and techniques guidelines are useful but experience is more useful and needed, they are just there to help out when you are stuck ”</td>
<td></td>
</tr>
<tr>
<td>R4</td>
<td>“You need both experience and the guidelines, experience is more important because the construction industry is not a plug and play industry but you need to know what needs to be done. Sometimes, you need to deviate and make ends meet, use discretion for the project to go through. I would give the PMBOK guidelines a 9/10 on its</td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>“They are effective I would still give you a 9/10. They keep me on track”</td>
<td></td>
</tr>
<tr>
<td>R6</td>
<td>“We follow the PMBOK, but it sometimes depends on the project, some steps you do not need to take because they have been taken”</td>
<td></td>
</tr>
<tr>
<td>R7</td>
<td>“My organization has brought in an external company to provide the necessary training for the project management tools and techniques that we utilize on projects. However, they often give generic training which does not always relate to our current projects”</td>
<td></td>
</tr>
</tbody>
</table>

**What tools and techniques do you use to run your projects?**

<p>| R1 | “Most of the time we use experience to run our projects, what is learnt in school and the general PMBOK standards do not seem to be useful when you are on site, but we do use software to run our projects” |
| R1 | “The company just has a document that has a checklists, it |
| R2 | “It is unfortunate that we cannot apply the same tools and techniques when working on a project.” |
| R3 | “we used the manual that we have developed by the company with reference to the PMBOK guidelines and past experiences” |
| R4 | “We use the quality control manual” |
| R5 | “We are a small company, there are no tools that are specifically used, it is the experience that guides us most of the time” |
| R6 | “The PMBOK is the foundation of how we run our projects, we need it for guidance” |
| R7 | “one needs experience of course, but guideline are importance but for the experience I would prefer it in a sense of ones need for guidance and mentorship in the early stages of the project” |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
</tr>
</thead>
<tbody>
<tr>
<td>procedures exist in your organisation?</td>
<td><strong>is basically a guideline to check and tick of the elements to consider when they are carrying out tasks on site like checklist on fitting columns</strong></td>
<td><strong>“We do not have a set document for tools and techniques, we look at the basic needs of the project before working on it then we know what to apply, we teach our staff to identify the task, look at the material and skilled labour needed for the project”</strong></td>
<td><strong>“Yes, it is a lot, it is called the best practice manual and procedure for managing projects, it tells you everything”</strong></td>
<td><strong>“We are candidate of the PMBOK, therefore we are guided by such associations and we have to comply”</strong></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Question</th>
<th>R6</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>We have guide documents on the documents that you</em></td>
<td><em>We have guide documents on the documents that you need to produce</em></td>
<td><em>We have guide documents on the documents that you need to produce throughout the lifecycle of the project, it guides us on what you need to deliver successful project. It is also to boost your knowledge</em></td>
</tr>
<tr>
<td><em>Are these procedures ever amended?</em></td>
<td>R1</td>
<td><em>Not that I know of</em></td>
</tr>
<tr>
<td></td>
<td>R3</td>
<td><em>yes, they get amended, the one we have now was last amended in 2014</em></td>
</tr>
<tr>
<td></td>
<td>R4</td>
<td><em>Yes, they get amended every few years</em></td>
</tr>
<tr>
<td><em>Do you have software that you use to run your</em></td>
<td>R1</td>
<td><em>No</em></td>
</tr>
<tr>
<td><em>projects?</em></td>
<td>R2</td>
<td><em>Yes, Candy. Ms Project</em></td>
</tr>
<tr>
<td></td>
<td>R3</td>
<td><em>candy and Ms project</em></td>
</tr>
<tr>
<td>R4</td>
<td>“Ms projects, but for more complicated projects we use candy”</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>“Ms project”</td>
<td></td>
</tr>
<tr>
<td>R6</td>
<td>“Ms project, there still need to be improved there is a potential that they work better than they do.”</td>
<td></td>
</tr>
<tr>
<td>R7</td>
<td>“Ms project”</td>
<td></td>
</tr>
</tbody>
</table>

Does a set of documented project management procedures exist in your organisation?

The researchers needed to know why they have set documented procedures and what they use them for. 9 of the project participants said that they use these set standard procedures for project start-up, to monitor and control the project, Handover of project deliverables and closing down a project and project selection and prioritisation.

Are the formal project management procedures ever amended?

11 out of 20 participants agreed that their tools and techniques are sometimes amended. The 11 who agreed to amending them said that they only do this on special cases or every three years and also when there is new technologies introduced into the industry. The reason behind this was so that they can be able help fit every unique project and improve their performance.
4.7 This section looks into objective two which is the application of tools and techniques affects project performance.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Respondent</th>
<th>Quote from questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you ever had first-hand experience with poorly performing project?</td>
<td>R1</td>
<td>“Yes …Rise of BEE influence the community on service delivery…it is at the cost of the project, they might not be aware of infrastructure delivery, Poor management from contractors…”</td>
</tr>
<tr>
<td></td>
<td>R2</td>
<td>“… The architect was a client at the same time, there was so much conflict of responsibilities… constantly detailed changes lead to loss of money from the client. I cannot perform quality work having changes on a regular basis…”</td>
</tr>
<tr>
<td></td>
<td>R3</td>
<td>“… [t]he project that I am currently working on It was a dump site. The archaeologist had to be involved to evaluate the bones which were found on site, this caused the project to be behind schedule by 2 months. We were able to fast track and crush certain activities of the project to ensure a better performance of the project…”</td>
</tr>
<tr>
<td>R4</td>
<td>“... we try to avoid government project becomes they take time to pay and it result in a lot of conflicts..”</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>“... no, only with the current project...”</td>
<td></td>
</tr>
<tr>
<td>R6</td>
<td>“... the bakkie contractors may get a project with a performance guarantee but cannot deliver, either because he does not have the experience; does not have the technical understanding or does not have the enough resource but he got the job because of the ratings...”</td>
<td></td>
</tr>
<tr>
<td>R6</td>
<td>“I have never been involved in a project that had penalties but we have issue..”</td>
<td></td>
</tr>
<tr>
<td>How do you measure project performance</td>
<td>R1</td>
<td>“... the client looks at everything... You need to look at everything and make sure you satisfy the client in every aspect of the project. however, when the client comes to site he/she ask about the quality and check if you’re on time”</td>
</tr>
<tr>
<td></td>
<td>R2</td>
<td>“... for me time, cost and quality is the main driving thing and the client pays more attention to that...”</td>
</tr>
<tr>
<td>R3</td>
<td>“... first we have to identify the task or scope of work, followed by the material needed for the task, and the number of skilled labour required for the specific task and the execution and better management... There are different things happening on site constantly, each person is responsible for certain of work. He has to come and report if the task is doable in time.</td>
<td></td>
</tr>
<tr>
<td>R4</td>
<td>“...we look at the project performance from each stage and figure out the necessary way to manage the project... project performance goes beyond the triple constraints. There is safety and risk management which the client looks at...”</td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>“...in building relationships with client, you have to go an extra mile in how you delivery the best performing project...”</td>
<td></td>
</tr>
</tbody>
</table>
This section looks into objective three which is the project performance using tools and techniques impacts on client satisfaction.

<table>
<thead>
<tr>
<th>Section D –objective 3</th>
<th>Respondent</th>
<th>Quote from questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the organization build relationships with clients?</td>
<td>R1</td>
<td>“Normally it’s through networking, so whichever property or construction event we go to we get to market our services and from there we market our staff to the individual clients and what we can offer them in terms of whatever projects they are looking into developing...”</td>
</tr>
<tr>
<td></td>
<td>R3</td>
<td>“it is just basically delivering the project in time, quality and ensuring that it’s within the budget because if you find yourself exceeding these you will most likely not be in good terms with the client...”</td>
</tr>
<tr>
<td></td>
<td>R4</td>
<td>“…we found that following up on the business with the client is important and you can be able to build a relationship with them and you will also be able to know...”</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>How do you make sure that you sustain a good relationship with the client during a project?</td>
<td>“every time you have a client you have to make sure that the client is satisfied with whatever services we providing them with and also...”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“...most of the relationships we build with our client are mainly based on our performance on that particular project, for instance if you carry out a job and finish it within the budget, time and the right quality and the client is happy, we are able to negotiate more jobs with like this one we currently working on was negotiated after the client was satisfied with another project we carried out for them...”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>when they have work and how they operate and mostly also what they require of the project, clients...”</td>
<td></td>
</tr>
</tbody>
</table>
we do send out surveys to our client just to also find out how are we doing in terms of expectations so from that we know whether to increase or maintain the level of standard and also making sure that we deliver the project within the triple constraints…”

| R4   | “we have got a quality management booklet that we give to all stuff to and we always run the projects according to that and we also have a project director on every project who plays an oversight role that helps our professionals with less experience on the project assists us a lot in the big decision making and the quality delivery of the project on the day to day works…” |
| R2   | “….so we have got public and private sector clients and everything on the delivery of project management, so over and above I know for a fact
that with private clients it's making sure that they can get return on investment at a quicker rate... so it's all based on delivery and delivering on expectations...”

<table>
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<tr>
<th>Question</th>
<th>Response 1</th>
<th>Response 2</th>
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<tbody>
<tr>
<td>Are the any other aspects that you take into consideration in making sure that the project performs well towards delivering client satisfaction?</td>
<td>“…risk, if risk is not managed properly it could really take a toll on the project and also communication, for me being in a public project, communication is a very important tool that everyone understands and is up to date, otherwise you have different dynamics stressing and frustrating you, I could say all of the ones in the PMBoK because scope creep is also a problem which can affect a project in a way....”</td>
<td>“For us the main performance indicator is if the project is within the budget and also finishing in time because then it’s got cost implications if does not ... and also reporting on quality</td>
</tr>
<tr>
<td>R5</td>
<td>&quot;...not that I can think of I mean for the client the only thing that matters to him is executing and delivering the project within the triple constraints only...&quot;</td>
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<tr>
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</tr>
<tr>
<td>R3</td>
<td>&quot;...most of the work that we do the client is the government, so you may find that it is affected by the politics so you may find that they may tend to want to give projects to different companies for the purpose of community upliftment and job creation reasons, however we have carried a lot of government projects under different sectors..&quot;,</td>
<td></td>
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<tr>
<td>R5</td>
<td>&quot;Yes, even this one we are currently working on was negotiated after we delivered one of their projects successfully and satisfactory within the budget, time and...&quot;</td>
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</table>
quality the client required…”

| R4 | “…we did quite a few for one of the mining companies were they were pleased with the delivery of our services and that led to us basically getting work with them on a more than once occasion…” |

To get insight on how the projects produced by our participants are of satisfaction to their clients; researchers asked client satisfactory indicative questions. Researchers first had to find out what factors matter the most to the participants when running projects. Surprisingly, client satisfaction was not one of the factors they consider as their priority. As stated before, achieving the triple constraints is of utmost importance for project managers.

Most project managers assume the needs of the client and get to work on projects to achieve the triple constraints without knowing what matters the most to the client and work on that. This creates miscommunication and project managers work on assumptions.
CHAPTER 5- CONCLUSION

5.1 Introduction

This chapter includes the findings, limitations, recommendations based on the body of knowledge provided under this study and the data that has been acquired and provided under chapter 4. It will conclude by presenting recommendations for the future studies and most importantly by demonstrating how the aim, objectives and research question of the study has been answered.

5.2 Findings

The first objective of this study was to identify the Tools and Techniques used in project management companies and their effectiveness. The data collected through the online and the physical surveys was used to answer these objectives.

5.3 Project Management Tools and Techniques

Objective 1- was based on the application of tools and techniques in Project Management organisations. The aim was to find out what tools and techniques they use to run their project, to know if they are effective, to find out the organisation’s insight on using tools and techniques to run project.
17 respondents have set procedures with tools and techniques. These companies have set out their own manual to run projects; these have been developed by the companies throughout the years and most of them are based on experience gained on different projects “…we have a quality control manual/project manual given to staff and we always run the project according to that. It is the control procedures that the company developed and drafted by the company” Respondent 4. 3 respondents do not use the guidelines for tools and techniques in Project Management.

The PMBOK tools and techniques provide guidelines for the stages of the entire project. The PMBOK guide is the annotated standard since it contains both the what-to and the how-to information (Rose, 2013). Having interviewed some of the participants; the researchers found out that 2 respondent companies that have set manuals are not necessarily to guide the project managers on tools and techniques to apply throughout the project but they are to guide them on the different documents that they should issue throughout the stages of the project. One must note that such guidelines are helpful contractually but they do not help with the effectiveness of the project in terms of project performance and achieving the goals that are set before the project commences. Giving guidelines on the documents that the project manager should be issuing with
an assumption that they know how to run the project could lead to a project objectives being neglected.

Only 7 out of the 20 participants agreed that there is a need for the PMBOK guideline since they are candidates for such associations “The PMBOK is the foundation of how we run our projects, we need it for guidance” Respondent 3 and “one needs experience of course, but guideline are important but for the experience” Respondent 9. While 15 of the respondents say that the experience of the project manager is more important. This could be the reason why they have set tools and techniques but hardly ever use them. There is a risk of going astray because of the experience that one has without being guided. There could be a risk with training younger project managers without having any form of reference that someone who is new in the company can always run to. When asked why they do not have the tools and techniques manuals or guide lines they answered “It is unfortunate that we cannot apply the same tools and techniques when working on a project.” and “We are a small company, there are no tools that are specifically used, it is the experience that guides us most of the time.” Standard tools and techniques to run project with proper and trusted guidelines is very important especially for small companies that are still growing. They could use the PMBOK guidelines to train up-coming project managers in the company and to also pave the way on how the company should run instead of starting on a wrong track without having reference to any standards set up for their company.

The significance found in these responses is that project managers that apply these PMBoK PM tools and techniques do not normally fully apply them throughout their construction projects but only apply them at the early stages of the project. This includes the scope statement and documentation; work breakdown structure; communication plan; and risk management. They rely more on their past experience.
7 participants disagreed with the statement that said ‘A project can run smoothly without the use of project management tools and techniques’. There seems to be a fine line with the statement that ‘a project manager needed experience more that the knowledge and application of tools and techniques’ 5 of the participants were neutral about the statement, 1 agreed with the statement while 6 disagreed with this statement. This sells out the reason why the researchers have found that most organisations have set tools and techniques and yet do not apply them throughout the construction cycle of the project to bring out the best results.

While conducting the face-to-face interviews, 9 participants supported the idea of having experience more than following the application of tools and techniques guidelines: “Experience always works more than the theory and guidelines, guidelines only work once they are applied, Knowledge is needed and guidance is also needed but experience always takes preference” Respondent 1, “you cannot use the manual all the time, one needs experience to be able to run a project knowing the guideline helps but experience is the best” Respondent 2. Others testify the
need of tools and techniques guidelines as the basic learning skills but also said that experience and attaining skills in the industry is more important “You need both experience and the guidelines, experience is more important because the construction industry is not a plug and play industry but you need to know what needs to be done. Sometimes, you need to deviate and make ends meet, use discretion for the project to go through. I would give the PMBOK guidelines a 9/10 on its effectiveness” - Respondent 6

Looking at the data collected from different Project Managers around Johannesburg 9 out the 12 that participated agree that ‘a successful project is a result of the effective application of project management tools and techniques and 6 agreed that a project cannot run smoothly without the effective application of tools and technique. This proves that the participants understand the need for the effective application of these tools and techniques. After reading this’ one may be puzzled and ask the question; if the Project Managers realise that for a project to run smoothly there must be effective application of tools and techniques, why is it that they do not apply them?

When the respondent were asked if they find the set tools and techniques are feasible to apply in the realities of the construction industry their responses were “My organization has brought in an external company to provide the necessary training for the project management tools and techniques that we utilize on projects. However, they often give generic training which does not always relate to our current projects” Respondent 7 and “Most of the time we use experience to run our projects, what is learnt in school and the general PMBOK standards do not seem to be useful when you are on site, but we do use software to run our projects” Respondent 1. 15 out of 20 respondents agree that applying such tools and techniques in reality is not easy because the construction industry some of them are not flexible enough to be applied in every unique scenario of the project. Respondent 6 said “the construction industry is not a plug and play industry but you need to know what needs to be done. Sometimes, you need to deviate and make ends meet, use discretion for the project to go through” when they were asked why they think the set tools and techniques are not feasible in reality.

Maserang (2002) discussed that there are many tools that are available to aid the accomplishing of task and process. Some of these tools require software from a computer, while others have to be practiced manually. No one tool addresses all project management needs.
All of our respondents admitted to the use of software to plan and schedule the projects the most common was MS project and Candy. Maserong (2002) agreed that CPM, Gantt charts and PERT are widely used tools in the practice of construction project management to control various processes in the construction phases. They could be useful for scheduling of the project but these tools do not manage the overall process of performance. For example, CPM can determine how change in time needed to complete one activity, as for preparing for the drawings, it may affect the overall completion time for the project. This brings forth the need to choose a strategy that will improve the state of the whole project.

5.4 Project performance

Investigate how the application of tools and techniques affects project performance

The second objective of the research was to investigate how the application of tools and techniques affects project performance. The primary finding of this section is that performance of the project is influenced by the effective application of project management tools and techniques.

Project participants believed that the project management tools and techniques can be used as basic blocks to construct a PM toolbox. According to the responses, many project managers are not highly dependent on the application of PM tools and techniques on the project in order to better improve or enhance the performance of a project. However they are dependent on their acquired experience on previous projects in order to improve the performance of a construction project. It is also validated by R7 “...experience is A need and you need someone to also guide you to the processes... practice sometimes is different from theory but the theory gives one a guideline of to do it, but experience is necessary..”. Experience plays a major role in the performance of the project. Miklosik (2015) mentioned one of the skills to a successful project manager is to be able to apply the knowledge obtained from previous projects to the current project. The participants believed that in as much as all construction projects are dynamic and different in nature, they can always depend on their experience due to the similarities of their operations in better executing the projects. Where else the PM tools and techniques are standard
procedures and systems which cater to the overall general aspect of projects, and hence they are not always helpful in the challenges encountered on some construction projects.

**Indicate your rating of the importance of the PM Key Performance Indicators (KPIs) listed.**

![Graph showing the importance of PM KPIs](image)

The table above reflects the results on the elements that the organisations perceive as their key performance indicators. To most organisations and stand-alone project managers the most important performance indicator is producing the project within the limits of the triple constraints which are; Time, Cost, Quality. Everything seems right about this perception, one could say, because when the produced on time the client does not have to lose profit or be inconvenienced by the project delaying and if the project is done on budget the client does not have to pay more. In reality and according to what the researchers came to find through the interviews is that when chasing time and saving cost on running project; R5 mentioned that “quality is often compromised and after handing over we take more than the initial project time frame working on latent defects”. Looking at the table above achieving the triple constraints is the main concern of most project managers and construction managers. This makes it easy for the project managers to consider client and their perceptions on how the project should run. It
does not benefit any of the parties to rush to finishing the project on time and within budget knowing well that the quality of the project being handed over is not on point and the contractor will still have to work on the structure after handing over.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>neutral</th>
<th>disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project management tools and techniques are used, helping us to better manage our projects.</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Project management tools and techniques are used, but add little value</td>
<td></td>
<td></td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

The data above indicate that project management tools and techniques are essential in managing the project. None of the respondents disagrees that project management tools and techniques influence project performance. The findings validates (Joshi & Khandekar 2015) which discussed the delay factors that affect the progress of project performance and the urgency of the need to improve the performance of a project through application of project management tools. R2 mentioned that “... as much as experience is important in managing the lifecycle of the project, PM tools and techniques is also important to effectively manage the project to client expectations...”. Participants supported that the project management tools and technique add more value to the project performance out of the 10 respondents 6 disagreed on project management tools and techniques adding a little value to the project.

In addition, R4 argued that “…following best practice manual which tells you what and how tools and techniques applied on each stages will put in best position to deliver the project..”
participant agreed that the effective application of tools and techniques affects the performance of the overall project. The results is confirms with the study by Ika, (2009) that discussed the need for project teams to utilise the project management approaches for good construction project performance in the construction industry.

Figure 2: shows what leads to poor project performance.

It is clearly from figure 2 that 10 participants support that lack of knowledge on project management tools and techniques plays a role in poor project performance. This is also validated by 8 of the respondents supporting that ineffective application of tools and techniques. About 10 respondents support that lack planning and controlling leads to poor project performance. The project management tools and techniques incorporate methods that are effective and efficient plan and control the project, and without the knowledge of project management tools and techniques it unlikely that project managers can effectively apply the tools and technique.

R3 added the courses of poor project performance by saying “...Rise of BEE influence the community on service delivery...it is at the cost of the project, they might not be aware of infrastructure delivery, Poor management from contractors...” the delivery and production of construction is affected by the
contractor with no experience or don’t follow the process protocol of the construction industry. R3 on the interview mentioned conflict of client which leads to poor performance.

R4 supported his reasoning about what lead to project performance by stating that (“...first priority is safety, you don’t compromise safety then follows quality then thirdly is production. We don’t compromise safety trying to push production...”). A project may perform well according to the triple constraints but when health and safety incident occurs on site, they have negative implications on the performance of the project. The respondent further argued that safety and the golden triangle affect the integrity of the structure or the project.

<table>
<thead>
<tr>
<th>A project can never run smoothly without the application of PM’s tools and techniques</th>
<th>Strongly agree</th>
<th>agree</th>
<th>Neutral</th>
<th>disagree</th>
<th>Strongly disagree</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>A project still run smoothly without the use of PM’s tools and techniques</th>
<th>Strongly agree</th>
<th>agree</th>
<th>Neutral</th>
<th>disagree</th>
<th>Strongly disagree</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>The experience of the project manager matters more than knowing how to</th>
<th>Strongly agree</th>
<th>agree</th>
<th>Neutral</th>
<th>disagree</th>
<th>Strongly disagree</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>5</td>
<td></td>
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</table>
A successful project is a result of the effective application of project management tools and technique. The project manager is responsible to ensure that the project run smoothly. The data on the table above shows that the project cannot perform to a required standard without the application of project management tools and techniques. From the background context of the study, failure of project success implies the poor performance of a project and Project performance gauges the failure and success of the project. About 11 respondents agree that a successful project is a result of the effective application of project management tools and technique.
5.5 Client satisfaction

Establishing how project performance using tools and techniques impacts on client satisfaction.

The third objective of this research study was to establish how project performance using tools and techniques impacts on client satisfaction. This objective was achieved through the online and the physical surveys questionnaire that was carried out. The main findings from this study show that when it comes to the construction industry, the performance of a project plays a very significant and pivotal role towards the outcome of a project and the satisfaction of the client.

The concept of project success is developed to a set criteria and standards by which project managers can complete the project with the most favourable outcomes. Project success is believed to be tied to performance measures which in turn are tied to project objectives. According to Chan (2004), at the project level, the success is measured by the project duration, monetary cost and project performance. According to the findings from the surveys which were carried for the purpose of this research, most participants consider time, cost and quality as the basic criteria on effective project performance towards achieving project success for client satisfaction.

Most project participants believe that the involvement and engagement of the client throughout the project plays a significant role towards the positive performance and success of the project. This is mainly because they believe that by having them involved helps better enhance the execution of the project within the scope, while steering the project towards ensuring that the project goals are met with the client channelling the project along the product they require through the appropriate planning towards that. Thomson (2011) argued that client’s consciousness of needs tends to improve and evolve with the project. Clients’ needs and wants may vary and change during the course of the project and that may cause miscommunication. As a result the project manager and other professionals have difficulties following these developments. Korpela (2015) indicated that in order to improve construction process, a shift to a collaborative approach with the client is very essential. Thus, this helps improves the efficiency and effectiveness of the overall project.
“...client involvement is very essential in the performance of the project, like for instance mostly with private companies, they are very active and quick in the implementation of a project, communication and payments which enhances the operations and performance of the project”

However on the other hand, there was the other small group which argued against the high involvement of the client throughout the project lifecycle. These respondents believe that the increased involvement of the client hinders the overall performance of the project, mainly because they turn to continuously suggest alterations to the project without even taking into account the implications these may have on the project and the organization, especially those clients with minimum or no experience about the construction industry. The variation orders tend to impact greatly on the efficiency and effectiveness of the on project on which in turn, normally results into unwanted disputes which affect the relationship of the parties and the performance of the overall project.

According to the findings, when it comes to the importance and significance of the aspect of building a relationship with the client, many respondents reflect that time, cost and quality are the main three elements that clients seek for in a project, thus the execution and delivery of a construction project within these three constraints is the best possible way to ensure they build relationships with the client. In addition to this, these project managers and their organizations also prioritize the issue of having a good relationship with their client in every project mainly because they believe that in their experiences, this can help better enhance the performance of the project as in minimizes the room for many misunderstandings and unwanted change variations which can affect the basic cost, time and quality implications in the run of the project. This is because when relationship between the project manager or organization and the client is good is in a good state, the two can be able to easily negotiate and reach consensus on the various aspects of the project which in turn will contribute towards the performance of the project while steering towards delivering the project within the three basic constraints.

“...most of the relationships we build with our client are mainly based on our performance on that particular project, for instance if you carry out a job and finish it within the budget, time and the right quality and the client is happy, we are able to negotiate more jobs with like this one we currently working on was negotiated after the client was satisfied with another project we carried out for them...”
Whilst respondents (project managers and construction professionals) aim to facilitate and manage the execution of a construction project from start throughout to the finish, they understand that the project has to be executed to the client’s requirements and most importantly to the client’s satisfaction. According to Egemen & Mohamed, (2005) client satisfaction is very important since companies can easily lose customers (clients) if they do not deliver projects that are not on the level of their expectations. The comments received from most respondents concerning clients satisfaction were more pressing on the triple constraints (time, cost and quality), there is a belief that the client is more concern and concentrated on the project being delivered within these triple constraints. Even though there are many other various aspects that project managers/construction professionals take into account towards delivering the project within the triple constraints while also making sure that project deliverables are met with the assistance of the PM tools and techniques, they also lean towards making sure that the client’s requirements are met and the performance of the final product is satisfactory to the client.

5.6 Limitations

This study was limited to construction project managers/professionals and companies operating within the construction industry. Another limitation of this study was the data collection on which the researchers carried out in accordance with the convenience sampling and data collection was only collected within the Gauteng region. The requests for participation was sent out to large numbers of potential participants, However, the response for participation was only limited to the willingness of the participants to participate in the study. due to the the time constraints, the research sample size was only limited to a reasonable number of participants that is manageable for the time allocated while also making sure that substantial and practical data is acquired to allow researchers to have a good amount of data to achieve the aim, objective and answer the research problem.
5.7. Practical Implications
This study will contribute on the Project Management Body of Knowledge since it is a study that traces from the tools and techniques that have been encompassed in the PMBoK. The implication that this study will contribute is derived from the fact that all project managers around the globe refer to PMBOK and use these tools and techniques to achieve their objectives. In addition, the study will subside the process mapping and protocol of the construction project operation and delivery.
This will also contribute to the success and growth of construction project management companies around South Africa and beyond because the aim of this research is to find ways in which project performance can be improved through the effective application of the PMBoK tools and techniques while consequently improving client satisfaction with a belief that clients are the driving force of the construction industry.

5.8 Recommendations
It is of great importance for the future upcoming study on the effective application of project management on data finding to expand the population to other provinces and other countries. This is due to the lack of valid knowledge that project management tools and technique are used around the world and impact it has on the construction industry project delivery the same way as in South Africa. Foregoing, PMBOK is universal applicable to the whole world and it should be contextualized. The researchers believe the research topic is broad and more time should be dedicated on the research study. We suggest that future researcher carefully consider the constraints and limitation and the time spend more time on project management tools and techniques and how effectively they are on every stage of the construction project from inception to close-out.
Researchers who would like to explore this topic in the future are advised to look at deeper in a sense of; limiting themselves to a few projects that they will observe from the beginning to its close out stage. This strategy will be helpful for them to see exactly what happens in construction projects, what limitations do the tools and technique guideline press on the project managers that they find it difficult to apply and therefore judge the performance of that project having been part of it throughout its construction cycle. One can also be able to observe the interactions and the
relationships the project managers have with its clients to monitor, observe and judge the levels of satisfaction.

In addition to the recommendations, more research study on this topic needs to be carried out in order to expand the body of knowledge in this section within the construction industry, especially in South Africa. By so doing this will enhance and stress the importance of the full application of the PMBoK Tools and Techniques in construction projects and better improve their performance towards achieving successful projects and most importantly client satisfaction.

Since the construction is developing and advancing, it can be recommended that future researcher could use the research topic as foundation of starting point to determine the effectiveness of the project management tools and technique. This would assist the construction professional to deliver projects that meet or exceed end users expectations.
5.9 Conclusion

With a close and critical observation of the results gathered; there is a great need for the construction project managers to take full advantage of the tools and techniques provided by the PMBoK as guidelines to apply throughout their projects. There is a need for project managers to respond appropriately to construction procurement changes and the nature of projects by effectively and fully applying the project management tools and techniques provided in the PMBOK to help enhance the performance of projects and achieving the set out project requirements (Love et al., 2002). There are also some other areas that can be enhanced and improved in order to better improve the performance of the construction project. Some of these framework include a quality control checklists and a structured standard monthly report, on which these participants believe that if the proper experience is employed along with a great team where everyone involved does their job as expected.

The aim of this research was to investigate how construction project management tools and techniques can be effectively applied by project managers to improve project performance in order to achieve client satisfaction. Through the surveys conducted the researchers were able to observe the pattern that; most PM organisations have their own tools and techniques but hardly ever apply them throughout the construction of the project, giving reasons that they are generic, impractical and not effective for every different project. Through literature, the researchers were able to find out the different tools and techniques that the Project Management Body of Knowledge (PMBOK) has put up as its guidelines for project managers to use throughout their projects. This guideline does not give you the ‘what’ part of the tools and techniques like most guideline would do, but it gives you the, ‘how’, ‘when’ and ‘where’ part of the guideline from the inception to the stage where you hand over the project. An example one can consider to test the effectiveness of these tools is under the Expert judgment tool. This tool is recommended by the PMBOK for: planning schedule management, defining activities, estimating activity resources and estimating activity durations. This tool is used on a lot of planning processes under each knowledge area of the PMBOK. For project management, an expert can be someone who is considered a subject matter expert or a consultant (Heldman, 2013). Expert judgment is used for: Consulting those who have had enough encounters to know the ins and outs; pros and cons and how the schedule must be managed. This is one practical and a not so far-fetched tool to apply. one can be sure that they apply this tool already in their organisations but they do not know that
it is one of the tools. This is an example that some tools are not as complicated as one would think. The PMBOK provides more practical guidelines on tools and techniques that could be easily applied by organisations without wasting a lot of time and money trying to figure out the right way of running projects. There are many more tools that can be applied without hardship: Alternative Analysis, Published Estimating Data, and Bottom-Up Estimating. These tools and techniques are used for estimating activity resources. The keyword that links all of these tools & techniques together is the word resources (Rowley, 2013). It is impossible to figure out the duration of an activity without knowing the quantity of resources available to carry out task. There are tools and techniques used for developing and controlling the schedule PMBOK (2013). These could be effectively applied if effectively followed by project managers since they give guidelines explicitly unlike the manuals they adopt for quality control in their organisations.

The researchers were able to achieve the objectives through the literature and the data acquired which simultaneously proved the problem facing many construction project managers in their execution and delivery of the projects to the client’s satisfaction. Through the data obtained from the research online and physical survey, most of the respondents that are project managers and principal agent strongly believe that Project success is archived through the application of project management tools and techniques which supports one of the key objective of the study. However, project performance cannot be influenced only by the project management tools and technique, Experience has a role in practical application of the theoretical content that PMBok recommend. Through literature, researchers were able to find out that project performance is affected by combination of factors and influence on these factors at the right activity and stage make it more probable (Savolainen, 2012). Project management tools and techniques are regarded as success factors which influence project performance which have to be identified before the commencement of the project. Therefore, knowledge on the project management tools and techniques is needed and is essential to be vested on project managers to increase the likelihood of delivery the project that meet client expectations.

Having researched on client satisfaction through asking our project management participants client satisfaction indicative questions. It seems that for most PM organisation clients are not much more than constant variables of the construction project. This is because there is a common assumption by all of our participants which is that clients are satisfied but just achieving the cost,
quality and time objective. Client satisfaction is the main driving force of the construction industry. Construction project managers stress the importance and significance of delivering the project within the triple constraints. This is because they believe that by being able to deliver a project within these three constraints, the client will be most happy and satisfied. Project managers continue to execute their construction projects with dependency to their previously acquired experience on which has not had much of an impact towards achieving the triple constraints. Fewing (2013) concurs with this reasoning “many project managers have become comfortable with the currently existing methods even though they have not been able to always produce the best value for the clients”. With this being said there is a need for project managers to dig deeper than the surface needs of the clients for their organisations to flourish in achieving client satisfaction.

The lack of the full application of the PMBoK tools and techniques has a negative impact on the performance of a project which normally results into client dissatisfaction. Therefore, the effectiveness of the project in terms of performance is affected by a number of aspects most importantly the full application of the tools and techniques throughout the project lifecycle rather only in the planning phase and also the involvement of the client contributes greatly in a positive manner towards the project. According to Chan (2004), Project success is believed to be tied to performance measures which in turn are tied to project objectives and not only the triple constraints. Therefore, by applying these elements from the PMBoK the project can be properly executed towards achieving the project objectives and perform effectively throughout to bring about client satisfaction beyond the triple constraints.
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Questionnaire

Which statement best fits your own definition of a project?

a. A project is used to manage major, one-off capital-intensive work activities in such areas as construction, engineering or the introduction of new systems.

b. A project is a vehicle for tackling all business-led change within an organisation.

c. Don’t know.

Which statements apply to your organisation? (Tick all that apply)

| The benefits of project management are not being promoted. |  |
| The benefits of project management are being promoted. |  |
| A company-wide project management system with centralised control is being set up. |  |
| A company-wide project management system with devolved control is being set up. |  |

The limited time frame (i.e. having a set time period to achieve a set of defined objectives) of a project causes problems resulting from a need to quickly achieve the following (provide a tick)

| Build a cohesive team. |  |
| Build trust within the team. |  |
| Develop rapport with stakeholders. |  |
| Develop a working control system. |  |
| Obtain organisational support. |  |
How does the organization build relationships with clients?

How does your organization ensure they deliver client satisfactory projects?

Give your opinion of the following statements (S. agree/Agree/Neutral/Disagree/S. disagree/Don’t know)

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a need for clients to be fully involved throughout the projects life cycle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The satisfaction of the client is more important than meeting the project objectives.</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Importance of meeting the project objectives (time, cost and quality) will always exceed meeting the client satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project performance affects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
client satisfaction

| A project is more likely to succeed if the client is informed about the construction industry |

Do you use a model of the stages of project life cycle when managing projects (e.g. initiation stage, definition stage, implementation stage)? (Always/Sometimes/Never/Don’t know)

<table>
<thead>
<tr>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sometimes</td>
</tr>
<tr>
<td>Never</td>
</tr>
<tr>
<td>Don’t know</td>
</tr>
</tbody>
</table>

Does a set of documented project management procedures exist? (Yes/No/Don’t know)

In which of the following areas do procedures relate to? (Tick all that apply)

<table>
<thead>
<tr>
<th>Conception/initiation of a project idea.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project selection/prioritisation.</td>
</tr>
<tr>
<td>Project start-up.</td>
</tr>
<tr>
<td>Defining of benefits, goals, objectives</td>
</tr>
<tr>
<td>Planning time, cost, scope of work</td>
</tr>
<tr>
<td>Managing risk</td>
</tr>
<tr>
<td>Change management</td>
</tr>
<tr>
<td>Contract management</td>
</tr>
</tbody>
</table>
Monitoring and controlling a project

Closing down a project

Handover of project deliverables

People selection

Benefit management

Quality improvement

Performance review/monitoring

Don’t know

Other (please specify: ...................................................).

Indicate under which situations amendments take place (tick all that apply)

- As a formal project activity based on the experience of past projects.
- As part of general ongoing continuous improvement programmes.
- During an individual project at the discretion of one of the project parties (e.g. manager, sponsor). Please specify who: ................................................
- Other. ................................................

How do you ensure that the tools and techniques applied in projects are applied effectively?

__________________________

__________________________

__________________________

__________________________
Give your opinion of the following statements (S. Agree/Agree/Neutral/Disagree/S. Disagree/Don’t know)

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project management tools and techniques are used, helping us to better manage our projects.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project management tools and techniques are used, but add little value.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project management tools and techniques are not used.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other (please specify: ................................................)

Is there a formal process for selecting the tools and techniques to adopt in managing projects? (Yes/No/Don’t know)

If yes, please provide details: ................................................

Are the formal project management procedures (application of tools and techniques) ever amended? Why? (Yes/No/Don’t know)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Which of the following statements best describes how your performance on projects is evaluated? (provide a tick)

| There is no process for evaluating my performance against project-related objectives. |
| My performance evaluation is built into the project management process of individual projects. |
| My performance is evaluated by a process linking high-level, organisation objectives to project work. |

Indicate your opinion of the importance of the PM KPIs listed (V. important/Important/Neutral/Unimportant/V. unimportant/Don’t know)

| Client perception. | Very Important | Important | Neutral | Unimportant | Very Important | Don’t know |
| Meeting specified project objectives. | | | | | | |
| Smoothness of handover. | | | | | | |
| Responsiveness to change. | | | | | | |
| Cost effectiveness of work. | | | | | | |
| Improvement in organisational capability. | | | | | |
Growth of others.

| Own personal growth. | | | | |

Please provide details of methods used to manage the PM KPIs rated as most important.


In your own opinion: what do you think leads to poor project performance? (provide a tick)

| Complexity of a project | | | | |
| The diversity of project team members | | | | |
| Lack of Knowledge tool and techniques | | | | |
| Lack of planning and control for the project | | | | |
| Incorrect amendment of project management procedures | | | | |
| Ineffective application of tool and techniques | | | | |

Give your opinion of the following statements (S. agree/Agree/Neutral/Disagree/S. disagree/Don’t know)

<table>
<thead>
<tr>
<th>A project can never run smoothly</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
</table>

5 | Page
<table>
<thead>
<tr>
<th>without the application of project management tools and techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>A project still run smoothly without the use of project management tools and techniques</td>
</tr>
<tr>
<td>The experience of the project manager matters more than the knowing how to apply tools and techniques in projects</td>
</tr>
<tr>
<td>A successful project is a result of the effective application of project management tools and technique.</td>
</tr>
<tr>
<td>Project managers still need to be trained how to apply tools and techniques in their projects</td>
</tr>
</tbody>
</table>