NELSON MANDELA UNIVERSITY

Business School

THE INFLUENCE OF PROJECT MANAGEMENT MATURITY ON PROJECT SUCCESS – A CASE OF A PRIVATE ORGANISATION'S INFRASTRUCTURE PROJECTS

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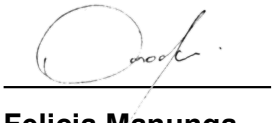
DECLARATION

I, the undersigned, hereby declare that:

- The work contained in this study is my own original work and was not submitted in full or partial fulfilment to any other recognised university for any other degree;
- This study is being submitted in partial fulfilment of the requirements for the degree of Master in Business Administration; and
- All sources used in this study are referenced and recognised.



Felicia Manunga

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Date

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ABSTRACT

The construction industry is characterised by the high rate of project failures. Industry professionals consider inconsistent project management practices to be a major cause of these failures. A leading contributor to these inconsistent project management practices is that there is no one project management standard followed in the industry, thereby resulting in different interpretations and applications by project managers. Given the intricate nature of construction projects, correct project management practices and project management maturity are paramount in achieving the overall envisaged project benefits, project success and business profit by organisations. As such, this study arose from the desire to improve the prevailing practices in construction projects, particularly in the Private Healthcare Industry.

Against this background, the purpose of this study was to develop a framework that aims to improve the prevailing project management practices in infrastructure projects within the Private Healthcare Industry. This was done through evaluating the appropriate frameworks and theories in construction project management practices, project management maturity, and project success concepts. This then led to determining the correct construction project management practices required for the successful execution of infrastructure projects.

To achieve this goal, a comprehensive review of literature was conducted that covered a review of project management practices, benefits, and theories. The review of literature formed the base for the identification of six propositions and the conceptual model of the study. This study further reviewed the PMBOK project management best practices in the construction industry. Literature identified that project management knowledge areas are not equally important to project success. Project manager competency and project size has an influence on the correct project management practices required for project success. When determining project success, the triple constraints and stakeholder satisfaction are identified as the core determinants of project success. Furthermore, leadership and top management support is found to have an influence on project success and can sometimes mitigate the inconsistencies of the project management practices. The review of literature concluded with the main study proposition: Project management maturity has an influence on project success.

The qualitative research methodology and case study strategy was used in this study. Six cases, comprising organisations that currently manage construction projects in the Private Healthcare Industry, were reviewed and one participant from each organisation was interviewed in the study. Both primary and secondary data were collected and analysed in the study. The data were analysed using thematic, pattern matching and explanation building techniques to achieve the main study objective.

The analysis of data revealed that the main research proposition, project management maturity has an influence on project success, can be confirmed. Of the five sub-propositions of the study, three could be confirmed; those include (1) project manager competency has an influence on the effective implementation of correct project management practices that enable project success. (2) The triple constraints and stakeholder satisfaction are the core determinants of project success. (3) Leadership and top management support has an influence on project success and can sometimes mitigate the inconsistencies of the project management practices. Two of the propositions could not be confirmed (1) the 12 PMBOK knowledge areas are not equally important for project success; (2) the project size determines the important project management knowledge areas required for project success, as such, alternative propositions were proposed. Subsequently, the study framework to improve the prevailing project management practices in infrastructure projects within the Private Healthcare Industry was developed, centred on the study results.

The study concluded with managerial recommendations that include the recommendation that organisations in the construction industry should implement the construction edition project management body of knowledge in its entirety in order to achieve improved probability of project success. Furthermore, the study recommended that managers should invest in training and mentorship programmes in the organisations as that will allow for the transferral of skills between junior and more senior staff and build competency of staff.

Keywords: knowledge areas, project management, project management maturity, project success

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LIST OF ABBREVIATIONS

APM	Association of Project Management
B-PMM	Berkeley Project Maturity Model
CSF	Critical Success Factor
CIOB	Chartered Institute of Builders
CMM	Capability Maturity Model
ECSA	Engineering Council of South Africa
HSSE	Health, Safety, Security, and Environmental
IPMA	International Project Management Association
K-PMMM	Kerzner Project Management Maturity Model
MINCE	Maturity Increments in Controlled Environments
OPM3	Organisational Project Management Maturity Model
P3M3	Project Programme Portfolio Management Maturity Models
PM2	Project Management Process Maturity Model
PMBOK	Project Management Body of Knowledge
PMBOK-CE	Project Management Body of Knowledge - Construction Edition
PMI	Project Management Institute
PMO	Project Management Office
PRINCE 2	Projects in Controlled Environments
PSC	Project Success Criteria
SACPCMP	South African Council for Project and Construction Management Professions
SMCI	Standardise, Measure, Control and continuous Improvement

CHAPTER 1: INTRODUCTION

1.1 GENERAL INTRODUCTION

Construction project management has witnessed great evolution in the last decades that has led to more structured project management approaches being documented by various industry bodies (Abbasi & Jaafari, 2018; Padalkar & Gopinath, 2016; Seymour & Hussein, 2014). In South Africa, the construction management industry is governed by many bodies, such as the Chartered Institute of Builders (CIOB), Engineering Council of South Africa (ECSA), Project Management Institute (PMI), and South African Council for Project and Construction Management Professions (SACPCMP). All these bodies provide varying but similar interpretation of construction management principles, process knowledge and project management practices (CIOB, 2014, SACPCMP, 2018).

Even with these industry bodies governing the construction industry, the industry itself is still characterised by frequent project deadline delays, budget overruns and problems in obtaining proper quality (Nowotarski, Matyja & Paslawski, 2016). Project delays result in monetary losses both through loss of revenue and increased project timelines and costs associated with these delays (Lester, 2014).

According to Deloitte (2017), project failures include, but are not limited to incomplete designs, significant problems with project leadership, poorly defined contracting strategies, projects not fit for purpose, inadequate opening project planning, poor benefits tracking, poor management of risk, and poor management of professional teams with ambiguous responsibilities. All these failures are a consequence of inconsistent management practices. According to Valentin and Vorster (2012), 10% of all project failures are due to the professional team's management of projects.

In monetary value, organisations in the construction industry are losing approximately US$122 million (R1, 881,166,800.00) for every US$1 billion (R15, 419,400,000.00) as a consequence of poor project management (PMI's Pulse of the Profession, 2016). The effects of poor project management practices are an industry wide problem with many firm battling to accomplished successful The Pulse of the Profession (2016) found that for organisations with formal project management structures, there is a 13 times decrease in loss of capital. The report further states that only 51% of construction projects are

finished as scheduled, 54% within the allocated cost estimates, 31% of projects experience scope creep, and 16% of projects are deemed to have failed (PMI's Pulse of the Profession, 2019).

To improve project management practices within organisations, much focus is given to the project management sub-discipline of project management maturity, which aims to develop the effectiveness of the project management office (PMO) in organisations in order to meet organisational objectives (Ofori & Deffor, 2017). According to Gomes and Romao (2016), project management maturity models afford organisations the opportunity to assess and improve the overall project management practices within an organisation. Similarly, Nenni, Arnone, Boccardelli and Napolitano (2014) state that project management maturity models provide a standard for best practices, identify strengths and weaknesses of project management practices that can be used to benchmark with different organisations, and provide a strategic plan for project management improvement.

The view from several scholars is that project management maturity leads to project success and this view has attracted much review from scholars resulting in many studies conducted to assess the relationship between the two concepts. Findings from previous studies conducted in line with project management maturity and project success have been largely inconsistent with some agreeing that mature project management practice leads to project success (Brookes, Dey & Clark, 2014; Kwak & Ibbs, 2002; Jugdev & Thomas, 2002, Langston & Ghanbaripour, 2016).

The Project Management Body of Knowledge - Construction Edition (PMBOK-CE), in an attempt to address this in the construction industry, developed a construction edition 12 knowledge area blueprint which focused on projects in that field. This then allows for an assessment of an aligned nature in project management practices that are not generic, limits room for gross error in interpretation, and provides a focused approach that are duplicable in other settings within the construction industry (PMBOK-CE, 2016).

1.2 PROBLEM STATEMENT

Literature identifies poor and inconsistent project management practices as a cause of project failure in construction projects (Deloitte, 2017; PMI's Pulse of the Profession, 2019; Valentin & Vorster, 2012). In addressing these failures and improving project management practices, organisations are looking at identifying the main issues and implementing corrective actions to achieve maturity in project management practices. As covered in the background, assessments of maturity in project management practices enable organisations to identify current weakness in order to improve these practices based on industry best practices. Although, findings from previous studies on the relationship between project management maturity and project success have been generally inconsistent (Berssaneti, de Carvalho & Muscatc, 2012; Brookes et al., 2014; Langston & Ghanbaripour, 2016; Muhammad, Mazlan & Nasruddin, 2016; Yazici, 2009).

This inconsistent application and the subsequent failures are also observed in infrastructure projects in the healthcare industry. The failures are widespread and have resulted in projects undertaken experiencing problems of differing magnitudes, which include time delays, budget overruns, poor customer satisfaction, or delayed return on investments. In response, management in healthcare organisations continue to erroneously invest more money in PMOs without properly identifying the issues and understanding the corrective actions required to improve the project success rate.

The operational risks associated with not attending to this problem include possible invalidation of bed licences by the Department of Health, incorrect classification of sterile areas, issues with infection control, and disruption with service delivery. This in turn may have an impact on the individual facility revenue losses and can contribute to the overall portfolio profit losses within the industry. Even more important, if this problem is not addressed the delivery of patient care will be compromised, which may result in fatalities.

The main purpose of this study is to develop a framework to improve the prevailing project management practices in infrastructure projects within the Private Healthcare Industry.

1.3 RESEARCH QUESTIONS

The main research question: What project management maturity practices influence infrastructure project success?

In answering the main research question, the study addresses six secondary research questions:

- RQ 1: What are the prevalent project management practices in construction infrastructure projects?
- RQ 2: What are the propositions of the study, based on the review of literature?

1.4 RESEARCH OBJECTIVES

1.4.1 Primary Objective

The primary objective of the study is to develop a framework to improve the prevailing project management practices in infrastructure projects within the Private Healthcare Industry.

1.4.2 Secondary Objectives

The above-mentioned primary objective was achieved through the secondary objectives of the study that included:

- To conduct a review on literature with a focus on the prevalent project management practices in construction infrastructure projects in order to identify the applicable project management maturity models for the study, to identify the applicable critical success factors for the study and to identify previous research on the impact of project management maturity on project success.

  The following is covered in the literature review:

a) An overview of project management practices that covers a discussion on generic project management and construction project management.
b) Define project management maturity and provide a discussion of the various project management maturity models
c) Define project success and critical success factors
d) Discuss previous studies on the influence of project management maturity on project success

- Formulate the study propositions based on the review of literature;
- Develop an interview guide, document review, and observation checklist based on the literature review, which entails ascertaining key project management practices that increase the probability of project success;
- Outline and establish the appropriate research design and methodology to be used in this study;
- Collect, record, analyse and interpret the empirical data to obtain results and finding of the study; and
- Draw conclusions based on the empirical results and findings, provide managerial recommendations and identifying research gaps for future research.

1.5 STUDY PROPOSITIONS

Following the review of the literature on project management, project management maturity, and project success, the study proposed one main study proposition and five sub-propositions, namely:

- Main Research Proposition: Project management maturity has an influence on project success.
- Sub-proposition 1: The 12 PMBOK knowledge areas are not equally important for project success.
- Sub-proposition 2: The triple constraints and stakeholder satisfaction are the core determinants of project success.
- Sub-position 3: Project manager competency has an influence on the effective implementation of correct project management practices that enable project success.
- Sub-proposition 4: Leadership and top management support has an influence on project success and can sometimes mitigate the inconsistencies of the project management practices.
- Sub-proposition 5: The project size determines the important project management knowledge areas required for project success.

1.6 STUDY OUTLINE

The study was divided into five chapters. The chapter followed previous research guidelines that aided the researcher in addressing the study's main research question and objectives. The first four chapters each addressed the secondary research objectives and questions one to five of this study. It is only in chapter five, that the last secondary research objective and question is tackled. The study structure comprises five chapters, detailed below:

1.6.1 Chapter 1 Introduction:

In chapter 1, the overview of the study was discussed. It outlined the study background and provided a brief review of literature. The chapter further introduced and outlined the problem statement and provided a brief discussion on the study's research questions, research objectives, and the study propositions that guided the researcher throughout the study process.

1.6.2 Chapter 2 Literature Review:

In chapter 2, various sources of literature were reviewed, such as scholarly books, journals, and previous dissertations, in order to address secondary objectives one to three of the study. The secondary objectives were - RO1: To conduct a review on literature with a focus on the prevalent project management practices in construction infrastructure projects. This included (a) an overview of project management practices that covers a discussion on generic project management and construction project management. (b) Defining project management maturity and providing a discussion of the various project management maturity models. (c) Defining project success and critical success factors. (d) Discussion on previous studies on the influence of project management maturity on project success. This addressed research question RQ1: What are the prevalent project management practices in construction infrastructure projects?

The chapter also addressed RO2: To formulate the study propositions based on the review of literature. This addressed RQ2: What are the propositions of the study based on the review of literature?

Furthermore, this chapter addressed RO3: To develop an interview guide, document review and observation checklist based on the literature review. This chapter concluded with a conceptual model and a discussion on the study propositions.

1.6.3 Chapter 3 Research Design and Methodology:

In chapter 3, the qualitative methodology and case study strategy was discussed and motivated. The chapter further provided details on the research design that included discussion on philosophical orientation and type of the case study, unit of analysis, conceptual framework, propositions, sampling design, data collection, data analysis, validity and reliability, ethical considerations and limitations of the study. The main aim of this chapter was to cover research objectives 4. RO4: To outline and establish the appropriate research design and methodology to be used in this study.

1.6.4 Chapter 4 Results and findings:

In chapter 4, the empirical data were collected, interpreted, and analysed. The chapter detailed descriptive statistics of the participants, provided a discussion on the six pseudonymous company cases, provided discussions on the research themes, provided discussion on the cross-case findings, discussions on the study propositions and findings. This chapter addressed research objective five that was RO5: To collect, record, analyse and interpret the empirical data to obtain results and findings of the study.

1.6.5 Chapter 5 Conclusions and recommendations:

Chapter 5 of this study served as a summary of the entire study. It provided conclusions and managerial recommendations, and addressed research objective 6. RO6: To draw conclusions based on

the empirical results and findings, provide managerial recommendations and identifying research gaps for future enquiry.

1.7 STUDY LIMITATIONS

The methodological limitations of this study were identified and summarised as follows:

- The primary limitation for the study was access to seasoned project management practitioners in the construction industry within the Private Healthcare Industry. Although much advancement has been witnessed in the construction industry as a whole, there is limited growth that can be seen in the subset of the Private Healthcare Industry. The quality of the findings and study allowed the researcher to include construction projects in other industries.

- Another limitation of the study included the lack of access to the organisations with low project management maturity levels, only one of the six organisations consented to a full maturity assessment in their organisation for privacy and confidentiality reasons. The study followed the OPM3 SMCI levels for the observation of the project management practices in the organisation. Upon evaluating the standardised level of the study the researcher identified that a limited number of the knowledge area processes were in place in the organisation and it was evident that a full assessment would not be effective to include the stages of ‘measure, control, continuous improvement’.
- This study also experienced common limitations attributed to the adoption of the case study methodology approach, that include lack of ability to generalise findings to the broader population, although all efforts were made to ensure that the study could be transferable to organisations in the construction industry, with specific reference in the Private Healthcare Industry.

- Documentation reviewed was internal company data and was not authenticated easily. As such, an error in the data may lead to the error being carried in this study. To ensure that did not occur in the study, a multiple case approach was used. According to Yin (2014), the use of saturation from multiple cases ensures that results validity is not compromised.

1.8 CHAPTER SUMMARY

In this chapter, an overview of the study was presented, in particular, the study background, which provided a brief review of literature. This chapter further introduced the problem statement and provided industry statistics of failures and the impact of inconsistent project management practices in the construction industry. Inconsistent project management practices are noted as a major driver of project failures that result in loss of revenue and lost opportunities in organisations. In addressing this, there is a widespread acceptance that the more mature an organisation is in project management, the better the probability of success. The chapter also provided a brief discussion on the study's research question and linked research objectives and the secondary objectives of the study. Furthermore, discussion on the study propositions and outline of the study was also provided.

CHAPTER 2: LITERATURE REVIEW

2.1 CHAPTER INTRODUCTION

The study concerns the prevailing project management practices in construction projects within the Private Healthcare Industry that seem to be inconsistent with best practices and project management maturity prescripts which have an impact on projects' success. Apparent issues of project management practices include lack of standardised approaches for a uniform framework for undertaking projects.

The primary objective of the study is to develop a framework that improves the prevailing project management practices in construction projects within the Private Healthcare Industry. This framework will be developed by critically assessing the relationship between project management maturity and project success, specifically using the theoretical aspects of these two concepts.

In order to fulfil these objectives, suitable literature on these two concepts will be critically reviewed, particularly the prevailing scientific theories, models, and frameworks. Then the suitable project success criteria and critical success factors will be established from the literature reviewed and analysed using the relationship between project management maturity and project success. Findings from this review will be modelled into an appropriate conceptual model. Project management practitioners and experts within the Private Healthcare Industry, and other related industries will then subject the conceptual model arising from the literature to empirical testing, as well as practical scrutiny.

As a result, this chapter critically reviews the appropriate literature in order to arrive at a suitable practical framework. The key literature areas that are critically reviewed in this chapter are project management, project management maturity, project success, and project management maturity, as well as project success linkage.

2.2 PROJECT MANAGEMENT OVERVIEW

2.2.1 Introduction

The discipline of project management has evolved over the past six decades with a rich history represented in literature. Although there appears to be no consensus on the origins of the discipline by researchers, much reference is made to iconic projects, such

as the Great Wall of China and the construction of ancient cities, as evidence of the commencement of the project management practices dated as far as ancient times (Abbasi & Jaafari, 2018; Padalkar & Gopinath, 2016; Morris, 2013).

A considerable contribution from the 20th century to the modern concept of project management is found in literature. Henry Gantt and Henri Foyal are considered the forefathers of project management. These pioneers are respectively recognised for the creation of the Gantt chart, a management tool for the management of project scheduling of all related project tasks, and the creation of administrative management theory that defined five universal functions of management, namely planning, organising, commanding, co-ordinating, and controlling. Both practices are still widely used in the project management field (CIOB, 2014; Garel, 2013; Ong, Wang & Zainon, 2016; Seymour & Hussein, 2014).

Further contributions in this field from this era include the development of two planning techniques, Critical Path Method and Project Evaluation Review Technique of project management. These planning and management techniques have shaped the structure of project management and form an integral part of the modern framework of project management (Abbasi & Jaafari, 2018; Takakura, Yajima & Kawajir, 2019).

It is only in the 1990s that the evolution of project management sees the efforts of formalisation of the discipline with the rise in acceptance of the practice in mainstream organisations. The establishment of industry bodies, such as the International Project Management Association (IPMA) and Project Management Institute (PMI) is testament to these efforts. It is in this period that the introduction of most of the project management methodologies and standards from bodies such as Projects in Controlled Environments (PRINCE 2) and PMI's Project Management Body of Knowledge (PMBOK) can be found. It should be noted that there have been debates around the legitimacy of project management as theory with scholars' advocating for and against the concept (Abbasi & Jaafari, 2018; Pollack & Alder, 2015).

Because this study is about project management practices, it is important to provide an overview of the current best practices within the project management discipline. The main aim of this section is to provide and answer the secondary objective, which is to evaluate

project management. This section reviews the concepts of generic project management, which is a foundation in the review of both project management maturity and project success in latter sections of this chapter.

2.2.2 The Project Concept

In a discussion on project management and the inherent processes, it is firstly important to understand what a project is. Therefore, projects are defined as a temporary endeavour undertaken to create a unique product or service and to achieve organisational strategic plans (PMBOK, 2017). Projects are then undertaken to produce results as per the initial request from the originator (Heagney, 2012; Oberlender, 2014).

A more comprehensive definition of a project is found in Project Management Vocabulary (BS 6079-2:2000) that explain projects as *"A unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including constraints of time, cost and resources"* (Lester, 2014).

Projects can be executed in a broad range of industries and thus produce a variety of outputs. Singh and Singh (2017) state that the management of projects includes scientific application of modern practices that enable the management of operationally related components (such as planning, monitoring, financing) in order to deliver the required outputs in any industry.

In managing projects, Morris (2013) argues that all projects, regardless of difference in outputs, follow a similar process or lifecycle. The project management lifecycle presented in Figure 2.1, follows a linear progression, with the end of one phase introducing the beginning of the next stage. This process involves five stages namely initiation, planning, execution, controlling and closing.

Figure 2.1 Project Management Processes (Author's own construction)

It is this defined project lifespan, particularly the front-end work that distinguishes the management of projects from traditional management styles. These processes allow organisations to determine the full extent of the scope of work required and the further execution and monitoring to facilitate business change (Ofori & Deffor, 2017; Morris, 2013).

For the purpose of this study, and in particular, the execution of infrastructure construction projects, a project is a unique endeavour undertaken to produce specific business objectives, within the constraints of cost, time, resources, and specifications.

2.2.3 Project Management

Project management is defined as the "application of knowledge, skills, tools, and techniques to project activities to meet project requirements" (PMBOK, 2017). Similarly, the Association of Project Management (APM) defines project management as the achievement of project objectives through the application of experience, knowledge, process and skills (Association for Project Management, 2012).

It is however the view of Berssaneti *et al.* (2012) that project management is more than grouped management tools, skills and techniques but rather a management style that is result oriented and is applicable to any project in any form of sector in the business environment. Project management is executed through the application and integration of five project processes detailed in section 2.2.2 (Heagney, 2012).

Lester (2014) states that project management comprises planning, monitoring, and control of all phases of a project within the constraints of time, cost, and performance. Lester (2014) further states that in order to achieve the overall project objectives, the management of projects has to include the motivation of all project participants.
Therefore, in this study, with particular reference to the execution of infrastructure construction projects, project management is the application of skills, tools, and experience in the planning, monitoring and control of all project phases, within the constraints of time, cost, performance, in order to achieve all project objectives.

2.2.3.1 Project Management Practices, Processes and Knowledge Areas

The practices within project management are generally governed by standards and best practice methodologies (Lester, 2014). It is important to note that no one standard is followed in the industry and all standards are aimed at providing an example of good practice in the industry. The aim of these methodologies is to provide organisations with best project management processes that are believed to be more effective at the delivery of projects and with fewer undesired project outcomes (Kerzner, 2016).

There are various project management bodies, such as Project Management Institute (PMI), International Project Management Association (IPMA), and Axelos' Global Best Practice, that have proposed project management methodologies, standards, and processes (PMBOK, 2017; PRINCE 2, 2017). Each standard has been widely adopted in different industries and each have the associated strengths and weaknesses. The project management framework detailed in this study is one developed by PMI. The reason for its adoption is that it is widely accepted, applicable in the diverse industries and comprises the full body of industry best practices (Farrokh & Azhar, 2013; PMBOK, 2017).

According to PMBOK (2017), project management involves the systematic application of knowledge to project activities and through different process groups in order to achieve project objectives. The process groups are defined as a series of actions that result in a desired result. PMBOK incorporates 49 processes in total, failure or success on one process will have an impact on other project areas. The activities and processes are integrated through four main components, including inputs, tools, techniques, and outputs. PMBOK (2017) follows the same project lifecycle phases as typical project phases (although classified as process groups) and further suggests best practice through performance processes grouped into ten knowledge areas. Knowledge areas, presented in table 2.1, are specialised sets of common project management processes used to manage projects (PMBOK, 2017).

Table 2.1.

Project Management Knowledge Areas

Knowledge Areas	Description
Project Integration management	Processes that identify and coordinate the various activities of the project (7 processes)
Project Scope management	Processes for defining and controlling the project (6 processes)
Project Schedule management	Processes involving project timelines activities are met and completed on time (6 processes)
Project Cost management	Processes that ensure project budget related activities (4 processes)
Project Quality management	Processes ensures that the project is delivered to the correct specification and meets stakeholder's expectations (3 processes)
Project Resource management	Processes that ensure the correct use of people to deliver the project (6 processes)
Project Communication management	Processes that align the communication of project information with all stakeholders (3 processes)
Project Risk management	Processes that identify, assess, mitigate and manage all potential project risks (7 processes)
Project Procurement management	Processes that govern the purchase and acquisition of products and services (3 processes)
Project Stakeholder management	Processes that identify role players within the organisations who can either impact or be impacted by the project (4 processes)

Table 2.1 Project Management Knowledge Areas (PMBOK, 2017)

Each knowledge area has its own set of processes executed at different phases of a project's life cycle, linked by the project inputs and outputs. The detailed interaction of knowledge areas and process groups is depicted in table 2.2. These processes enable project managers to have better management and to control the overall project outcomes (Silva, Duarte, Barros & Fernandes, 2019). It should be noted that PMBOK is not a methodology but rather provides best practices used widely in industries and thus allows the use of knowledge to develop methodologies by organisations. Even with this understanding, PMBOK has been widely applied by many organisations as a standard or methodology (PMBOK, 2017).

Table 2.2.

Interaction of Project Management Process Groups, Knowledge Areas, and Deliverables

	Description	Knowledge Areas and Deliverables
1. Initiating	This process group covers the sanctioning of the projects and the identification of all project stakeholders. 2 processes	- Project integration management includes development of a project charter - Project stakeholder management includes development of a stakeholder management plan
2. Planning	This process group holds most of the effort in project management, as it relates to the planning of all project related activities. All ten of the knowledge areas are included in this process. (24 processes)	- Project integration management includes development of a project management plan. - Project scope management includes defining project scope and creating a Work Breakdown Structure. - Project schedule management includes the identification and sequencing of work activates, developing network diagrams. - Project cost management includes drafting budgetary estimates and obtaining budget approval. - Project quality management includes defining quality requirements and establishing a project management plan. - Project resource management includes the identification of human resources requirements. - Project communication management includes developing a project communication plan. - Project risk management includes identifying, analysing potential risks to the project and establishing a project risks plan. - Project procurement includes the development of procurement plan. - Project stakeholder management includes the development of a stakeholder management plan
3. Execution	This process group includes only the processes involved in the delivery and execution of the project (10 processes)	Deliverables from this group include the appointment of the project team, implementation of the project management plan, ensuring that quality requirements are implemented, ensuring continuous stakeholder engagement and implementation of a communication plan
4. Controlling	These processes run simultaneously with the planning and execution phases. It involves all ten knowledge area. (12 processes)	In the event that changes happen, a close implementation of the agreed change-control processes is initiated. It further ensures that the project is executed, based on the agreed parameters.
5. Closing	These processes include the conclusion of the contract and administrative close out (1 process)	Mainly involving the procurement management and communication knowledge areas

Table 2.2 Interaction of project management, process groups, and knowledge areas (PMBOK, 2017)

2.2.4 Project Management in Organisations

Literature confirms that the steady increase in the adoption of project management practices can be attributed to the attempt by organisations to secure competitive advantage. The reported increase in the number of project management jobs observed over the last decade confirms the importance (PMBOK, 2017). Furthermore, the adoption is due to the enormous strain experienced by organisations on traditional management structures (Grant & Pennypacker, 2006; Farrokh & Azhar, 2013; Too & Weaver, 2014).

Traditional structures are bureaucratic and fail to respond rapidly to the fast changing business environment. Therefore, organisations move to adopt temporary management structures, such as project management, that are highly organic and have a quicker response rate (Kerzner, 2016). Project management has the flexibility required to manage the inherent complexity of projects and provides improved capability for organisations to manage cost, time, and specification that leads to improved organisational performance (Steyn, Carruthers, Dekker, du Plessis, Kuschke, Kruger, Sparrius, van Eck & Visser, 2016).

Meredith and Mantel (2012) state that the emergence of project management is due to the demand of new management methods in order to meet the changing characteristics of a contemporary society. Meredith and Mantel (2012) further advise that the adoption of project management is a consequence of three driving forces, namely; (1) the accelerated growth of human knowledge; (2) the increased demand for more customised products; and (3) globalisation of markets for the production of goods and services.

Project management practices are used to manage the organisation's outputs through projects (Maritato, 2012). According to Ramazani and Jergeas (2015), projects and project-based organisations play an integral role in modern organisations, even with the increased acceptance of project management mentioned above. Silva *et al.* (2019) recommend that before motivating any business to adopt or improve project management practices, a clear understanding of the desired state of project management maturity is important, as the implementation of these may be costly.

2.2.5 Conclusion

In this section, the review of generic project management practices was discussed. Project management is the application of skills, tools, and experience in the planning, monitoring and control of all project phases, within the constraints of time, cost, performance, in order to achieve all project objectives. Project management affords organisations opportunities to be flexible and meet the demands of a changing market. Additionally, this section briefly discussed the project management body of knowledge and methodologies available in the market and narrowed to a discussion on the body of knowledge that is applicable in this study, that is, the PMBOK. This body of knowledge offers organisations with industry best practices from which an organisation can draw in managing and executing their projects.

2.3 CONSTRUCTION PROJECT MANAGEMENT

2.3.1 Introduction

The construction industry is noted as a forerunner in the adoption of project management. The origin of managing construction projects can be linked to the great ancient pyramids and ancient cities. Even with this widespread adoption, several studies have found that the principled and structured approach to managing construction projects is still relatively young, with origins only evident from the beginning of the last century. The evolution of this discipline is closely associated with that of generic project management. A large body of work is found in literature that reviews the concepts entrenched in this discipline (Abbasi & Jaafari, 2018; Padalkar & Gopinath, 2016; Seymour & Hussein, 2014).

The main aim of this section is to provide for and address the secondary objective, which is to evaluate construction project management. This section reviews the theoretical concepts and practices of construction project management and construction project failures that form a basis for the review of both project management maturity and project success.

2.3.2 Managing Construction Projects

PMI's Pulse of the Profession (2019) is an industry comparative report on project management practices between global organisations and different industries that covers areas such as talent, process and project management capabilities, culture and

organisational capabilities, project performance, dollars wasted, performance and primary cause of project failure. The construction industry is found to be comparable to global practices but results indicate the need for more standardised practices within the industry, with only 25% of organisations in the construction industry having standardised project management practices with an average 42% on project management maturity (represented by mature project management practices, high project management maturity, and high programme management maturity).

In addressing this gap in the construction industry, PMI developed a construction edition of the body of knowledge. PMBOK-CE (2016) believes that the diverse nature of construction projects warranted a specific edition. The construction edition retains much of the same structure as the knowledge areas discussed in section 2.2.3.1 and expands the knowledge areas to include Project Health, Safety, Security, and Environmental (HSSE) Management and Project Financial and Claim Management. Minor modifications on processes in each knowledge area have been included in this edition to support the unique attributes of projects in construction. As indicated in section 2.2.3, this study uses the construction edition of the PMBOK, as it is industry specific and is not a generic approach to project management.

The Occupational Health and Safety Act (OHS) (85 of 1993) and Section 4 of the Construction Regulations (2014) requires that a safe and reasonable working environment, that is safe and without risks to the health of workers, be provided and maintained by the employer. In the construction industry it is of particular importance, due to the high levels of risks involved, that the client, contractor, and all consulting project team members work together to achieve this goal. Furthermore, all health and safety responsibilities are required to be clearly identified, communicated, and executed to ensure no harm is experienced any of the employees nor the environment at large (Oke, Aigbavboa, & Seemola, 2018). The HSSE Management knowledge area focuses on addressing this important need by determining and implementing all safety and environmental policies required to ensure that the project is planned and executed in a manner that prevents accidents so as to avoid personal injury, fatalities, or damages (PMBOK-CE, 2016).

Project Financial and Claim Management focuses on how the project will be financed. It is focused on acquiring and managing the financial resources which include identifying revenue sources and monitoring net cash flows and insuring that the overall business can still service the required business objectives (PMBOK-CE, 2016). This ability to successfully plan and manage project finances and claims has been most important in the South African construction industry in the last decade with a number of reputable large and medium enterprises closing down which is mostly attributed to financial woes and non-payments by government and large private clients (Cohen, T., 2019; Janice, K., 2019 & Property Wheel, 2019). This knowledge areas then focuses on the appropriately allocation of top management resources and flags any potential problems well in advance (PMBOK-CE, 2016).

PMBOK-CE (2016) argues that the publication should not be too prescriptive, but rather provide a range of best practices and a platform for organisations to use in adopting any methodology. It may be that not all knowledge areas are of equal importance or lead to the success of construction projects. PMBOK-CE (2016) classifies the knowledge areas into core functions (integration management), critical for project success functions (schedule, cost and quality management) and facilitating functions (scope, resource, communication, risk, procurement, stakeholder, HSSE, financial management). Literature has indicated that knowledge areas do not have the same influence on project success (Pretorius & Steyn, 2012; Dermirkesen & Ozorhon, 2017). Therefore leading us to conclude:

Proposition: The 12 PMBOK knowledge areas are not equally important for project success.

Because the discussion of construction project management has so many perspectives from which one can depart, it is important to indicate from which standpoint a researcher is delivering a study. In this study, the discussion of construction project management is viewed from the owner's perspective. This then allows the discussion to cover the project from business decision to inception to project closeout or handover (PMBOK-CE, 2016).

Construction projects fall into four main categories, namely, residential, building, engineering, and industrial construction. All these types of projects require a co-ordinated

effort from several stakeholders to accomplish and thus require a more rigorous management of time, cost, and quality and require a multi-faceted approach to management. The execution and performance of a construction project depends on many variables, such as the consulting team, regulatory institutional bodies, contractors, communities, stakeholders, and contract type (de Plessis & Oosthuizen, 2018; Oberlender, 2014; Gudiene, Banaitis, Banaitiene & Lopes, 2013; Singh & Singh, 2017).

The management of construction projects is customarily done on an individual project basis, with a project manager being made responsible for all aspects of the project life cycle. A project manager is responsible for the management of a project, as well as the achievement of the overall specific project objectives (Lester, 2014). However, the contracting methods chosen by the owner often determine which party or consulting specialist will be used to manage the project, which can be either a project manager, a construction architect, an engineer, a construction manager, or a general contractor. It is however not clear that all these different parties have the required competencies and knowledge to properly manage a project (Sears, Sears, Clough, Rounds, & Segner, 2015).

Contracts in construction projects establish and control the performance and serve as a tool for administering terms and conditions for parties such as owners, contractors, consulting professionals and detail the roles and responsibilities of each party. Project managers in construction may come from different disciplines in the industry but all are required to have the necessary competencies and skills to manage all aspects of a project from inception to completion (CIOB, 2014). The methods used to manage and deliver projects are influenced by experience, capability, stakeholder management, and expertise. According to Valentin and Vorster (2012), 10% of project failures are due to the professional team's management of projects. Therefore, it is imperative that even with the different contract types that skilled and capable professionals be given the responsibility of managing the project (de Plessis & Oosthuizen, 2018). As such, individual project manager competency has an integral role in project success, thus the proposition as follows:

Proposition: Project manager competency has an influence on the effective implementation of correct project management practices that enable project success.

According to Burgan and Burgan (2014), the competency of project managers allows for the appropriate selection of project management methodologies or framework that is applicable to a specific project. This selection is not based on a traditional singular point of project execution or organisational project management policies but should rather be dependent on the nature and size of a project. Project categorisation, such as larger-high risk and small-low risk work should in fact, be used to determine the project management approach best suitable for the project (Burgan & Burgan, 2014).

Proposition: The project size determines the important project management knowledge areas required for project success.

2.3.3 Construction Projects Failures

Construction project failures have been widely reviewed in literature in pursuit of improving project delivery and success. A loose definition of failed projects in construction is recognised as the cancellation or termination of a contract. However, this definition does not provide an in-depth understanding of what leads to projects failing and is limited in uncovering project the phenomenon (Shahhosseini, Afshar & Amiri, 2018).

Some definitions have project failure attached to deliverables, such not achieving agreed upon project timelines, budget, and quality. Nguyen and Chileshe (2015) state that the main challenges contributing to construction project failure include poor planning, co-ordination and poor on-site management. Nguyen and Chileshe (2015) conclude that the main cause of construction project failure is as a result of poor construction project management practices in emerging countries.

In a report on projects globally, PMI's Pulse of the Profession (2019) confirmed that organisations in the construction industry are losing approximately US$122 billion for every US$1 billion as a consequence of poor project management. For organisations with formal project management structures, there is a 13 times decrease in losses of capital. The report further states that only 51% of projects are completed on time, 54% within budget, 31% have project scope creep, and 16% projects are deemed to have failed. Furthermore, it is reported that the primary cause of project failure is due to inaccurate cost estimates for the projects.

Construction in healthcare infrastructure projects have much of the same failures. Barlow and Koberle-Gaiser (2008) indicate that a challenge to managing construction projects in the healthcare industry is due to the dynamic business environment, complex designs, and high switching costs. Furthermore, when undertaking refurbishment projects in 'live' hospital environments, normal operations continue which requires a high degree of adaptability.

In a report on trends in African construction projects, Deloitte (2017) provides a list of the top factors affecting project overruns. Figure 2.2 provides a summary of these factors from the perspective of the owner. Some critical issues identified include incomplete designs, significant problems with project leadership, poorly defined contracting strategies, poor management of professional teams with ambiguous responsibilities, and poor management of risk. All these identified challenges can be addressed with proper implementation of correct project management methodologies, processes and standards in an organisation, all the identified areas are comprehensively covered in PMBOK or PMBOK-CE.

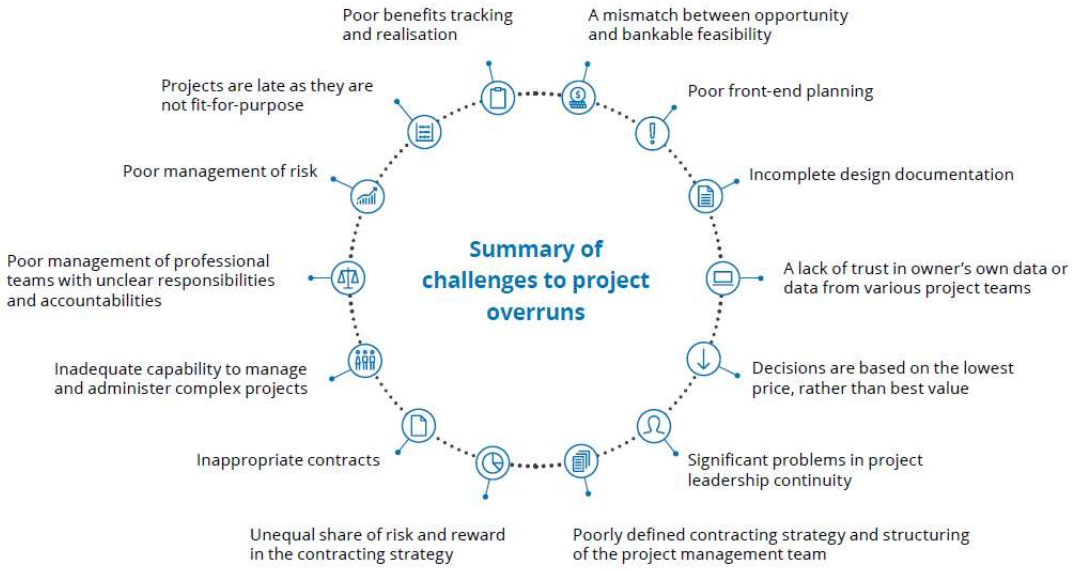

Figure 2.2 Summary of Project Overruns Challenges (Deloitte, 2017)

2.3.4 Conclusion

The review of literature has revealed that there is widespread acceptance of project management by both industry participants and scholars alike, although the Pulse of the

Industry Report indicated that there is low to medium adoption to project management and maturity. Some of the evidence that anchors these findings is incorrect project management responsibility, inadequate capability to manage and administer complex projects and poor overall project management has been identified. Furthermore, this section revealed that the knowledge areas in PMBOK-CE for the construction industry appear not to be equally important to project success and ranking of the processes is thus required in order to identify which of the 12 knowledge areas are critical in achieving project success.

2.4 PROJECT MANAGEMENT MATURITY

2.4.1 Introduction

Project management maturity is a relatively young sub-discipline of the project management discipline. It has, however, been extensively researched in recent years (Kerzner, 2016; PMI-OPM3, 2013). Several project management maturity definitions and models have been advanced by several and diverse scientific studies. All these will be reviewed in this section and then narrowed down to the one that is most appropriate to this study's secondary research objective, which is to define project management maturity and provide a discussion of the various project management maturity models. This chapter aids in addressing the secondary objective of the study, which is to define project management maturity. This section is a base in deciding on the best management maturity model that is suitable for the study.

2.4.2 Project Management Maturity

Literature provides similar definitions of project management maturity, stating that maturity, when simplified, includes the methodology adopted by organisations for the management of their projects and where certain standards and procedures are implemented to effectively deliver projects (Pretorius *et al.*, 2012; Ofori & Deffor, 2013).

Project management maturity is a detailed process that explicitly defines, measures, controls and manages the growth of project management practices in an organisation (Kruger, 2005). Therefore, when organisations have project management maturity, they are in a position to execute all their projects perfectly (Khoshgoftar & Osman, 2009).

According to Anantatmula and Rad (2018), in order for organisations to improve and obtain project management maturity, it is critical that they learn from historical projects to improve project performance. Hillson (2003) also explains that for an organisation to improve the effectiveness of the project management office, there is a need to first quantify the current project management competencies, capabilities and skills within the organisations that will enable target setting for organisation maturity improvements.

Kerzner (2016) states that maturity occurs when there is a high probability of repeatability of success in projects and is achieved through the implementation of standardised processes and project methodology. Wong, Yeoh and Yap (2016) confirm that maturity in project management includes the development of repetitive processes that can provide the organisation with a higher rate of project success, but also caution that the repetitive nature of project management processes does not guarantee success but rather increases the probability of project success confirm this.

Maturity includes the development of project management strategy, methodology, and approach to increase the probability of consistent project success and further provide the ability to replicate project management achievement. In conclusion, project management maturity is the optimal state of organisational efficiency when undertaking projects (Ofori & Deffor, 2017).

2.4.3 Project Management Maturity Models

The aim of management maturity models is to assess, improve, and integrate project management practices within an organisation (Gomes & Romao, 2016). These management maturity models are transformational frameworks used by organisations to guide and attain greater project management standardisation and consistency through the improvement of project processes by directing the organisation's improvement efforts (Ofori & Deffor, 2017). Muhammad *et al.* (2016) define maturity models as tools that enable organisations to measure the current project management competences and allow strategic planning to align project management practices with the overall organisational strategies.

Literature identifies project management maturity as a key in leading organisations to increase project performance, therefore resulting in the achievement of goals and successfully completing projects. Therefore, organisational project management competency and maturity appear to be variables that relate to project success (Gomes & Romao, 2015).

Some researchers estimate that there are more than thirty available models currently in use in the industry (Farrokh & Azhar, 2013; Grant & Pennypacker, 2006; Pretorius *et al.,* 2012; Seelhofer & Graf, 2018). Some examples include Capability Maturity Model (CMM), Organisational Project Management Maturity Model (OPM3), Berkeley PM Maturity Model (B-PMM), PM Solutions Maturity Model, Kerzner Project Maturity Model (K-PMMM), Maturity Increments in Controlled Environments (MINCE) and Project Management Process Maturity Model (PM)[2].

There are common similarities observed in the content and structures presented by most of these models, according to Cooke-Davies and Arzymanow (2003). This is because of the first model that inspired maturity models developed by the Software Engineering Institute of Carnegie-Mellon University in the period between late 1980s and early 1990s, which had a similar structure. Most models consist of five (5) distinct maturity levels or stages that give an account of the current state of project management practices within an organisation through well-established processes or frameworks.

According to Crawford (2002), the achievement of maturity is cumulative and holds the assumption that before an organisation can realise the next level of maturity, it should ensure that all criteria from the previous levels have been accomplished. Table 2.3 provides project management maturity stages, the different maturity stages and provides a brief description of each level, based on Kerzner (2016).

Table 2.3

Project Management Maturity Levels

Maturity level	**Description**
1. Embryonic	Organisations at this level have a strong emphasis on educating and training the employees. Emphasis is placed on rudimentary PM

	knowledge and related terminology. Recognition on need, application and benefits of PM
2. Executive Management Acceptance	Organisations at this level understand that there is a need to institute common processes to increase success and ensure that this is repeated while project failure is decreased. There is also an executive visible understanding and support of project management principles, project sponsorship and a willingness to change by the organisation
3. Line Management Acceptance	Organisations at this level have a single project management methodology to streamline all processes within the organisation. It may lead to change management being required in the organisation because at this stage, all employees and management at all levels are required to align to a common way of operating. Line management support, commitment and education is evident
4. Growth	Development of a project management methodology, use of project-life-cycle, planning, minimising scope creep and use of an appropriate project tracking system
5. Maturity	Development and integration of a management finance control system. Commitment to training and educating project management skills

Table 2.3 Project Management Maturity Levels based on Kerzner (2016)

The levels are set up in such a way that they measure the existing organisation's processes and assess the capabilities, in order to streamline and prioritise organisational improvement plans (Malik, Hariyono & Pratami, 2018). Backlund, Chroneer and Sundqvist (2014) state that there is a belief in literature that organisations with higher levels of maturity have a higher rate of successful project delivery, with specific reference to efficiency and effectiveness, and have a competitive advantage.

In contrast, Albrecht and Spang (2014) explain that organisations should not be working to attain the highest maturity level but rather to find the correct level of maturity for the organisation. Similarly, Crawford (2002) advises that a maturity model selected by an organisation to measure maturity should provide a coherent path for progressive organisational project management growth and improvement. Brookes *et al*. (2014) summarised that successful maturity models have to be logical, allow for repetition, and provide immediate identification on how to improve project success.

Therefore, each organisation should determine the minimum acceptable level of maturity that will yield a return on investment to the organisation (Crawford, 2006). Hillson (2003) concluded that every organisation should appraise its own results and identify the best methods to improve project management maturity.

Although there are a variety of maturity models available in the market, Khoshgoftar and Osman (2009) found that a standard framework governing project management maturity models does not exists and therefore makes it difficult to build on past research, making maturity advances in literature limited over the years. The section below briefly provides a comparative discussion on a few maturity models that align with the management of construction projects and aid in the selection of project management maturity models to be used in this study.

2.4.3.1 Project Management maturity models – A Comparative Discussion

As indicated previously, a variety of maturity models are available in the industry, therefore necessitating a discussion of the various dimensions in order to choose the optimal model for this study. Maturity models have seen a gradual evolution from the first model, Capability Maturity Model (CMM), presented by Software Engineering in 1991 (Brookes & Clark, 2009).

The model offered a five level maturity structure that assisted organisations in prioritising their investments. The model is used in the software industry and has since been found to be lacking in application of other industries. Some criticism of the model include that it only has one dimension, complicated to apply, a vague use of project management terminology, not founded on any theoretical base (Wong *et al.*, 2016; Farrokh & Azhar, 2013).

Even with the criticism mentioned, CMM influenced most of the maturity models currently in circulation today. According to Kwak and Ibbs (2002), variations of CMM adoption were observed in the construction and engineering industries which aided organisations in the discussion for the incremental use of information technology (IT). Although most models have developed, progressed, and transformed into two dimensions, they still retain the five level maturity structure of CMM. Guangshe, Li, Jiangou, Shuisen and Jin (2008)

indicate that the first dimension reflects the maturity levels and the second dimension indicates the project management knowledge areas. The only two exceptions are Price II that only has three stages and OPM3 by PMI that has four levels although there is a focus on continuous improvement as an approach to project management maturity.

Examples of models that incorporate the PMI knowledge areas and five maturity levels, are the Berkeley (PM) ^{2,} Kerzner's PMMM and PM Solution PMMM. Kwak and Ibbs (2000) advise that the model Berkley (PM) ^{2} has the ability to measure project management financial effectiveness, measure the relationship between effectiveness and performance, as well as a return on investment on project management. It further allows the incorporation of project management as a business management discipline. In contrast, Khoshgoftar and Osman (2009) found that the models lacks focus on maturity on a portfolio management level.

The PM Solution maturity model is a framework centred on two dimensions, horizontal and vertical (Crawford, 2002). The first aspect is horizontal and comprises the different maturity levels, founded on the Software Engineering Institute's (SEI) capability model. The models presents maturity in five different levels, beginning from the lowest maturity level one, namely initial processes and ending at the highest level five maturity, namely 'optimising process' (Grant & Pennypacker, 2006). The second aspect focuses on vertical components that comprise nine knowledge areas, as structured by PMI (Miklosik, 2015). Crawford (2002) believes that the benefit of this model is that it provides assistance in establishing an organisational project management culture. Criticism includes the lack of inclusion of portfolio management and the lack of sufficient support in setting project management direction in the organisation.

Kerzner (2001) proposed a maturity model. In this model, the five maturity levels differ slightly from the generic level discussed in the beginning of this section and thus Table 2.1 provides a brief description of the levels. Khoshgoftar and Osman (2009) found that the model only focuses on maturity on a project management level and does not review programme or portfolio management. When compared to OPM3, K-PMMM is found to be more technical and complicated (Khalema, van Waveren & Chan, 2015).

To achieve the expected benefits from evaluating how to increase project management value, the maturity assessment model should cover the three spheres of the project management, namely project, programme and portfolio management, therefore narrowing their choice to be based on two maturity models namely Project Programme Portfolio Management Maturity Models (P3M3) and OPM3 (Nenni *et al.,* 2014).

The main drawback to P3M3 is the five level linear process that measures maturity which lacked in comparison to the OPM3 approach of continuous improvement (Nenni *et al.,* 2014). Furthermore, Khoshgoftar and Osman (2009) provide a more solid argument representing that P3M3 has low process coverage, high assessment difficulty, no known tangible results documented, and the cost of conducting the assessment is high.

Some researchers identified OPM3 as the most suitable model to use in terms of the variables selected in their research. One benefit mentioned in the literature on the model included the reference to PMBOK that it makes an acceptable standard (Silva *et al.,* 2019). Furthermore, the model is said to be simple and understandable to the user, easy to execute and inexpensive to undertake, with strong support and improvement by the publisher and has an emphasis on continuous improvement.

Khoshgoftar and Osman (2009) confirm this in their study, which compares nine maturity models based on 27 variables. They found that OPM3, based on the variables they had chosen, was the most suitable of the nine models reviewed; a compressed summary of the reason for the selection is as follows:

- Aligns to a project management standard (PMBOK);
- Links considered to organisational strategy;
- Considers three levels of project management (project, programme and portfolio);
- Has a continuous approach to maturity, not five levels only;
- Identifies strengths and weaknesses;
- Gives emphasis to continuous improvements;
- Not costly to undertake and is simple for users.

Bento, Gomes, and Romao (2019) conducted a comparative review of three maturity models, namely, CMM, P3M3, and OPM3 that they referenced as the most recognised of all the models. They covered variables such as theoretical background, scope, levels,

self-assessment, and continuous improvement. OPM3 was found to be most suitable maturity model to use based on the chosen variables (Bento *et al.*, 2019). Furthermore, Farrokh and Azhar (2013) advised that OPM3 has solid theoretical base, is not orthodox, is flexible as it has no defined KPIs and the model is multidimensional which something that separates this model from others is.

2.4.3.2 OPM3 Proposition

OPM3 is a standard project management maturity framework developed by the PMI in 1998. This model defines how organisations can plan for improvements through the achievement of industry best practices. It gives a holistic review of project management capabilities within an organisation at three distinct management levels including 'Portfolio, Programme, and Project'. It is a generic model that is easily adaptable in various industries (PMI-OPM3, 2013).

OPM3 comprises three interrelated elements: knowledge, assessment and improvement, commonly referred to as OPM3 Cycle. 'Knowledge' is the first component and it provides information on industry best practices, organisational maturity, and project management maturity. 'Assessment' is the second component that allows the organisation to evaluate its current abilities on the scale of project management maturity. The final component is that of 'improvement' which provides a base for maturity improvement planning. Implementing this model covers a 5-step plan navigated through the improvement cycle (PMI-OPM3, 2013).

Nenni *et al.* (2014) state that OPM3's main feature is that it is based on best practice and therefore not prescriptive, seeks to assist organisations to create a project management framework that aligns to the strategy and undergoes continuous improvement. A drawback is that there is no partial fulfilment of any best practices with OPM3 therefore it may not offer a true reflection on the current state of project management practices in an organisation.

2.4.4 Conclusion

Project management maturity includes the development of project management strategy, methodology, and the relevant approach to increase the probability of consistent project

success and further provides the ability to replicate project management achievement. Therefore, maturity is the optimal state of organisational efficiency when undertaking projects (Ofori & Deffor, 2017). Measurement of such maturity is thus aided by instruments and frameworks developed to align project management practices to organisational strategy.

In deciding which model to choose for this study, the studies by Bento *et al.* (2019); Farrokh and Azhar (2013); Nenni *et al.* (2014), were accessed and the top linking variables extracted, to aid in establishing the decision criteria to be used in identifying the optimal maturity model for this study that includes:

1. Models a theoretical base or is based on a body of knowledge;
2. Model covers a multitude of project management levels (project, programme and portfolio);
3. Continuous project management improvement and improvement guidelines support offered;
4. Model implementations and execution should not be expensive; and
5. Any individual must easily understand models.

Based on the selected variable and criteria, OPM3 is suitable to be adopted in this study on project management maturity in construction projects. For the purpose of a construction evaluation, the OPM3 model includes the specific knowledge areas as expanded by the PMBOK-CE that are HSSE management and financial management.

2.5 PROJECT SUCCESS

2.5.1 Introduction

Project success is an extensively researched and widely contested concept in scientific literature with the origins of the concept stated to date back as far as the origin of projects. Some notable researchers in this field include A. De Wit, D.I. Cleland, J.K Pinto, and D.P. Slevin, who are the forerunners in the discussion on project success (Prabhakar, 2008; Mir & Pinnington, 2014; Yong & Mustaffa, 2017). Cleland found that project success divided into two broad themes: technical performance in terms of time and budget and strategic contribution to organisation's objectives (Prabhakar, 2008).

It is only in the 1980s where evidence appeared, in scientific literature, on critical success factors as enablers for project success. Rockart was one of the first researchers to create the term ‘critical success factors’ (Yong & Mustaffa, 2017). Rockart found that it is of utmost importance that organisations seek to achieve project success, with a strong focus on appropriate resource allocation. Rockart further defines CSF as limited areas, often related to the specific conditions of an industry that have a strong influence on project success (Alzahrani & Emsley, 2013).

This section reviews the broad definitions and concepts of project success and narrows down to the most appropriate definition applicable to this study’s secondary research objective, which to discuss project success and critical success factors and narrow down to identify these for the study. This chapter aids in addressing the secondary objective of the study, to define project success.

2.5.2 Project Success - A Triple Constraint Perspective

The ability to identify and understand project success is important for all key project role players, such as the project team, project owners, contractors, etc., and stakeholders alike. It allows for organisational learning, assessment, and improvement in the execution of strategic business objectives through projects. A review of the literature revealed that the measurement and definition of project success is ambiguous, problematic, and widely subjective and depended on individual perspectives (Hughes, Tippette & Thomas, 2004; Ika, 2009; Pretorius *et al.*, 2012).

Some literature advocates a traditionally recognised definition of project management success, commonly defined to contain cost, time, and quality and often referred to as the “iron triangle” or “triple constraints". This means that for a project to be efficient and successful, it should be within budget, delivered on time and meet the determined quality or performance (Berssaneti, *et al*., 2012; Pretorius *et al.*, 2012; Muller & Judgev, 2012; Serrador & Turner, 2014).

Some researchers criticise this acceptance of the assumed association of project management success to project success. According to Radujkvovic and Sjekavica (2017), the two concepts, although similar, remain distinct and have different measures.

Project management success measurements relate to the three-dimensional criteria of cost, time, and quality and project success measures are focused on the achievement of overall project objectives and goals (Yong & Mustafa, 2017).

Furthermore, both project management and project success are concerned with efficiency (internal project team concerns) but project success further includes effectiveness (this is all related to internal and external concerns) (Ika, 2009). Barry and Uys (2011) state that project management success has an influence on project success but may not prevent project failures.

Barry and Uys (2011); Munns and Bjeirmi (1996) and Serrador and Turner (2014) advance that project success should not be restricted to only objective metrics such as time, cost and quality. Muller and Judgev (2012) concur with this assessment and advise that if project success is restricted to the “iron triangle”, project management will only have operational (tactical) value and will lack any strategic significance to the organisation.

Hughes *et al,* (2004) strengthen this understanding, adding that the measurement of success, with only objective metrics, which excludes subjective metrics (such as meeting stakeholder expectations) by project specialists, may lead to erroneous project conclusions. They further highlight that an understanding of “soft” subject metrics may be dependent on the perspective of a particular observer.

Poli and Shanhar (2003) indicate that measuring project success on the triple constraint is short-term thinking and advise that in order to achieve organisational project strategy, different measures should be utilised for projects. Poli and Shanhar (2003) further indicate that more important measures should be increasing revenue, building market share, product line expansion or customer satisfaction. Schwalbe (2017) indicates that for healthcare projects, success requires a more in-depth analysis and integration of patient lives.

Each stakeholder will have different criteria on how to measure project success, depending on their point of view and whether the completed projects meet their required goals (Williams, 2015). This is validated by Ika (2009), who quote Murphy and Fisher (1974) stating “there is probably no such thing as absolute success in project

management, only the perception of success". Therefore, project success should encompass set criteria agreed upon by all stakeholders at the beginning of a project and used to benchmark and evaluate the different short and long-term project objectives (Baccarini, 1999).

It is clear that there is a lack of consensus amongst researchers on the definition of project success. Although it is important to note that even with these differences there is a general understanding of the significance of the triple constraints (Cserhati & Szabo, 2012; Gomes & Romao, 2016; Sebestyen, 2017). Since the triple constraints form a foundation of all measures of project and project management success, this study includes the triple constraints as measures of project success, therefore:

Proposition: The triple constraints and stakeholder satisfaction are the core determinants of project success.

2.5.3 Critical Success Factors

Gomes and Romao (2016) suggest that there are two concepts that are significant when reviewing project success; these are project success criteria (PSC) and critical success factors (CSF). According to Davis (2018), there is no significant development in literature around measures of project success. Furthermore, the stakeholder's perspective is not accounted when considering PSC. Nelson (2005) suggests that components of CSF are necessary for PCS delivery.

CSFs are components that can significantly influence the probability of project success. These factors, actions, or situations are tools that help facilitate the achievement of project success. Having an understanding of these factors is vital in a project environment, although there has been no consensus in the literature on CFS, as researchers present different factors and criteria to define success (Mohd, Sahibuddin, Rodina & Fauzi, 2015; Collins & Baccarini, 2004; Sebestyen, 2017; Esmaeili, Pellicer & Molenaar, 2014).

Cserhati and Szabo (2012) analysed previous literature and concluded that success factors divide into a relationship or a tasked approach. The task-oriented approach

includes two top factors, including project management and resources as common attributes to success. The relationship-oriented approach includes project team, organisational culture, and communication with project stakeholders. Another study by Esmaeili *et al.* (2014) focused on a literature review on CFS and found that building trust, communication, upper management, teamwork and constructability reviews are key elements of project success in most construction projects.

In the construction and engineering industry, there are a number of studies conducted to identify CSFs. Doulabi and Asnaashari (2016), in a study in construction project in the healthcare sector, found that PSF includes scope, cost, time, human resource, external matters, quality, and environment. Although findings from the interviews highlighted a lack of knowledge for project success factors found from participants who participated in the study. However, a study by Kog and Loh (2012), on different components of construction projects, presented the 10 top CSFs based on interviews with industry professionals, and it was found that industry professionals categorised CFS (budget, schedule and quality performance) differently.

Yong and Mustaffa's (2017) study on CSF for construction projects in Malaysia that reviewed 46 factors identified the importance of both hard and soft CSF. Hard factors include project-financing, competency (project lead, consultants and contractors) and soft factors include communication with all stakeholders. Gomes and Romao (2016), in a study on a small-medium geographic engineering company, found that project success factors are time, cost, technical requirements, customer satisfaction and objective achievement. Furthermore, Gomes and Romao (2016) found that CSF included scope control, team engagement, risk management, market impact, financial resources, top management support, resource availability, and business opportunity.

Kuwaiti, Ajmal, and Hussain (2018) conducted a study in construction for healthcare projects in Abu Dhabi from the perspective of both the customer and contractor. The study identified 10 main CFS and 36 factors. The study found significant CSF to be management (factors include top management support, commitment to project, project mission, monitoring and feedback, project management, process management) and financial (adequate funding throughout the project, availability of resources and accurate initial cost estimates).

It is evident from the scientific literature reviewed that leadership and top management support, in reference to the commitment to organisational project management adoption, has an integral role in influencing successful completion of projects and can sometimes mitigate the inconsistencies of the practices. Top management in organisations has a strategic role that aligns the accomplishment of business objectives through execution of projects within an organisation (PMBOK, 2017).

Project management leadership and support is comprised of focus on (1) strategy, policy systems development and driving organisation-wide project management awareness (Hyväri, 2016); (2) project management staff, with emphasis on training, capability development and systems for reward (Cserhati & Szabo, 2012; Muhammad *et al.*, 2016); (3) establishing stakeholder partnerships (Mir & Pinnington, 2014). Therefore, this leads to the proposition:

Proposition: Leadership and top management support has an influence on project success and can sometimes mitigate the inconsistencies of the project management practices.

2.5.4 Conclusion

Project success is still a widely debated concept in literature with two schools of thought contending how project success is measured. Some advocate the use of the triple constraints (time, cost, and quality) and others say this is not sufficient as it lacks the perspective of the project stakeholders. Even with the continued debate, the triple constraints are still widely used as success criteria by many researchers and business organisations alike. The constraints form a critical base measure for this study with the inclusion of stakeholder satisfaction. It is only in the last decade that the concept of critical success factors as enablers of project success gained traction. In this study, the identified critical success factor was leadership and top management support. These CSFs are project components that have a significant influence on the probability of project success.

2.6 PROJECT MANAGEMENT MATURITY AND PROJECT SUCCESS

Mir and Pinnington (2014) state that literature accepts that there is a significant positive relationship between project management maturity and project success. This continued

acceptance that organisations with mature project management practices are more likely to have a higher rate of project success has led many scholars to conduct research assessing the these two concepts over the last decade (Berssaneti *et al.,* 2012; Brookes *et al.*, 2014; Ibbs & Kwak, 2002; Jugdev & Thomas, 2002, Langston & Ghanbaripour, 2016; Yazici, 2009). These studies are from diverse industries, which range from IT to construction, although a review of previous research reveals limited findings regarding the contribution by project management maturity to project success.

For example, in earlier studies, Kwak and Ibbs (2002) found no statistically significant relationship between project management maturity and project success. Similarly, in a study conducted by Jugdev and Thomas (2002), there was no correlation between process capability and project success for many maturity models. In contrast, when Yazici (2009) looked at the relationship between project management maturity and organisational performance, he found that there is a significant relationship between maturity and organisational performance. The study further revealed that when organisations have higher project maturity, it could have better competitiveness, increase growth of sales, and substantial savings when compared to other organisations in the industry.

Berssaneti *et al*. (2012) investigated the relationship between project management maturity (Level 2) and the project success (namely budget, project requirement, timeline, and stakeholders' demands). Berssaneti *et al*. (2012) found a positive relationship between project management maturity and only stakeholder demands being met. No significant correlation was found between project management maturity and the dependent variables.

Muhammad *et al*. (2016) found three dimensions of project management maturity namely, knowledge management transfer, project management awareness and process management, that have a significant positive influence on project success but when the combined effect of project management maturity was measured, only moderate results were witnessed with project success.

Brookes *et al.* (2014) conducted an empirical investigation on management maturity models and project performance. Their findings indicate that there are high levels of

inconsistencies in each assessment of project management maturity. They conclude that maturity model structures need further review. These findings have been evident through our review of previous literature.

Main Study Proposition: Project management maturity has an influence on project success.

Based on the review of literature above, it is evident that studies reviewing the impact of project management maturity on project success has yielded inconsistent findings and in order to sufficiently answer the research question, a further investigation is warranted.

2.7 CONCEPTUAL MODEL TO IMPROVE PROJECT MANAGEMENT PRACTICES IN PRIVATE HEALTHCARE INFRASTRUCTURE PROJECTS

The influence of project management maturity on project success can be determined using the conceptual model presented in figure 2.3 that depicts an illustration of how this study will be explored. The model aims to develop a framework for construction projects that aims to improve the prevailing project management practices. To achieve the main objective of the study, it is first important to understand the current levels of project management maturity, by means of evaluating 12 knowledge areas from PMBOK-CE (2016), within the organisation.

However, PMBOK-CE (2016); Pretorius *et al.* (2012) indicate that not all knowledge areas have the same influence on project success. Therefore, the knowledge areas ought to be classified into three levels (red- critical, orange-support, and yellow-periphery) to limit the drivers of inconsistent project management practices in construction projects, such as the results from the different contract administrative requirements and point of responsibilities chosen, based on the different types of construction projects.

The categorised knowledge areas have an influence on project success, measured by the triple constraints (cost, time, quality) and stakeholder satisfaction. Stakeholders are divided into internal (executives, project sponsors, process owners, doctors, staff and end-users) and external stakeholders (patients, communities, government and shareholders). However, in understanding the influence of project management maturity

to project success, it is evident that leadership and top management support have integral roles in project success and can sometimes mitigate the inconsistencies of the practices.

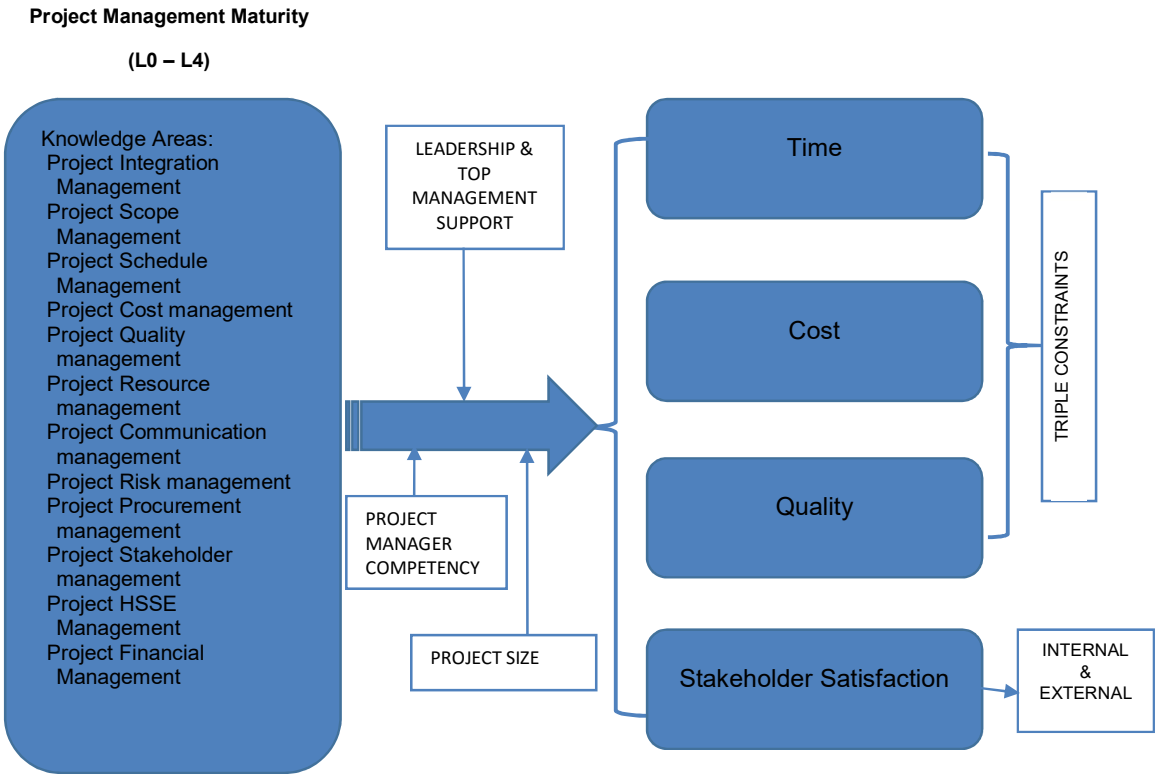

Figure 2.3 Conceptual Model (Author's own construction)

2.8 CHAPTER SUMMARY

This chapter provided an overview on project management, project management maturity, and project success. The first section gave a brief overview of project management, related practices and discussed construction project management. Having reviewed the basic concepts with the relevant practices in construction, it is evident that there is widespread acceptance by both industry participants and scholars alike but the Pulse of the Industry Report found that only 25% of organisations in the construction industry have standardised project management and average 42% on project management maturity. Some salient issues were discovered in the section.

First, the owner's choice of construction contract conditions determine how the project will be administered, resulting in different parties bearing responsibility for all aspects of the project life cycle, this however may have resulted in the inconsistent application of project management. Therefore, **Proposition:** Project manager competency has an

influence on the effective implementation of correct project management practices that enable project success. In improving the inconsistent processes in construction, it is important to ensure that suitable parties are tasked with the responsibilities of executing projects.

Moreover, the study identified that the competency of project managers allows for the appropriate selection of project management methodologies suitable for the different project classification. The new school of thought encourages the selection of project execution approaches that are hybrid and not based on traditional single points of project execution or organisational project management policies but should rather be dependent on the nature and size of a project. **Proposition:** The project size determines the important project management knowledge areas required for project success.

Second, some researchers state that not all knowledge areas are critical to project success and thus requiring a ranking and classification of the knowledge areas to establish which areas are critical, supportive, and peripheral when developing a framework. **Proposition:** The 12 PMBOK knowledge areas are not equally important for project success. Ranking of the knowledge areas will aid in the development of the framework to improve the practices in construction projects and provide a guide on which process are critical for project success and focus the efforts of project parties with the responsibility of managing project performance.

The chapter further established in this review that project management maturity is concerned with the development of project management strategy and methodology used in the efforts to increase the probability of project success. This section further identified selection criteria and a suitable model to use in this study, that is, the OPM3 by PMI, although, minor modifications to the model is required. The modification will include making allowance to two construction related knowledge areas (HSSE and finance management). This will aid in establishing the current levels of maturity in the practices adopted in the organisations and provide targeted project management improvement efforts. As such, the ranking of knowledge areas to develop the framework will serve as a base for a relevant maturity assessment that is critical to project success and not a generic approach.

The review of literature identified two main themes on project success. First, there is inconsistency in the definition of the concept. Second, focus on literature in the last decade has introduced the concept of critical success factors as enablers of project success. The review of different project success criteria and critical success factors aided the selection of the suitable factors applicable in this study. Project success criteria include time, cost, quality, stakeholder satisfaction, and critical success factors include leadership and top management support. As such, **Proposition:** The triple constraints and stakeholder satisfaction are the core determinants of project success and **Proposition:** Leadership and top management support has an influence on project success and can sometimes mitigate the inconsistencies of the project management practices.

Lastly, a review of previous scientific research on studies investigating the relationship between project management maturity and project success revealed inconclusive findings. **Main Study Proposition**: Project management maturity has an influence on project success.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 CHAPTER INTRODUCTION

The primary objective of the study is to develop a framework to improve the prevailing project management practices in construction projects within the Private Healthcare Industry. In this chapter, the research paradigm, methodology and approach is discussed, which is followed by addressing the study's research objectives. The motivation for the selected methodology is provided as justification of such selected approach in this study.

The research design and process that was followed in formulating a project management framework improve the prevailing project management practices in construction projects within the Private Healthcare Industry is discussed. This entails a discussion of the philosophical orientation, research strategy, research unit of analysis, conceptual framework, the propositions of the study, sampling design, data collection, research instrument and data analysis.

The chapter concludes with a discussion on critical research elements that include ethical considerations of the study that were followed in formulating the project management framework to improve the prevailing project management practices in construction projects within the Private Healthcare Industry and methodological limitations.

3.2 RESEARCH PARADIGM AND PHILOSOPHY

Research involves the gathering of objective scientific knowledge by various methods and procedures. It is a scientific and systematic process used in the exploration and gathering of pertinent information in a specific area of academic interest. It involves the planning, collection, analysis of data and ensuring that the results are correctly communicated (Creswell, 2014; McDaniel & Roger, 2012).

Every study begins with considerations of the applicable research paradigm. A paradigm includes the researcher's assumptions, belief system, perspective, and theoretical framework that informs the meaning of research data (Creswell, 2014; Rehman & Alharthi, 2016).

According to Kivunja and Kuyin (2017), it is important to understand the basic and essential components of a research paradigm, as these elements each hold specific norms, beliefs, and basic assumptions that are then assumed if a researcher adopts a specific position on research. The four main elements include axiology, epistemology, methodology, and ontology, as presented in table 3.1.

Table 3.1.

Summary of main components of research paradigm

ELEMENTS OF A PARADIGM	PARADIGM CONSIDERATIONS
Axiology	Includes all assumptions and considerations on what is good or bad and covers all ethical matters of a study. It considers the human value of all respondents involved in a study
Epistemology	Includes all assumptions involved in the study of human nature and the justification. It has a focus on how knowledge is acquired and best communicated to other humans.
Methodology	Includes considerations on the processes and flow that will be followed when undertaking a study. It incorporates the things to be incorporated and used in the research design, approaches, strategies, data collection, data analysis, and research design.
Ontology	Includes all assumptions made by the researcher in making sense of a social phenomenon investigation and refers to the nature of one's beliefs about reality.

Table 3.1 Summary of main components of research paradigm (Kivunja & Kuyin, 2017)

A research paradigm supports and helps define the overall research philosophy adopted in a research study that in turn, outlines the research design to be followed (Collis & Hussey, 2014; Zukauskas, Vveinhardt & Andriukaitiene, 2018). Research philosophy is defined as a system formed by the investigator's thoughts and beliefs about the research process and provides guidance to shape the research study that results in the identification of the research strategy (Johnston, 2014). Zefeiti and Mohamad (2015) indicate that philosophy in research refers to the development of knowledge in a particular field.

There are two main categories of philosophies discussed in literature, namely; positivism and interpretivism (Collis & Hussey, 2014; Kivunja & Kuyin, 2017; Saunders, Lewis & Thornhill, 2016).

The basic assumption of the positivist philosophy is that the social world can be understood objectively. The investigator or researcher considers themselves as objective

analysts whose work is removed from their personal values and encourages working independently (Zukauskas *et al.*, 2018). The post-positivist researcher approaches research from the opinion that there exists a bias in everyone and all research measurements are imperfect. In mitigating this bias and imperfection, triangulation of multiple data sources is used to reduce errors and to find the truth. There is a strong focus on maintaining objectivity in the research design process with post-positivist researchers and thereby limiting interaction with respondents. Post-positivist researchers use science as a way of understanding the phenomenon in a natural setting or in its reality (Harrison, Birks, Franklin & Mills, 2017). Positivism philosophy aligns itself more with the quantitative research methods with a focus on empirical measurement, large samples, low validity, and high reliability (Collis & Hussey; Creswell, 2014).

In contrast, the interpretivism philosophy is founded on the assumption that the social world is not easily understood but should rather be looked at from a subjective perspective where the researcher investigates areas of interest, gaining an understanding of people's experiences in a natural setting (Zukauskas *et al.*,2018). The interpretivist researcher views reality as multiple and subjective, based on the meaning and understanding. This philosophical orientation is motivated by the discovery and understanding of contextual experiences that is anchored on the production of knowledge. The researcher is a participant in the study and plays a pivotal role in the discovery of knowledge. In this philosophy, the case is selected either as the main point of interest and/or as a facilitator for understanding another issue. Multiple forms of data sourcing may be used in this orientation but strong emphasis is placed on interviews and observations (Harrison *et al.,* 2017). Interpretivist philosophy aligns more with the qualitative research methods with a focus on the development of theories, small samples, in-depth investigations, low reliability, and high validity (Collis & Hussey 2014; Creswell, 2014).

In this study, the interpretivism philosophy was applied, as the purpose of this study was to gain understanding and insights from project management practitioners in the natural settings of construction project execution. The ontology of an interpretivist philosophy considers the researcher's existing reality and is not separate from this reality. In considering the epistemology aspects, the knowledge gained is from human experiences. The research approach typically includes interviews, case studies, ethnography, and phenomenology. The study used the case study research strategy with interviews as the

primary data source and used observation as a secondary source of data. The primary objective of the study is to develop a framework to improve the prevailing project management practices in construction projects within the Private Healthcare Industry.

3.3 RESEARCH METHODOLOGY

According to Kothari (2014), research methodology is defined as a systematic method used to solve research problems and it prescribes how research should be conducted. He further advises that methodology clarify the logical steps to be followed by a researcher when studying a research problem. In its simplest form, methodology in research is a general approach applied when a researcher conducts a research project and guides the selection of data collection tools that are most appropriate to a study (Rehman & Alharthi, 2016).

In considering the research methodology of a study, aspects such as the research objectives, research questions, and topics that determine the most appropriate research method to a study should be factored. There are two main research methodologies referenced in literature, namely quantitative and qualitative (Blumberg, Cooper & Schindler, 2014; Creswell, 2014; Saunders *et al.*, 2016).

3.3.1 Quantitative methodology

According to Saunders *et al.* (2016), quantitative research is used when the purpose of the study is the testing of theory. There is no engagement between the researcher and the phenomenon under investigation. Quantitative research examines the relationship between variables using statistical procedures, findings can be inferred to the broader population, and the structure is inflexible and uses the deductive approach to research (Creswell, 2014).

3.3.2 Qualitative methodology

In contrast, the purpose of qualitative research is the engagement of the researcher and the phenomenon under investigation to provide greater understanding of the interaction between humans and subjects (Saunders *et al.,* 2016). Qualitative research has a more flexible structure, builds general themes in the interpretation of data collected, and employs an inductive approach to research. It is characterised by gaining understanding, insights and uncovering trends on a phenomenon under investigation (Creswell, 2014).

In this study, the qualitative methodological approach was applied; this approach allows for discovery of insights, thoughts, and opinions to better understand the problem under investigation. The purpose of this study was to develop a framework to improve the prevailing project management practices in construction projects within the Private Healthcare Industry. Project management is a highly researched topic in literature that has produced many forms of theoretical studies adding to the body of knowledge, although mostly from a theoretical and quantitative perspective. This study used previous project management theories, methodologies, and insights from industry professionals as a base for formulating the framework. As such, insights and experiences from project managers was the cornerstone in developing this framework. The study engaged seasoned project management practitioners to gain a better understanding of the project management best practices best suitable for the construction environment.

3.4 RESEARCH STRATEGIES

A research strategy is the method chosen by the researcher to meet the objectives of a study and is guided by the research questions of a study (Creswell, 2014; Saunders *et al.,* 2016). There are nine generic strategies that include action research, case study, correlational, experimental, ethnography, grounded theory, historical, phenomenological, and survey. These research strategies are associated with either qualitative or quantitative research approaches (Saunders *et al.,* 2016).

3.4.1 Action Research

Action research is a cyclical process-driven research strategy that is centred on the management of changes. It involves collaboration between specialist and investigator. The strategy involves a six-step process which includes problem identification, generating ideas for possible solutions, design of alternative responses, execution of responses, evaluating the effects of responses and learnings. The process is repeated until the desired outcomes are realised (Blumberg *et al.*, 2014).

3.4.2 Case Study

Yin (2014) defines a case study as an empirical inquiry used when investigating a contemporary phenomenon that occurs in a real life setting, especially when the boundary between the object and the context of the study is unclear, while the researcher has little control of the objective or context. Merriam defines case study as an in-depth analysis

focusing on a specific phenomenon such as a person, process, or programme (Harrison *et al.,* 2017; Yazan, 2015). Case study research requires collaboration between researcher and organisations under investigation (Zikmund, Babin & Carr, 2010). This strategy is associated with both quantitative and qualitative research methodology (Kumar, 2014).

3.4.3 Non-experimental

The non-experimental strategy is used when evaluating the correlation of two variables with no manipulation of the independent variable permitted. It is descriptive in nature but does not attempt to describe the cause and effect relationship of the variables. It focuses rather on what is the cause of the outcome or phenomenon (Kumar, 2014).

3.4.4 Experimental

Unlike non-experimental, experimental strategy investigates the influence of a particular treatment on the outcomes. The researcher can manipulate the phenomenon to measure or observe the assumed changes (Kumar, 2014). The purpose of this strategy is the understanding of causal links between independent and dependent variables. Research instruments associated with this strategy include true and quasi-experiments (Creswell, 2014).

3.4.5 Ethnography

Ethnography is a research strategy used when observing people in their natural settings. This strategy has the purpose of describing and explaining the world and its inhabitants through their lens, in a way they would describe it. It involves long periods of observation and the researcher is required to immerse him or herself when undertaking this type of strategy (Saunders *et al.,* 2016).

3.4.6 Grounded theory

A grounded theory strategy approaches research in isolation from previous theories or studies conducted in research. This process entails a three-step process that includes open coding (original raw data is grouped into themes), axial coding (linking relationships between categories or groups from data), and selective coding (tests if original relationships between categories from new data found). This strategy is used to develop new theory (Blumberg *et al.*, 2014).

3.4.7 Historical

Historical research strategy allows for understanding of a process or phenomenon that occurred in the past. The strategy is driven by the assumption that no historic event is beyond inquiry. It is a process of continuous review and rechecking that involves the evaluation of historical documents, relics or records in order to explain the events of the past (Buckley, 2015).

3.4.8 Phenomenological

The phenomenological research strategy involves an understanding of the participants' human experiences. In this approach, the researcher is required to remove himself from his experiences in order to understand those of the participants. The purpose of this approach is to describe the nature of the phenomenon under investigation (Creswell, 2014).

3.4.9 Survey

This research strategy is used in quantitative studies and allows for the collection of numerical description of findings from participants. The purpose of this strategy is to evaluate relationships between variables and produces models from these relationships. The strategy can either be used in cross-sectional or longitudinal studies. It uses either structured interviews or questionnaires and generalises findings to the entire population (Saunders *et al*., 2016).

3.4.10 Motivation of Case Study in Study

In this study, the case study strategy was applied because the case study approach provides great advantages. For example, Harrison *et al.* (2017) advise that a case study methodology bring a more flexible and in-depth comprehensive research approach that ensures that a phenomenon is explored with multiple approaches. Flyvbjerg (2011) summaries that case studies have four main strengths: (1) provides richness, detail, and completeness within the case variance; (2) has high conceptual validity; (3) provides understanding of the process and context; (4) promotes new research questions, propositions, or hypotheses.

According to Baxter and Jack (2008), case study methodology provides researchers with the necessary tools for investigating complex issues. This is supported by Ebneyamini,

Sadeghi and Moghadam (2018) who advise that case study allows for understanding to be gained by observing actual practices and generating relevant theory, through asking questions such as how, what and why, to have a complete view of the nature and complexity of a phenomenon.

Edwards (1998) states that case study can be used for testing, developing, understanding, and providing an extension of an existing theoretical framework. Edwards (1998) further advises that there are three main phases in case study; descriptive, theory development and testing of theory. Similarly, Ebneyamini *et al.* (2018) have identified that case study has four main purposes: exploration, theory building, theory testing, or theory refinement.

3.5 DESIGN OF THE CASE STUDY

In making the choice on which case study to use, a researcher is directed by the main study objectives and purpose. Baxter and Jack (2008) provide a summary of Yin and Stake's previous work on the different case study varieties and conclude that there are six different types of case study research, namely, exploratory, descriptive, multiple-case studies, intrinsic, instrumental, and collective case studies. Table 3.2 provides a brief discussion on each of the different types of case studies.

Table 3.2

Types of Case study

CASE STUDY	DESCRIPTION
Explanatory case study	The explanatory case is best suited when the intervention under evaluation has no single set of outcomes. This type of case is concerned with identifying the underlying causal relations and is used when one seeks to explain assumed links in real-life interventions that are difficult to evaluate using other methods such as surveys.
Descriptive case study	Descriptive case studies are aimed at describing a real-life intervention in its natural setting. These types of cases are detailed and focused on the careful assessment of either propositions or answering questions.
Multiple-case study	A multiple case study has a goal of replication of findings across similar cases and draws comparisons and when differences identified, this can be explored within and between cases. This study is used for the review of multiple experiences and is used to 1. Literal replication (predict similar results); or 2. Theoretical replication (predict contrasting results).

Intrinsic case study	The purpose of an intrinsic case study approach is not to build theory or provide understanding of generic phenomena and it further does not represent other cases or problems. Intrinsic case study is used when the intention is to understand the case itself.
Instrumental case study	The instrumental case study approach has the purpose of theory refinement and providing better insight to a problem and is not focused on understanding a problem. The case is of secondary interest and facilitates the understanding of the main research problem. It is through the case that in-depth analysis and contextual scrutiny is conducted in order to pursue the external interest.
Collective case study	Collective case study is similar to the multiple case study.

Table 3.2 Types of case study (Kreindler, 2017; Tobin, 2010)

In this study, the multiple case study and instrumental case study approaches were applied. The primary objective of this study was to develop a project management framework to improve the prevailing project management practices in construction projects within the Private Healthcare Industry. The study used existing generic project management frameworks as a basis of creating a healthcare construction project specific model. Multiple case study approach was used in gaining an in-depth industry understanding and to have a basis of replication of results and comparison of prevailing factors.

3.6 THE CASE

3.6.1 Unit of analysis

The unit of analysis considers who or what will provide data and to what degree of aggression. According to Zikmund *et al.* (2010), defining the unit of analysis is an important step in the research design phase and should not be overlooked. There are two dimensions of unit of analysis, namely, holistic and embedded. The holistic dimension looks at an individual unit for the purpose of analysis, such as a specific organisation. Conversely, the embedded approach considers more than one unit (Saunders *et al.,* 2016). The unit of analysis further enables the researcher to specify from whom data will be collected, these include individual, households, departments, or by geographical areas (Zikmund *et al.,* 2010). In this study, the unit of the analysis was embedded, with specific reference to project management practitioners with work experience in construction project healthcare and similar related industries.

3.6.2 Conceptual Framework and Proposition

The study aimed to formulate a project management framework for construction projects to improve the prevailing project management practices in Private Healthcare Industry construction projects. To achieve the main objective of the study, it is first important to understand the current levels of project management maturity, by means of evaluating 12 knowledge areas from PMBOK-CE (2016) within the organisation.

However, PMBOK-CE (2016); Pretorius et al. (2012) indicate that not all knowledge areas have the same influence on project success, therefore the 12 knowledge areas ought to be classified into three levels (red- critical, orange-support, and yellow-periphery) to limit the drivers of inconsistent project management practices in construction projects. Furthermore, issues such as top management support and leadership have been identified as influencers to project success and were evaluated. As such, the following propositions are because of the literature review conducted in chapter two:

Main Research Proposition: Project management maturity has an influence on project success.

- Sub-proposition 1: The 12 PMBOK knowledge areas are not equally important to project success.
- Sub-proposition 2: The triple constraints and stakeholder satisfaction are the core determinants of project success.
- Sub-position 3: Project manager competency has an influence on the effective implementation of correct project management practices that enable project success.
- Sub-proposition 4: Leadership and top management support has an influence on project success and can sometimes mitigate the inconsistencies of the project management practices.
- Sub-proposition 5: The project size determines the important project management knowledge areas required for project success.

3.7 POPULATION OF THE STUDY

Boddy (2016) defines a population as either a cluster of events, people or other phenomena that is of interest to the study. The population can be defined in terms of awareness measures, demographic characteristics, product or service usage or

geographic area. It is important to carefully identify and define the parameters of a study's target population as this removes ambiguities and provides the proper sources from which data can be collected (Zikmund *et al.,* 2010).

This study had the main objective of formulating a framework to improve the prevailing project management practices in construction projects within the construction industry, and therefore the population of the study included all professionals involved in the management of construction projects in the Private Healthcare Industry. According to Ridder (2017), case study research has no sample representation of a larger population, this is because in case study research, the case is itself the area of interest and may be chosen for theoretical reasons. The population of this study consisted of project management practitioners in the construction industry with specific emphasis on project managers managing construction projects within the Private Healthcare Industry in South Africa.

The project management practitioners involved in construction projects are bountiful in numbers and consist of project management offices that manage infrastructure projects across different industries. Although less than 30 of these consulting organisations are currently contracted in healthcare specific infrastructure projects, this is due to the high concentration of the industry with only three major organisations (Netcare Ltd, Life Healthcare Group Limited, and Mediclinic International) that account for more than 70% of market share.

3.8 SAMPLING DESIGN

Saunders *et al.* (2016) state that when conducting a research study, no matter the objective or research question, there will be a requirement to consider the need for sampling. There are two main options when collecting data for research studies: consensus and sampling. Consensus includes the collection of data from an entire population of interest and sampling allows for the reduction of the number of data required to only a specific subgroup that will be used to draw conclusions on the population (Blumberg *et al.*, 2014).

According to Zikmund *et al.* (2010), sampling comprises any procedure or technique that bases the conclusions on measurements drawn from a portion of a population. Sampling involves the development of a plan that specifies the characteristics of the area of interest from which information will be required in order to address the study's objectives (McDaniel & Roger, 2016).

Kumar (2014) simplifies the concept of sampling to include selecting a sub-group (sample) from a larger group (population) to use in order to predict an outcome regarding the larger population. Sampling is found to offer advantages that include saving on costs, resources and time but has a disadvantage of not allowing for exact outcomes that can be drawn from a study and limits outcomes to predictions or estimates that are assumed to be applicable to the larger population.

Sampling allows a researcher to identify the most appropriate method in identifying a sample for the study that is without bias. When determining the sample of a study, one needs to consider things, such as study population, appropriate sample size and appropriate sampling methods (McDaniel & Roger, 2016).

3.8.1 Sampling method

Selecting the appropriate sampling method to use in a study will depend on factors such as the objectives of a study, nature of the phenomenon under investigation, time limitations, and/or financial limitations (McDaniel & Roger, 2016). There are two major alternatives for sampling methods from which the researcher can choose, namely; probability and non-probability sampling methods (Kumar, 2014; Leedy & Ormrod, 2015; McDaniel & Roger, 2016; Saunders *et al.,* 2016).

Probability sampling is used when every member of a population is known and when there is a non-zero probability of selection, meaning every member of the population has an equal chance of selection (McDaniel & Roger, 2016). This method includes sampling techniques such as simple random, systematic, and stratified methods, summarised in table 3.3. Zikmund *et al.* (2010) state that these methods have a moderate to high cost attached to them.

Table 3.3

Types of probability sampling

SAMPLING TECHNIQUE	DESCRIPTION
Simple Random	Simple random sampling ensures that all members of a population have an equal chance at selection
Systematic	Systematic sampling starts a random position within a listed number of sample members and from then, the selection of members will be as per the rate of frequency chosen (*n*th)
Stratified	Stratified sampling divides the sample population into smaller strata or sub-groups, that have similar (but not equal) characteristics drawn from each of the different spectrums of the population

Table 3.3 Types of probability sampling techniques (Kumar, 2014; Saunders *et al.*, 2016; *Zikmund et al., 2010)*

In contrast, non-probability sampling is used when the chance of selection of members of the population is unknown (McDaniel & Roger, 2016). This method includes techniques such as convenience, judgement (purposive), quota, and snowball sampling techniques, summarised in table 3.4. The costs attached to using non-probability methods are noted to be low to moderate (Zikmund *et al.,* 2010).

Table 3.4.

Types of non-probability sampling techniques

SAMPLING TECHNIQUE	DESCRIPTION
Convenience	Convenience sampling technique uses sample members that are conveniently able
Judgement/Purposive	Judgment sampling technique chooses the suitable sample based on the researcher's personal judgement to satisfy a specific purpose of a study and is based on specific characteristics of the sample.
Quota	Quota sampling technique is driven purely from ease of accessibility of the sample for the researcher. The selection of the sample population is based on the characteristics chosen by the researcher and ensures that all sub-groups within the population are represented.
Snowball	Snowball technique uses the initial sample members as a network to gain access to more sample members.

Table 3.4 Types of nonprobability sampling techniques (Kumar, 2014; Saunders *et al.*, 2016; *Zikmund et al., 2010)*

According to Ridder (2017), multiple case study design guides the purposive sampling strategy, extends the instrumental case study, and has the assumption that the increase in the number of cases will improve the understanding of theory through the comparison of the cases. This study used non-probability sampling and with specific reference to

purposive/judgement sampling, based on the guidelines for an instrumental case that apply to multiple case studies.

The non-probability sampling method was used in this study as the chance of selection of members of the population is unknown. The purposive sampling technique was used and was based on the understanding that instrumental case study allows for the maximisation of control through the research process and leads to uncovering the phenomenon under investigation. In order to understand the dynamics involved with the management of construction projects, appropriate field experts were identified and chosen. It was based on the principles of judgement sampling that project managers with eight years and more experience were selected as the sample members. The selection of project management practitioners was further based on the number of projects in the construction industry the sample members have managed.

3.8.2 Sample size

An important concept when determining the correct sample size is that of determining the point of saturation. In qualitative research, saturation point is defined as the stage in the data collection process where very little to no new information or discovery is recovered from the respondents. This point is considered as an appropriate indication that the investigation has obtained adequate sample size (Kumar, 2014).

The case study methodology can be used to investigate single case phenomenon and provides an effective approach of verifying the outcomes or findings by replication on similar cases. This is because the level of detailed records kept on each study, findings of each study can be used to compare similar studies, and all differences can be tested separately. This replication between cases then allows for corroboration of propositions (Ridder, 2017).

According to Yin (2014), in case study research, the saturation point is reached between six and 10 cases. In this study, the sample size was kept within these bounds as determined by Yin (2014) and it allowed for verification by using replication logic across multiple cases. Similarly, Gentles, Charles and McKibbon (2015) who provide a summary of sample size estimates suggested by case and qualitative literature, state that for a multiple case study, the sample size should be between four and 10 cases.

In this study, the sample size was six cases. The study drew from the respondent's experience on project management on multiple projects as a base of analysis because this allowed the researcher to focus intensely on the experiences of the respondents and a larger sample might not have yielded the desired in-depth analysis.

3.9 DATA COLLECTION AND RESEARCH INSTRUMENT

3.9.1 Data collection and research instrument

There are two forms of data, namely, primary and secondary data. Primary data includes the collection of original data from sources in the form of surveys, interviews, experiments, or focus groups, while secondary data are collected from existing sources, using sources such as external sources (including media publication and previous literature), internal records, and internal databases (Wegner, 2016; Collis & Hussey, 2014).

The focal point in case study is the collection of data and this is usually done through multiple sources that are then joined in the analysis process. Unlike other research methods, case study views each data source as a piece that contributes to the researcher's understanding of the phenomenon under investigation. Therefore, case study research is not limited to a single strategy but uses an array of data collection methods (Ridder, 2017). Researchers should be aware that both quantitative and qualitative data collection could be used in a case study.

According to Yin (2014) and Ridder (2017), there are six potential sources of data or research instruments, each has associated strengths, and weakness; table 3.5 provides a brief summary of sources:

Table 3.5

Various case study sources of data

SOURCES OF DATA	DESCRIPTION
Direct Observation	Allows for observation of the phenomenon in its natural setting that may include observing relevant behaviours or environmental conditions. Strengths of this source include the coverage of both events (in real time) and context of the "case". Weaknesses are that this source can be time consuming, costly, risk of lack of objectivity (when using a single observer) and may find different outcomes due to many observers. Examples of direct observation: observations of meetings, factory work, and classroom

Participant Observation	The researcher may participate in the events under investigation and may assume a variety of roles within the case study. The strength of this source is that it can provide insight into interpersonal behaviour and motives but has the risk of falling prey to the observer's bias and manipulation of events.
Interviews	Yin (2014) states that interviews are the main source of case study research. In context of case study interviews, the researcher uses conversations rather than structured queries. Some strengths include that this source method allows for targeted-focus, provides insightful inferences and explanation pertaining to the phenomenon under investigation. There are some weaknesses noted for this method, risk of inaccuracies due to poor record keeping, bias from both the researcher (poor vocalisation of questions) and respondent and risk of respondents answering based on what they perceive is wanted by the researcher and not actual events. Examples of interviews include in-depth interview, focused interview, structured interview with survey, semi-structured, and unstructured
Documentation	Documentation is used predominantly in supporting primary evidence in order to corroborate or augment findings from other sources. It is viewed as a secondary source of data collection. The strengths of this type of data source include that it is unobtrusive, can be viewed repeatedly and precise in the details of events. Although it has weaknesses that include respondents purposefully withholding information, reporting and selectivity bias, and may be difficult to find the required information. Example includes letters, e-mail administrative documents, and formal studies
Archival Records	Archival records are used in conjunction with other data sources but unlike the documentation, its effectiveness will differ depending on the case study. Much like the documentation, this source is used as a support to primary evidence. Examples of archival records include public use files, organisational records, and service records.
Physical artefacts:	Physical artefacts may be less relevant in most kinds of case study although when relevant they play an integral part in the overall study. Strengths are noted offering insight to technological operations and cultural features and weaknesses include discernment and accessibility. Examples include works of art, and technological devices or instruments.

Table 3.5 Various case study sources of data (Yin, 2014; Ridder, 2017)

In this study, data was collected using multiple approaches. Primary data was collected using the semi-structured interview approach, as maintained by Yin (2014) interviews are the main source of data source in case study research. Observation with checklist and document review was used as secondary data in conjunction with the interviews to corroborate, augment, or even contradict findings from the semi-structured interviews. The interview guide questions were sent to the participants prior to the agreed interview dates to allow for thoughtful consideration and insightful responses from the meeting. The interviews were recorded, following an appropriate consent from participants, to eliminate any misrepresentation of the participant's responses.

3.9.2 Mapping of the interview guide

For this study, a semi-structured interview guide was developed that is comprised of nine main questions. In conducting the interviews, the researcher provided the background of the study and explained the objectives of the study. The ethics component of the study was comprehensively explained to each of the respondents and it was stressed that participation in this study was strictly voluntary and that the respondents could withdraw when they desired to do so. Furthermore, the respondent's safety and right to privacy was communicated. The interview guide is presented in Annexure A.

3.9.3 Mapping of the document review

The secondary data was used to gain an understanding of the project management maturity of the organisation, which was then used to assess the levels of project management maturity. The study used the PMI-OPM3 self-assessment method that looks at project management maturity. This assessment evaluates the project management practices currently used in the organisation against industry best practices and provides a summary of the organisation's maturity levels based on the findings of the assessment.

The OPM3 assessment assesses maturity from three areas: 1-Specific domains (project, program, and/or portfolio); 2-Organisational Enablers; 3-Specific stages of process improvement SACI (standardise, measure, control, or continuously improve). As mentioned in chapter 2, some additional questions were included in the assessment related to the two knowledge areas questions' these were Health, Safety, Security, and Environmental (HSSE) Management and Financial Management.

In line with the study objectives, the assessment focused on high-level specific domains for projects only with the specific stages of improvement SACI. Some of the organisational enablers which were found important as influencers of project success were included in the assessment, that are; (1) organisational project management policy and vision; (2) organisational project management practices and techniques; (3) competency management and project management training; (4) project success criteria.

In order to substantiate findings from participant interviews, company specific documents were reviewed. The plan of conducting document review entails first sourcing applicable documents from the public domain and requesting these from participants where

documents cannot be retrieved from public sources. Second, all confidentiality was ensured with all organisations using pseudonyms where permission was not obtained to use company details. Third, the researcher only evaluated company documents that provided information on project performance, organisation policies, project management methodologies, industry accreditations, and processes involved in project execution, project manager competency, and project success criteria. Included company reports, company policies, project management methodology, and reports on project performance. Fourth, a case was developed from the summaries of this process for each organisation. This enabled triangulation of the interviews, cases, and/or checklist.

3.10 DATA ANALYSIS

Once the data has been collected, the next step in research is the analysis of the collected data (Saunders *et al.,* 2016). Data analysis involves the process of data preparation for the analysis and interpretation of data to enable the reporting of findings (Creswell, 2014). The data analysis process is central to the credibility of qualitative research. According to Ebneyamini *et al.* (2018); Maguire and Delahunt (2017) in determining which research process to use in analysing data, a researcher needs to take into consideration the reliability and validity of the collected data.

According to Zikmund *et al.* (2010), data analysis follows a similar process that moves from raw data, editing, coding, data file, and choosing the applicable analysis approach. The selection of the data analysis procedures applicable to a study depends on the instrument used to collect data. For example, in quantitative research the methods of analysis used include bivariate analysis, descriptive statistics, parametric and non-parametric statistics (Saunders *et al*., 2016; Zikmund *et al.*, 2010).

In qualitative research, both deductive and inductive analysis methods can be used, which includes content analysis, discourse analysis, explanation building, cognitive mapping, conversation analysis, pattern matching, narrative analysis, and thematic techniques (Collis, & Hussey, 2014; Saunders *et al*., 2016; Yin, 2014). Table 3.6 provides a brief description of each method.

Table 3.6

Qualitative data analysis methods

Analysis Method	Description
Content Analysis	Analyses of patterns, themes or relationships in recorded communication (documents, recordings, articles)
Discourse Analysis	Analyses the 'how' or 'why' language is used by individuals in a particular social context
Explanation building	Attempts to build explanations based on the process of data collection and analysing
Cognitive mapping	Involves the process of acquiring and coding of information on events under investigation
Conversation Analysis	Examines both verbal and non-verbal methods used to communicate
Pattern matching	Uses propositions to predict outcomes or patterns to explain findings
Narrative analysis	Explains an account or story with focus on the sequences of events or relationships that occurs in a natural setting
Thematic Analysis	Identifies common themes in multiple accounts from participants

Table 3.6 Qualitative data analysis methods (Collis, & Hussey, 2014; Saunders *et al.*, 2016; Blumberg *et al.*, 2014)

In this study, thematic, pattern matching and explanation building techniques were used, in the process of data analysis in line with case study data analysis processes (Maguire & Delahunt, 2017; Saunders *et al.*, 2016). Pattern matching and explanation building allow the researcher to follow a clear route when collecting data, because there is a clear study framework followed based on literature. There is clarity on the organisation of interest from which data is collected (Saunders *et al.*, 2016). These organisations of interest for this study include project management offices (PMOs) and organisations involved in the management of construction projects in the Private Healthcare Industry and other related industries.

3.10.1 Thematic analysis

Thematic analysis is a process used to identify, analyse, and report themes or patterns within a qualitative research study. It is a technique used to enable the researcher to describe and organise the data. Maguire and Delahunt (2017) provide a 6-step approach, based on the initial framework by Braun and Clarke (2006) to include:

Table 3.7

Thematic Analysis Stages

PHASE	DESCRIPTION
1. Identify and familiarise with data	Read the data and get familiar with the data type and content. Check for any mistakes in the data recordings and check overall data credibility
2. Identify codes	Identify interesting elements and document them Keep a document trail of each step Document the main codes that you find in the data
3. Find themes in data	Look for themes in the data and document these themes Look for data that is relevant to each theme Document and keep a record of each and every step
4. Finalise themes	Finalise your themes and names Look for the data that can be analysed under each theme
5. Review themes	Review each theme for its credibility Check that no data is missing and each theme has a specific identity
6. Document analysis	Analyse the resultant themes and draw inferences, document the findings Make sure that no data that is important related to the research question is left unanalysed.

*Table 3.7 Thematic Analysis Stages (*Maguire & Delahunt, 2017)

3.10.2 Pattern Matching and explanation building

Yin (2014) states that for case study research, the most desirable analytical technique to be used is pattern matching. Pattern matching involves the comparison of patterns revealed by the case outcomes with that of an initially predicted pattern. If a match in the words is found and the patterns correspond, it will be found that the initial proposition is confirmed and then the internal validity of the research is strengthened.

According to Ridder (2017), in this study, the appropriate data analysis method is pattern matching. Pattern matching provides the basis of comparing theoretical predictions and analytical generalisation that leads to the modification or extension of the theory. Pattern matching enables further analysis techniques such as explanation building, time series analysis and logic models.

Explanation building is an attempt to build explanations through the collection and analysis of data. This technique involves the testing of theoretical propositions and involves a set procedure that includes the following steps (Saunders *et al.,* 2016; Baškarada, 2014):

Table 3.8

Phases of explanation building

1.	**Develop proposition based on theory**
2.	Collect data through an initial case study in order to compare the findings from this to this theoretically based proposition.
3.	If necessary, the researcher can amend the initial theory propositions, in light of the findings.
4.	Conduct other data collection rounds in order to compare the findings from this in relation to the revised proposition.
5.	If necessary, the researcher can amend the initial theory propositions, in light of the findings.
6.	Repeat this process until a satisfactory explanation is derived.

*Table 3.8 Phases of explanation building (*Saunders *et al.,* 2016)

In this study, both pattern matching and explanation building was adopted in the collection and analysis of data. This was done to ensure that internal validity was met as per Yin's case study research protocol.

3.10.3 Coding and software tool

Qualitative research can be analysed using a variety of software tools that include MAXQDA, Qualtrics, or Quirkos to mention a few. One of the more recognised and used software tools is Atlas.ti software; this tool is recognised as an efficient and effective software that aids researchers' ability to systematically analyse and order data (Rambaree & Faxelid, 2013). In this study, the software tool, Atlas.ti, was used for analysis of data.

3.11 VALIDITY AND RELIABILITY

A researcher uses the research design to ensure rigour of the research and limit the uncertainty of the research findings. There are different evaluation criteria used to ensure this rigour in research. These criteria are dependent on the research approach (quantitative, qualitative, or case) adopted by the researcher (Anney, 2015; Saunders *et al.*, 2016).

In quantitative research, the methods employed account for the reliability (measurement precision and accuracy) and validity (the degree to which the tests measure the desired final tests of the inquiry). Measures may include credibility, reliability, and transferability. Credibility establishes if findings represent the correct representation of the original data from respondents. The dependability/reliability is the level of the suitability of research

findings in the long term. Transferability or generalisability is the degree in which situations may overlap or match. Confirmability is the degree that the findings can be corroborated by other researchers (Anney, 2015; Collis, & Hussey, 2014; Saunders *et al.,* 2016; Sinkovics, Penz & Ghauri, 2008).

There are various criticisms in the validity and reliability in case study research, which include results that are not applicable in real life and that the studies are strictly exploratory with no proof (Ebneyamini *et al.,* 2018). There are three different methodologies from Stake, Merriam or Yin that can be used in case research for data validation and reliability of the research findings (Baxter & Jack, 2008; Yazan, 2015).

Stake's strategy emphasises the required additional effort by researchers to minimise any misrepresentation or misunderstanding of data analysis by using structured protocols, procedures, and member checking. He further focuses on four types of triangulation (data source, investigator, theory and methodological) and includes a strategy of self-reflection and questioning by the researcher of the validity of data at every stage of the study (Yazan, 2015).

Merriam's strategy entails six steps for internal validity (members check, triangulation, long-term observation, participatory research, peer examination, and disclosing research bias), and three steps to enhance external validity (triangulation, modal categories, detailed descriptions) (Ebneyamini *et al.,* 2018).

Yin's protocol includes four conditions of validity and reliability, which relate to the design that is used throughout the case study processes and looks at construct validity, internal validity, external validity, and reliability. Table 3.4 provides details on the different tests, the methods used for each test and the associated phase in the study where the test occurs (Ebneyamini *et al.,* 2018).

Table 3.9

Reliability and validity in case research

TEST	CASE STUDY METHOD	PHASE OF RESEARCH IN WHICH METHOD OCCURS
Construct	Use multiples of evidence	Data collection
Validity	Establish the chain of evidence	Data collection

	Have the key informants or members check	Composition
Internal validity	Do pattern matching or explanation building or time series	Data analysis
External validity	Use replication logic in multiple case studies	Research design
Reliability	Use study protocol Develop case study	Data collection Data collection

Table 3.9 Reliability and validity in case research (Ebneyamini et al., 2018, p05)

In this study, Yin's method of reliability and validity in case study research was used. This is to ensure the reliability and validity of the research, as this method is widely accepted by researchers (Ebneyamini *et al.,* 2018; Yazan, 2015). This method ensures that a structured framework is used when conducting case research and eliminates the uncertainty in the research findings through the testing of construct validity, internal validity, external validity, and reliability.

3.12 ETHICAL CONSIDERATION

Research ethics forms an important aspect of a research project (Collis & Hussey, 2014). Part of the responsible research process involves ensuring that the participant's anonymity and privacy is maintained, avoiding the exploitation of participants, ensuring that the research process has no misleading behaviour or deception, and ensuring the transparent communication of information at all times (Blumberg *et al.,* 2014). The researcher adhered to a strict professional ethics conduct when collecting and processing the data collected.

Ethics covers three important issues that ensure participants' safety, namely; protection from harm; right to privacy and an informed consent. Leedy and Ormrod (2015) indicate that individual participation in a study is strictly voluntary and advice that informed consent from participants is a prerequisite. In addressing the pertinent confidentiality and privacy issues, the researcher provided the participants with the assurance that their identities and organisations' details would be confidential and anonymous. Additionally, the researcher obtained consent from each of the participants before their participation in this study. The consent letter sent to the participants covered issues such as the aim of the

study, procedure data collection (recording and transcription), confidentiality, voluntary participation, and access to study findings.

3.13 CHAPTER CONCLUSION

In this chapter, the case study research methodology approach was motivated and discussed. The discussion considered the holistic design of the case study with specific reference to the interpretivist philosophical orientation. The discussion included the case study strategy applied in this chapter. Furthermore, this chapter discussed the research design that entailed a clear indication of the embedded approach to units of analysis, the case, sampling design, data collection, research instrument, and data analysis techniques.

The primary objective of the study is to develop a framework to improve the prevailing project management practices in construction projects within the Private Healthcare Industry. As such, the chapter highlighted the use multiple case study approach in the collection of data. This allowed for a replication approach in other cases. The chapter discussed the primary data collection method that is semi-structured interviews, with the support of secondary document review and observation.

CHAPTER 4: RESULTS AND ANALYSIS

4.1 CHAPTER INTRODUCTION

The primary objective of the study is to develop a framework to improve the prevailing project management practices in construction projects within the Private Healthcare Industry. This framework is developed by critically assessing the relationship between project management maturity and project success, specifically using the theoretical aspects of these two concepts.

The secondary objectives of the study includes: (1) to conduct a review on literature with a focus on the prevalent project management practices in construction infrastructure projects. (2) To formulate the study propositions, based on the review of literature. (3) To develop an interview guide and observation checklist based on the literature review, which entails ascertaining key project management practices that increase probability of project success. (4) To outline and establish the appropriate research design and methodology to be used in this study. (5) To collect, record, analyse and interpret the empirical data to obtain results and findings of the study. (6) To draw conclusions based on the empirical results and findings, provide managerial recommendations and identify research gaps for future enquiry.

The secondary objectives, one to four, was addressed in chapters 2 and 3 of this study. In this chapter, the secondary objective five is addressed. These objectives collect, analyse and provide the results of the empirical data collected. This section entails discussion on the approach to the analysis of the multiple cases under investigation, descriptive statistics of the participants, details of the interview transcriptions, analysis of the primary data source (interviews) and secondary source (observations) and findings.

4.2 APPROACH AND EMPIRICAL DATA OF THE STUDY

In this study, the approach to the analysis of the data is based on the multiple case study and follows the path as presented in Figure 4.1. Six cases were selected from the construction industry, focusing on the health care sector. These cases were individually analysed and a report for each case was compiled. The individual report is the cross-case conclusion, and verification of the propositions of the study.

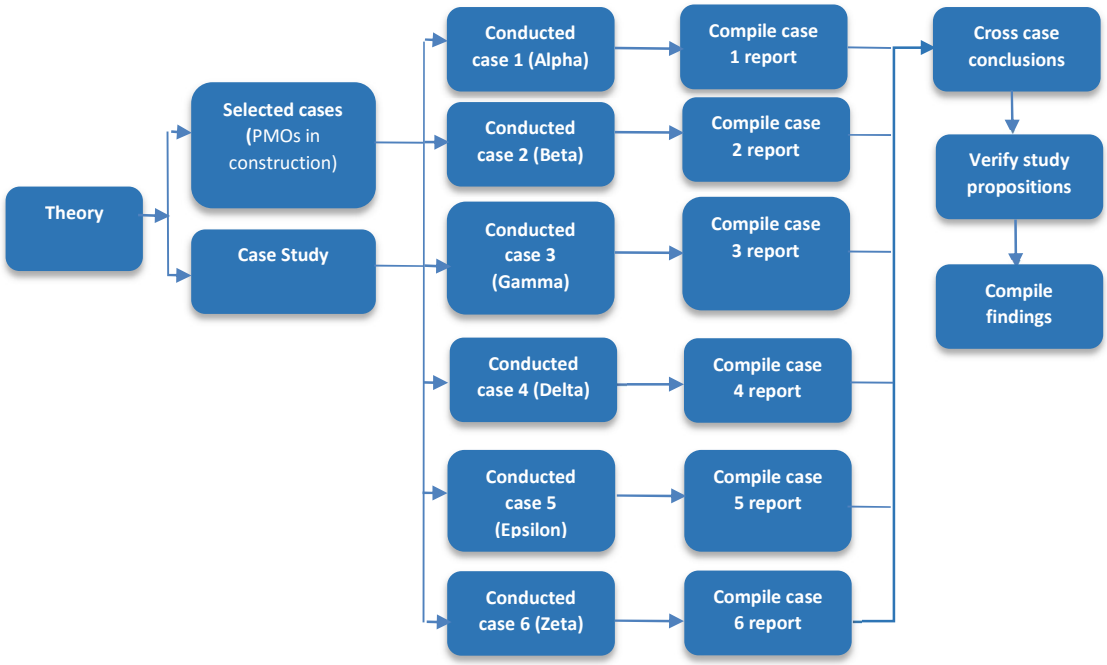

Figure 4.1. Study approach to data analysis

The cases were compiled using multiple sources of data, which included the semi-structured interviews for representatives of each of the six cases under investigations, the assessment of the methodology by the researcher as well as the other documentary review and publicly available report from the case companies.

4.2.1 Semi-structured interviews

The semi-structured interviews were conducted on a face-to-face basis. The researcher used this form of interview style because this enabled the researcher to gain a better understanding through probing of information given by the participants that may have not been achieved in other forms available. The first question of the interview guide had the aim of obtaining the respondent's profile in terms of rank, qualifications, and experience as project management practitioners in the construction industry and with reference to Private Healthcare Infrastructure project management experience. Subsection 4.2.1 provides details of the respondents' profile data.

Table 4.1 presents the profile by rank, qualifications, and experience of the participants. The six participants had a collective of over 70 years' experience with an average of 12.5 years' experience. The participants held managerial positions that include Senior Project

Manager, Project Manager, Associate Director-Project Manager, Regional Project Manager, Senior Project Manager, and Group Engineering Manager.

Table 4.1

Rank and experience profile of participants

Participant	Position	Qualifications	Years of experience
Interview 1	Senior Project Manager	Master in Project Management, MBA, PMP Certification	+15 Years
Interview 2	Project Manager	BSc Hons Quantity Surveying, Master in Construction Project Management	8 Years
Interview 3	Associate Director-Project Manager	BSc Hons Construction Management, PMP Certification	19 years
Interview 4	Regional Project Manager	BSc Hons Construction Management, PMP Certification	9 years
Interview 5	Senior Project Manager	Master in Construction Management, MBA	9 years
Interview 6	Group Engineering Manager	Master in Mechanical Engineering, MBA (in progress), Project management certifications	17 years

Table 4.1 Rank and experience profile of participants (Authors own construction)

The details of the transcripts of the interview duration with the six respondents is summarised as follows: The total duration was 191:38 minutes, with the average interview time of 32:30 minutes. The shortest interview was 20:57 minutes, and the longest interview was 46:02 minutes, presented in Table 4.2.

Table 4.2

Details of transcripts

Description	Details
Number of interviews	6
The total duration of the interview	191:38 minutes
Average duration	32:30 minutes
Shortest duration	20:57 minutes

Longest duration	46:02 minutes

Table 4.2 Details of transcripts (Authors own construction)

To evaluate the consistency and extensiveness of the interviews, the word cloud, and the word cruncher were used to obtain the details of the empirical data. The total word count from the interviews comprised of 15766 words. A word cloud of these words is presented in Figure 4.2 and shows some of the most dominant words that are project management, knowledge, construction, healthcare, and methodologies.

Figure 4.2. Word cloud for total transcripts

The edited words relevant to the purpose of the study resulted in 1016 words, and these relevant words are provided across the six interviews presented in Figure 4.3.

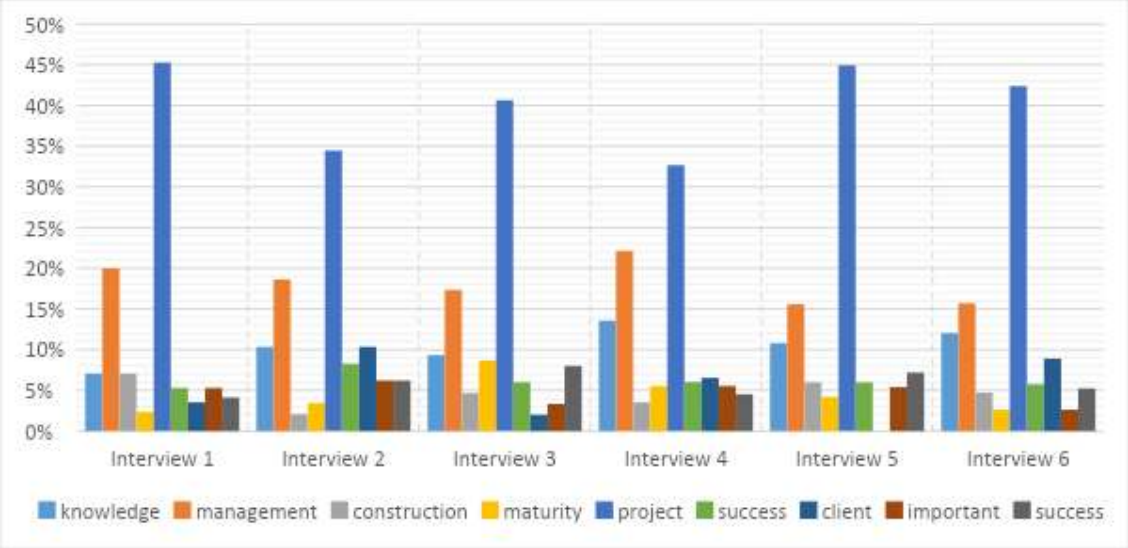

Figure 4.3. Distribution of keywords across the interviews

4.3 ANALYSIS OF EMPIRICAL DATA

The data were analysed using the open coding technique. The process entailed the initial development of codes through a process of defining concepts, labelling and categorisation of pertinent information found in the interviews. These codes were based on dimensions and specific properties within the interviews and were further combined into consolidated codes, which were then used to develop the themes of this study.

4.3.1 Open coding

The raw data from the six interviews were transcribed and coded using Atlas.ti. The software was also used in the grouping and forming of networks (relationship) stages with the process flow to aid in the answering of the questions.

4.3.2 Themes and Consolidated codes

A total of five themes and eighteen consolidated codes were extracted from the online coding; these codes had no duplications and were unique.

Table 4.3

Themes and consolidated codes

Themes	Consolidated codes
1. 12 Important Knowledge management areas	Equal Importance
	Integration, Cost, Time, Quality Knowledge Areas
	Emotional Intelligence
2. Core determinants of project success	Stakeholder Satisfaction
	The triple constraints
	Environmental and legislative compliance
3. Leadership and top management support	Strategic Alignment
	Team competency
	Progress Monitoring
	Decision Making
4. Project manager competency on project success	Risk Management
	Problem Solving
	Instil order
	Required Knowledge and experience
5. Project size on project success	Insignificant
	Significant

Table 4.3 Themes and consolidated codes (Authors own construction)

4.3.3 Document review

The review of the organisation's documents followed a similar principle set out by PMI-OPM3 assessment (process discussed in the following section). The assessment was used as a checklist or a guide in conducting the document review. The review included establishing the documents inclusion criteria; this necessitated identification of the parameters of which organisations to include and the types of documents to use. The criteria used in this study included a review of archived, public, and private documents from the organisations. The researcher requested further documents from the participants, related construction projects and the management thereof, where public files did not provide sufficient information. The parameters in the review limited the company data review to only include documents providing information on project performance, organisation policies, project management methodologies, industry accreditations, and processes involved in project execution, project manager competency, and project success criteria.

4.3.4 Methodological assessment

The assessment followed the PMI-OPM3 self-assessment that included the SMCI four stages of improvement consisting of standardise (stage 1), measure (stage 2), control (stage 3), and continuous improvement (stage 4). These were aligned to construction project process groups, the 10 project management knowledge areas and with additions of HSSE and finance knowledge areas. The assessment application was confined to only include project domain, with no inclusion of programme or portfolio management domains.

In line with the main objectives to the study, some organisational enablers were included in the assessment that were found to be significant influencers of project success and linked to the study propositions, which are (1) organisational project management policy and vision; (2) organisational project management practices and techniques; (3) competency management and project management training; (4) project success criteria.

Fifty-one questions were included in the assessment. The researcher first focused on stage 1 of the SMCI stages of the assessment for better control and processing of supporting document review process. Each question called for evidence in the form of supporting documents and for each question, a score from 0 (not implemented) to 3 (fully implemented for best outcomes of best practice) was given, based on the evidence provided.

There are four key deliverables from this stage: (1) an established governing body that manages the processes and the associated changes; (2) the process should be clearly documented; (3) the process communicated to those who exercise the process; (4) process should be applied consistently throughout the organisation. A company should fulfil all four deliverables to be considered as having project management processes that are standardised. When an organisation does not satisfy the Standardise stage assessment criteria and are no sustainable processes existed in the organisation, the researcher could not continue assessing the following stages of the OPM3 assessment.

4.4 MULTIPLE-CASE STUDY IN CONSTRUCTION PROJECTS

In order to ensure that the agreed terms of confidentiality, with the different organisations and the key interview participants, were met in this study pseudonyms were given for the six cases. The pseudonyms were Alpha, Beta, Gamma, Delta, Epsilon, and Zeta.

4.4.1 Alpha Case

Company Background

The organisation was established in 2005 and initially offered only construction management services. Over the years, the organisation has expanded its geographical footprint to include over 50 African Countries, which include but are not limited to Mozambique, Tanzania, South Africa, Zambia, and Zimbabwe. Core services offered have also since grown to include construction project management, property development management and construction management, retail tenant co-ordination, programme and portfolio management and other services. Project values range from R16 million to R8 billion. The organisation is involved in construction and infrastructure projects as a project management office (PMO), offering services as project managers, or principal agents throughout the normal 6-stage process of construction projects. Company Alpha is actively involved in projects across sectors such as corporate, residential, retail, industrial, public, hospitality, and healthcare.

Project Management Methodology

Company Alpha uses a quality management system (QMS) that has been developed in line with the SACPCMP scope of services, forms of contract (namely PROCSA and JBCC). The supporting pillar of the QMS system is the PMBOK and the nine knowledge areas, of which the most important knowledge areas as observed in the QMS system focus include integration, schedule, cost, stakeholders, and quality management. The QMS system is audited annually by the International body for continuity and process improvements. The project management processes used in the organisation are based on the PMBOK but are adapted based on the regions, location, or country they are in and align with the contracting strategy predominant in that area, and local laws.

Project management maturity and project success at Company Alpha

Company Alpha not only considers project management maturity from the organisational perspective but also has a view of project management maturity from the individual project manager perspective. The project processes currently adopted within the organisation includes things such as the lessons learnt, that is a cornerstone of maturity, it enables organisations to continuously improve processes and learn how best to improve on new projects. Based on the OPM3 self-assessment, Company Alpha appears to be on the continuous improvement stage, having standardised project management processes that are measured and controlled.

Company Alpha considers project management maturity to have an influence on project success. When asked whether project management maturity influenced project success, the participant stated that; "*Project management, absolutely without a doubt influences project success. It is very important to have the knowledge, lessons learnt, maturity, and a set of leadership skills going into a new project. The more experience you have the more chances you will have at a success rate in your projects*."

Company Alpha processes review

The organisation's QMS system has an inherent central role for leadership within the organisation. Leadership is tasked with overseeing the planning, support, operations, performance evaluation, and improvement efforts for the projects. Company Alpha has a stage-gated project management approach that requires senior management to sign-off each stage of the project before the commencement of the next stage.

The organisation has hired specialist project managers in the related project management sector, this has in turn, improved the project execution statistics in the organisation. For example, the senior project manager dedicated to the organisation's healthcare portfolio has extensive experience, a Master in Project Management, Master in Business Administration, and a PMP certification. Similar trends can be seen in retail and commercial project management appointments in the organisation.

Company Alpha has reported an average of 93% rate for successful projects across the range of sectors. The criteria used to evaluate success includes on time, within budget and correct quality. It has completed the construction projects for Private Healthcare

Groups, which include Level 1 trauma - 410 bed hospital, oncology bunker, master plan hospital upgrade project in Klerksdorp, upgrade of theatre and pharmacy in neuro-theatre project in Pretoria, refurbishment of medical ward, and ICU.

4.4.2 Beta Case

Company Background

The organisation was established in early 2000 in South Africa with core specialties in construction project management and quantity surveying. An established PMO is used in multiple industries and has since expanded its operations to include locations surrounding South Africa and the Middle East. Company Beta is associated with a number of industry bodies, such as, Southern African Council for the Project and Construction Management Professions (SACPCMP) and South African Property Owners Association (SAPOA).

The organisation is involved in construction and infrastructure projects as a project management office (PMO) offering services as project managers or principal agents throughout development and execution of construction projects. Company Beta is currently actively involved in projects across sectors such as retail, commercial, airports, rail, and transport, industrial infrastructure, healthcare, educational, mining, and residential. Project values range from R50 million to R5.5 billion.

Project Management Methodology

Company Beta uses construction project management frameworks as established by SACPCMP identification of work with support from contracts such as PROCSA and JBCC. The company also has an internal quality management system that governs their project processes. The QMS is audited annually for continuous improvement and to renew accreditation. The link to the PMBOK is assumed, used as a guideline and there is no written project management methodology that draws from the PMBOK knowledge areas.

Project management maturity and project success at Company Beta

Company Beta considers project management maturity to have an influence on project success. The participant advanced a view in this regard and stated that, "*I would say yes, project management maturity does have an influence on project success. For example, I*

will speak to the specific organisation's quality management systems. This is the way you do things. If the QMS systems are clearly defined, your chances of project success are high. So now where you have clearly defined QMS you find that there is a small gap between an experienced project manager and a non-experienced project manager because everyone knows what to do and how to do it as it is defined. So yes, project maturity will then increase project success, for example if your organisation has systems that are well defined and updated, then the individual's ability to interpret the works is improved compared to a company that does not have defined processes." The view from the organisation is that when processes are clearly defined, easily understood and are well communicated this will limit the gaps in errors by project managers and decrease inconsistencies in managing projects and thus improve project success.

Company Beta appears to have structured and documented project management processes but these are not followed consistently by all project managers in the organisation. This can be attributed to the limited involvement from management in putting measures in place to control and continuously improve the project management processes in the organisation. Based on the OPM3 self-assessment maturity level, it is unclear where Company Beta is positioned in the SMCI stages. The company appears to have the correct structures in place and comprehensive execution, therefore have reached the standardise stage from the OPM3 self-assessment.

Company Beta overview

The organisation employs project managers who are suitably qualified and who are either registered with SACPCMP as candidate construction project managers or registered, although none of the project managers have project management certification such as the PMP from PMI. The company reports high success rates on projects although some failures are mentioned when reviewing the project performance details. There are issues around leadership in projects and the lack of appropriate project integration, particularly project planning and close-off procedures. No formal project management communication procedure is evident. There is no routine in the organisation as to the managing of projects, even with the existence of QMS systems in place. The delivery is different with the change of a project manager and change in project type.

4.4.3 Gamma Case

Company Background

Company Gamma was established in 2007. It initially offered services in pure construction management but has since expanded operations to Occupational Health and Safety consultancy services and specialises in energy (i.e. solar panel installation and energy engineers). The organisation operates around South Africa and is based in Gauteng. It has operations in Ghana and Zambia, managing some infrastructure projects in those countries. The organisation is associated with the Royal Institute of Chartered Surveyors, Southern African Council for the Project and Construction Management Professions SACPCMP, South African Property Owners Association (SAPOA), and Project Management Institute (PMI).

Company Gamma in involved in construction projects as either principal agent, project manager, development managers and has an established PMO. The organisation is involved in many sectors, such as healthcare, commercial, residential, public infrastructure, educational and national projects. Project values range from R5 million to R8 billion.

Project Management Methodology

Company Gamma uses a quality management system (QMS) that has been developed in line with the SACPCMP identification of work, forms of contract (namely PROCSA and JBCC). The QMS system is based on the PMBOK and the nine knowledge areas as a foundation but the PMBOK is used extensively in the organisation. All knowledge areas are engaged, evidence is noted from the different management plans developed to manage all projects by all project managers. The QMS system is audited annually by the internal association.

Project management maturity and project success at Company Gamma

Project management maturity in Company Gamma is taken seriously, as it is linked to the ISO accreditations but it is evident that the repeatability of processes is seen to increase the probability of success by the organisation. When asked on the influence of project management maturity on project success, the participant stated that, "*It does have an influence because as you mature and not maturity in age but maturity in exposure in that*

particular field, and we are talking Healthcare in this instance. That maturity is that ability to work through the risks and that ability to identify the risks in advance, identify the constraints that you have. That are passed from project to project, and generally, you would see an improvement in the magnitude of how much you have improved but there will always be an improvement. Maturity in actual organisational processes can work both ways, so the project management maturity in a particular organisations can lead them to make a discussion about how they can discharge projects. For example, the QMS system we use in our organisation is ISO accredited which then means we are required to follow the processes prescribed in this methodology or we risk the chance of non-compliance and losing the accreditation. This in itself has required that we implement the same project management project execution in all our projects and identify weaknesses and address any deviations before it is measured and found as an audit finding. We align with measuring and continuously improving our project management process which leads to realisation of project success."

Based on the OPM3 self-assessment review and guidelines, the organisation appears to have standardised and measured controls and is on a continuous improvement path. This has led to improved levels of project success in the organisation.

Company Gamma Overview

The organisation has always had a management system that helps guide and direct the projects in the organisation. Internal project reports indicate an average project success rate of 98%, the criteria used is based on the triple constraints and stakeholder management. The issues reported on the four unsuccessful projects are unpredictable environmental issues (ground water high water tables and unsuitable ground conditions that led to floor and wall cracks).

The project managers employed in the organisation are educated and there seems to be a skills transfer programme in place in the organisation. Each senior manager works with junior project managers as support in all projects. The addition of the Associate Director-Project Management in the last four years has resulted in more structured project management processes in the organisation, a higher level of knowledge and support. An example provided included that the organisation has, in the last four years, registered

more professional construction project managers than before and there is an increase in the level of directives provided by the senior manager. All work is evaluated and approved before being issued by all project managers and there is a culture of post-project reviews that has been introduced which assist in future projects.

4.4.4 Delta Case

Company Background

Company Delta is a private healthcare organisation that has been in operation since the early 1980s. The organisation's core service offering is on healthcare with over 50 acute hospitals, 87 renal stations, over eight mental health facilities and rehabilitation facilities. This represents over 65 facilities in total. It is only in the last decade that the organisation has established an in-house engineering department that looks at the management and execution of construction and infrastructure projects, as a support service. This department is responsible for projects valued from R5 million (usually refurbishments) and +R550 million (new builds). All small projects are managed at the hospital level and not handled through the engineering department.

Some of the projects recently completed in the organisation include additions and renovations of existing wards such as, oncology ward project in KZN, hospital master projects in Klerksdorp, external parking and parkade project in Gauteng, mental wellness centre in Alberton, and catheterisation laboratory in Benoni.

Project Management Methodology

The organisation does not have a project management framework or methodology used but practices are aligned to the PMBOK 12 knowledge areas. In contrast, the project management policies are aligned to the SACPCMP six stages of construction project but do not provide an in-depth process detail for the link of PMBOK on the project management policy. The management of projects is highly dependent on external consulting services, which then results in inconsistently applied project management practices.

Project management maturity and project success at Company Delta

The view of the participant in the organisation is that project management maturity has a great influence on project success. When asked if project management maturity has an influence on project success the participant stated, "*Project management maturity influences project success in a big way. I think with project management maturity, in an instance where there is high project management maturity means that there is a strong level of understanding and endorsement from senior management and capability of an organisation or a unit to be able to deliver*." Although the concepts of project management and project success are understood in the organisation, the lack of documented project management process and procedures is evidence of the maturity infancy of the department and their management of project management practices.

For this reason, an assessment based on the PMBOK maturity levels was conducted to evaluate the current practices in the organisation and the project management assessment yielded, on 'standardise' stage. On the knowledge areas (such as cost management, schedule management, HSSE management, and finance management) level 3 was achieved, which means the processes are all applied on all projects but there is no continuous improvement. On the knowledge areas (such as integration management, scope management, quality management, risk management, procurement management, and HSSE management), a level 2 was achieved, which means the processes are fully implemented but are not consistent across all projects. In other knowledge areas (such as human resource management, communication management, and) a level 1 as achieved, which means processes are partially implemented with the outcome of 1 in the scale. Stakeholder management and all the organisational enablers achieved a level 0, which means nothing has been implemented for outcomes of a best practice.

Company Delta overview

No support from management (executives) is evident in the organisation. The management of projects is done *ad hoc* and is not standardised across the organisation. Leadership is more a barrier than a support to the maturity of project management practices in the organisation; this is linked to a culture of lack of change that translates to the engineering department and to the projects.

Even with the low maturity levels witnessed, the organisation is reporting a 97% project success rate, based on the triple constraint criteria. The organisation has no established PMO but rather a project management division that looks after the construction projects of the organisation.

4.4.5 Epsilon Case

Company Background

Company Epsilon is a project management organisation new in the industry, the organisation was established in 2013 and only has six years' experience. Although young in age, the organisation has employed experienced project managers with both engineering, and project and construction management backgrounds. In the six years, Company Epsilon has managed to penetrate through various sectors in the construction industry, residential development, retail and healthcare (both public and private) sectors. The organisation is associated with the Southern African Council for the Project and Construction Management Professions SACPCMP, South African Institute of Black Property Practitioners (SAIBPP), and Association of Construction Project Managers (ACPM).

Company Epsilon is involved in four projects in construction and others are in planning. The four projects in construction include an upgrade and the addition of an emergency ward in Eastern Cape, phase 1 project refurbishments of the Boardwalk Centre in the Eastern Cape, residential development in Gauteng and an upgrade to a retail group chain of stores, a national contract. These projects range in from R5.8 million and R160 million.

Project Management Methodology

Company Epsilon uses the SACPCMP identification of works and a company specific project management system that is tailored from the normal six project stages to five stages. This project management system is loosely based on industry norms but is flexible enough to be adjusted per industry or project. This flexibility is noted when clients have their own project management methodology that is a prerequisite, Company Epsilon has an internal process alignment procedure that allows for the clients' methods to be followed but related back to the standards internal project management methodology.

Project management maturity and project success at Company Epsilon

Company Epsilon considers project management maturity to have an influence on project success. When asked whether project management maturity has an influence on project success, the participant advanced a view in regard and stated that, "*Yes it does, I'll give you an example because when I look at it from an individual and company perspective. From an individual perspective the more mature you get it means the more understanding of how things work, you get a greater understanding of how to manage a project and what to look for in terms of when you are defining your scope or designing for example. Also from a company perspective, I have worked with companies where they were just starting off as project managers and you find that we did not have a lot of lessons learnt that helped us see around corners. With my current employer, we say as a project manager you should be able to see around the corners and be able to anticipate what could go wrong and what can be obstacles on your path to project success. It is because we have a wealth of experience and maturity within the company itself and the systems that we use. So you find that we are able to run projects faster, more efficient and deliver better results because of that combined maturity in terms of knowledge, expertise, and resources as well.*" This is in line with the high level review of maturity in the organisation. The maturity levels of Company Epsilon are on the continuous improvement stage of the OPM3 self-assessment, based on review of the systems and processes within the organisation.

Company Epsilon overview

The organisation is relatively young with only six permanent project managers employed in the organisation. The structure includes two project managers with more than nine years' experience in the construction industry and more junior staff. The owner is hands-on with all projects, resulting in more planning, direction efforts offered to more junior staff. There is a single layer of upper management in Company Epsilon's structure, making the turnaround in decision making more efficient than in bigger organisations. No performance results (evidence of project success) were made available in the organisation.

4.4.6 Zeta Case

Company Background

Company Zeta is a private healthcare organisation that has been in operation since the early 1990s. The organisation's divisions include 56 acute hospitals, 12 mental wellness facilities and 15 care centres. The organisation has a national footprint and manages internal construction projects of all hospitals. Company Zeta established a project management office that manages the construction projects centrally. The PMOs structure is such that all refurbishment and new projects are managed at head office level with all contractors and suppliers contracted to them. The project support division is responsible for capital expenditure projects to the value of R600 million that includes greenfield and brownfield projects. Some projects recently completed in the organisation include refurbishment of change rooms and theatres in Krugersdorp, medical ward upgrade in Gauteng, ICU refurbishment in Gauteng and new 410 bed hospital in Gauteng. Figure 4.9 provides an example of a project recently completed.

Project Management Methodology

Company Zeta aligns all project management practices to the PMBOK 12 knowledge management areas, six stage project stages and the PROCSA and JBCC contracting strategies. Company Zeta has tailored the internal project management methodology to suit its internal project governance structures. Company Zeta's project management processes are further managed by an online project management systems (PMS) to improve project delivery, transparency, and efficiency.

Project management maturity and project success at Company Zeta

Company Zeta considers project management maturity to have an influence on project success. When asked whether project management maturity has an influence on project success, the participant advanced a view in regard and stated that, "*It does. Quite a lot of times, knowledgeable organisations, or if you can actually say mature, will start touching on what was intended and find that the projects are deliverables of certain organisational inputs. Therefore, you find that you do not reach a stage where review and check whether all your intended outputs delivered through the projects. Also where all the required or desired stakeholders included or brought in during the execution of the project*

and as such I have a belief that you sometimes deliver a project without really having successfully delivered on a project."

Based on the OPM3 self-assessment review and guidelines, Company Zeta appears to have standardised, measured, controlled project management processes and is on the continuous improvement path. This has led to improved levels of project success in the organisation.

Company Zeta overview

Leadership and top management play an integral part in the execution of projects in Company Zeta. The policies and governance structures in place allow for more efficient execution of projects. The stage-gated project processes have been put in place to align the projects with best practice while providing live project management performance information of all projects, which is enabled by the PMS. All projects that are managed and executed by Company Zeta follow the same management processes. The project success rates are reported at 98% that is confirmed by evidence seen from the bi-monthly executive reports. The company has in the last month, partnered with a leading PMO to manage most of the green field projects and further allow for skills transfer from the external service provider to the internal project managers.

4.5 CROSS-CASE CONCLUSIONS

4.5.1 Theme 1: 12 knowledge areas equally important

The first theme was developed to determine whether all of the 12 knowledge management areas are equally important in Private Healthcare Industry construction projects. To get useful insights on a theme, a total of three consolidated codes were developed namely - Equal Importance, Emotional Intelligence (Stakeholder Management), Ranking of Knowledge Areas (Integration, time, cost, and quality management).

4.5.1.1 Equal Importance

Participants gave their views on whether the 12 knowledge management areas are equally important in healthcare construction projects. Most of the participants indicated that all 12 knowledge areas are equally important for the successful completion of a

project. Additionally, they suggest that the knowledge areas are interdependent, meaning that one cannot exist without the other. One of the participants explained how the importance can differ depending on the project stage but holistically, the 12 knowledge management areas are of equal importance.

"All the knowledge areas of equal importance but at different stages of the project. All the knowledge areas speak to each other and you cannot management one without the other." – ***Interview 2***

"For me the knowledge areas are all equally important and are interdependent and are all required for projects." – ***Interview 5***

"The knowledge areas are all important, but differs between each of these knowledge areas is the extent or the bias of a particular project that you are dealing with but if you were to look at them holistically for the success of the project they are all of equal importance." - ***Interview 6***

4.5.1.2 Ranking of Knowledge Areas (Integration, time, cost, quality management)

Some participants suggested that there should be a weighting to the knowledge areas to suit the specific requirements of a specific project. One participant suggested that although equal, the knowledge areas should be given a different ranking as time, cost, and quality management are the three most critical in construction projects. Another participant put forward that you have to tailor the knowledge areas to suit what you need from the body of knowledge and in line with the specific requirements of that particular project.

"I think that they are all important but I do think that there is a different weighting to them… But the knowledge areas from a time, cost, and quality that in my view carries a lot of weight when it comes to project management in construction." – ***Interview 1***

"I think definitely the important ones are around risk management, stakeholder management, cost management, and schedule management." – ***Interview 4***

"When looking at the execution of construction projects in general, I would depart with the time, cost, and quality management as critical. But in our space where we have multiple projects, integration management becomes the leading factor into success and crucial." ***Interview 6***

4.5.1.3 Emotional Intelligence (Stakeholder Management)

Emotional intelligence is also one of the most important knowledge management areas according to one of the participants; the participant mentioned that this is very important to understand the client in the beginning of the project so that there is mutual understanding that is even more important than the technical side of things.

> "*The knowledge areas are not equitably important, I think depending on the particular stage of a project you are, certain things come to the fall a lot more. So, for example emotional intelligence is probably a big one when dealing with a client in the beginning of a project because you are still trying to understand each other and less more the technical components of it*" - ***Interview 3***

In summary, evidence from the findings demonstrate that most participants believe that the 12 knowledge areas are equally important for the success of a project and interdependent on each other. There is an expanded opinion from another participant, which advises that although the knowledge areas are equal in importance, there are knowledge areas that are more critical than others. Integration, time, cost, and quality management are some of the knowledge management areas that are considered more important than others.

Figure 4.4 Thematic map for the important knowledge management areas

4.5.2 Theme 2: Core determinants of project success

Theme 2 was developed to determine the core determinants of project success. To understand this, a total of four consolidated codes were developed namely: Stakeholder Satisfaction, The Triple Constraints, Environmental, and Legislative Compliance.

4.5.2.1 Stakeholder Satisfaction

The participants gave their input on what they believed are the core determinants for project success. According to some participants, stakeholder satisfaction is considered as one of the critical determinants, meaning that whether or not a project is successful, depends on how satisfied the client is. How the stakeholder or client responds at the completion of a project is a big determinant of the success of a project.

"*Generally, the topic of project success can be interpreted differently according to what I know from best practice is that they say that stakeholder satisfaction is the key objective*"- ***Interview 4***

"*Most importantly client satisfaction, for example the moment you finish a project and the client feels that on the next project he/she doesn't require the services of any other project manager ever again then you know you have done your job well."*- ***Interview 1***

"*…so, for us if the client is happy for us the biggest criteria is client satisfaction. The client has to come back and say you did a good job and the client comes back and says so whenever the client thinks of doing something the client comes back to us."*- ***Interview 5***

4.5.2.2 The triple constraints

The other important determinant according to the participants is the triple constraints, which are time, quality and cost. Simply put, it is crucial for the success of a product that it is delivered within the prescribed time, within the agreed cost bracket and the quality is that which the client required.

"*First of all, it is the basic, knee jerk answer that speaks to, was the project finished within time, was it finished within budget, and within quality*"- ***Interview 1***

"You need to complete the project on time and on time is if there has been an extension of time claim that was approved we would then complete by that new revised baseline practical completion date. The project has to be within budget and if the revised baseline project applies then sometimes the cost may also be adjusted. And also with good quality." – ***Interview 2***

"*So, we typically use time, quality, cost, and client satisfaction. The client is not necessarily the person who is paying you, but the client is the stakeholder, whoever the stakeholder may be.*"- ***Interview 3***

"…we have always known that in a bigger scheme of things that project success is defined, like I indicated right in the beginning, that the project was delivered within the desired timeframe, with the desired schedule and met the requirement."- ***Interview 6***

4.5.2.3 Environmental and legislative compliance

In addition to the two identified determinants, the participants added that environmental and legislative compliance is also a good indicator of project success; according to one of the participants this one of the recent criteria for project success.

"*But recently I've seen the involvement of other areas such as ensuring that it was delivered within the required compliance, which could incorporate both the environmental and legislative compliance. This has been more recent of the criteria of project success.*"- ***Interview 6***

The stakeholder satisfaction, the triple constraints, and environmental and legislative compliance are considered as the core determinants of project success in construction projects. Stakeholder satisfaction is measured by the level of satisfaction of a client with the end product and the continued request for repeat project management services, while the triple constraints consider whether the project met the original scope of the project, which are the delivery on time, on budget and within the correct quality. In addition to two determinants, the participants identified environmental and legislative compliance that looks at whether the end product has met local and national laws.

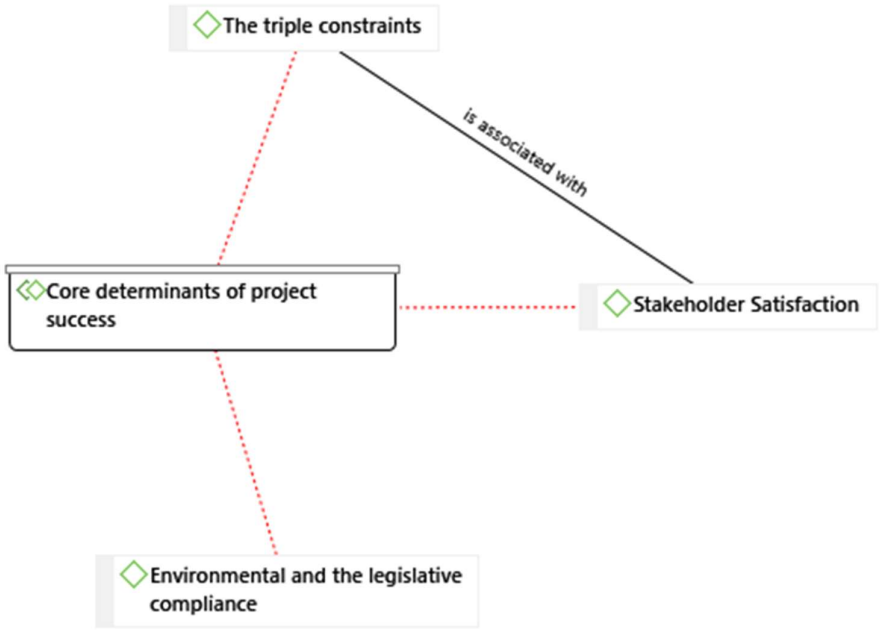

Figure 4.5 Thematic map for core determinants of project success

4.5.3 Theme 3: Leadership and top management support

Theme 3 was developed to understand whether or not leadership and top management support has a critical influence on project success. A total of six consolidated codes were developed to understand this theme, namely, strategic alignment, team competency, progress monitoring, decision making, project direction, and appropriate planning.

4.5.3.1 Strategic Alignment

Leadership has a direct effect and influence on the success of the project, as they are tasked with the responsibility of providing the correct organisational structures, understanding the strategic intention of a project, appropriate project resourcing, ensuring governance, and alignment with the overall organisation's business objectives.

"I think that leadership of an organisation are in charge of making sure that the correct structures are in place within the company… They also are in charge of correctly resourcing the projects and then allowing that the processes will ensure correct business alignment." ***Interview 1***

"..And also the strategic intent of why that company is doing the particular project is driven by senior management and they of course would make decisions that may not always make sense to those who

are watching because they do not understand what the particular driver is behind how you are executing a project." ***Interview 3***

"*The biggest role that leaders in an organisation play departs from the initial prioritisation of the projects chosen, which should ensure alignment of the strategic objectives of an organisation. They also ensure that the required governance processes are followed and correct security measures are provided when executing the projects."* ***Interview 6***

Another fundamental function of project management is around planning of all activities and anticipating any challenges that may hinder the success of the project and planning how to mitigate or remove those challenges. Top or senior management has the responsibility of ensuring that proper measures are in place for proper risk management and also to ensure successful execution of the project.

"This allows for repetition of processes by project managers and increasing the successful outcomes of projects and you are required to ensure that you have looked around the corners and planned appropriately for any possible risks using the tools provided in the organisation to apply the lessons learnt in new projects."- ***Interview 5***

"Therefore, the project knowledge of leadership is critical and the project knowledge within senior management play a major role in the successful execution of projects."- ***Interview 6***

4.5.3.2 Team competency

It is clear from the interviews that leadership and top management support has an influence on the project success. The participants advised that leadership and top management provide the correct organisational structures, and also boost team competency. Furthermore, the participants advised that leadership help team competence through the provision of mentorship, which ensures that junior project managers are provided with the correct guidance and training to enable them to grow and build confidence.

"Leadership will always have an impact on project success because not only does it focus on the correct skills but also the soft side of project management. This helps in boosting the construction team lack of competency when lacking but also provides ability to see problems even before they become evident"- **Interview 2**

"*As a senior manager I have three people that report under me and the structure allows for the project managers to advance their skills with my guidance until such a time when they have been properly training, guidance, and mentoring. This is how the support of top management allows people to stand on their own feet and they build confidence in the project managers*." – ***Interview 1***

4.5.3.3 Progress Monitoring

Leadership and top management is also very important for the success of a project because they ensure that there is progress monitoring structures in place during project execution. It is therefore very important that there is senior management that is overseeing and evaluating a project.

"*And the ability to identify the progress of a project and the overarching role that your senior person would play becomes quite important*."- ***Interview 3***

"Senior management are in charge of gate reviewing each project and whenever we move from one section of the project to the other, they play the governance role and ensure that all the correct checks and balances have been met." – ***Interview 4***

4.5.3.4 Decision Making

Leadership and top management is crucial for decision making, which is an important aspect or factor in the success of any project. The decisions taken can either support or inhibit project success.

"They offer support and lead in making crucial legal decisions and provide the correct direction in contractual claims from the contracting parties too. Sometimes it is management that can make a call to withdraw from a project when assessing the potential risks and future damage that may be experienced by continuing with the project to the organisation"- ***Interview 4***

A team that is moving in the same direction is important if the project is to succeed and it is leaders and top management that provides project direction. One of the reasons why leadership is very important to the success of a project is that they provide the necessary support and direction on the execution of the project all through to the end.

"Leaders in an organisation provide the direction and support when executing projects."- ***Interview 5***

"*Top management provides the needed support in projects by providing the right resources, tools, and organisation direction. When you have issues and problems, they are at a position of proving with experience and historical knowledge to help solve problems"*- ***Interview 2***

It is quite evident that leadership and top management support has a critical influence on project success. The influence can be attributed to two main points: leadership and top management support. This is important because it sets the strategic intention of projects, helps boosts the team's competence, ensures that there are progress monitoring structures in place during project execution. This is crucial for decision making, which provides the necessary support and direction on the execution of the project all through to the end.

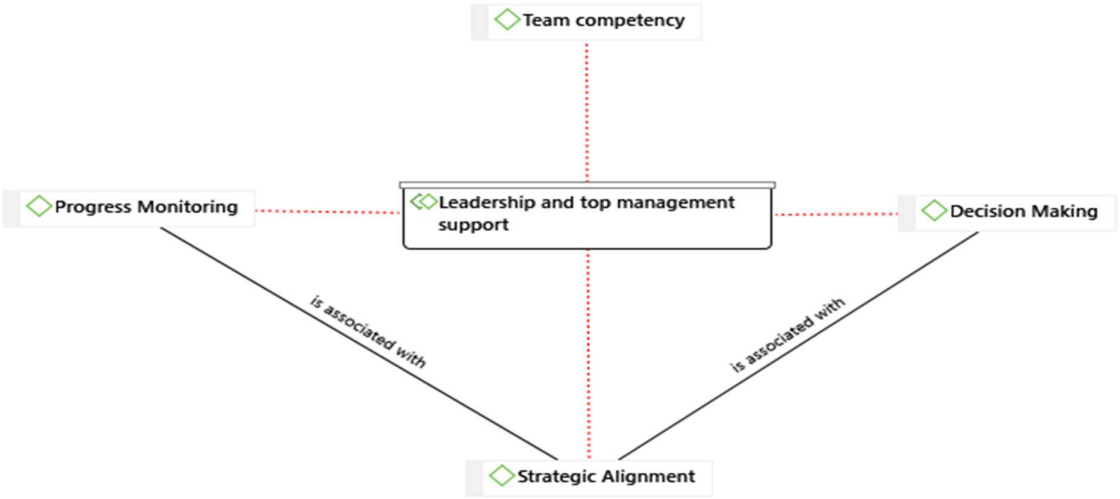

Figure 4.6 Thematic map for leadership and top management support

4.5.4 Theme 4: Project manager competency on project success

Theme 4 was developed to understand if the project manager competency has an influence on the project success. There were a total of four consolidated codes developed in order to get optimal insights on the theme, the consolidated codes include Risk Management, Problem Solving, Instil Order and Required Knowledge and Experience.

4.5.4.1 Risk Management

The competency of a project manager has influence on the success of a project. One of the reasons is that a competent project manager understands potential risks and is able to put the necessary strategies in place in order to avoid project failure. Therefore, a

project manager who is capable of identifying and managing risk is very important for the success of a project.

*"You have to understand what the risks and potential issues are to a project and this comes with the correct competency and understanding of the project management processes, without this then your project will be at risk of failing even before you start."- **Interview 1***

*"A competent project manager would be able to understand for an example in the field of risk management. Someone who is not very capable in risk management might perceive the risk as in a meeting to say that in a meeting." – **Interview 4***

4.5.4.2 Problem Solving

A project manager's competency is also important because it is critical to problem solving. A project manager who has the skills and ability to solve problems using an approach that is best suited for that particular project, is a very important part of the success of a project.

*"I have seen for an example an older project manager with years of experience, that managed to avert an issue on site by simply remaining calm and ensuring that the team takes a step back and revisit the problem with fresh ideas"- **Interview 1***

*"Project management is based on interpretations, so a competent or a mature project manager would resolve or approach a problem in a different way compared to a project manager that is not competent."- **Interview 2***

4.5.4.3 Instil order

Another important aspect that makes the project manager's competency very crucial to the success of a project is the fact that they are able to instil order during the execution of the project. This allows for harmony of all the project aspects and ensures that various elements move together, which then increases the probability of project success.

*"The competency of the project manager defines the competency of how the team is going to produce. If you support the view that the project manager is the conductor of the professional team and or of the project and if they are driving what should happen and they are driving a programme." –**Interview 3***

"As a project manager I think one of the things that I always say is that a project manager is like an orchestra conductor. This is because you have to know how to conduct the rest of the team to bring in the

beautiful sound and if you do not know how to do that then there going to be noise there will be chaos."- ***Interview 5***

4.5.4.4 Required knowledge and experience

The competency of project managers bring the correct knowledge and experience to the project which in turn, increases the probability of successful execution and delivery of the project. The participants emphasised how the correct education and experience is an important aspect when dealing with project manager competency. This background empowers a project manager to understand the basics and complexity of project management in such a technical field of construction, which is an important requirement to carry out a project successfully.

"The competency of a project manager definitely influences the success of a project. Competency is an important ingredient, although not the only, it is one of the most important ones. Competency talks to knowledge and experience and by knowledge it means being able to demonstrate by qualification and also experience."- ***Interview 4***

"Project management in construction is a very technical field so competency includes experience, education, and qualification. So you have to have the correct background, you have to know and understand the basics of construction you cannot go around without understanding that."- ***Interview 5***

It is without doubt that project manager competence has a big influence on the success of a project. A competent project manager understands potential project risks and is able to put the necessary measures in place in order to avoid project failure. They have the appropriate skill set to solve inherent problems that less competent managers may fail to offer; a very important part of the success of a project. In addition, a competent manager is able to instil order; this allows for harmony of all the project aspects and ensures that various elements move together, which then increases the probability of project success. Lastly, competent project managers bring the required knowledge and experience to help with the successful execution and delivering of the project.

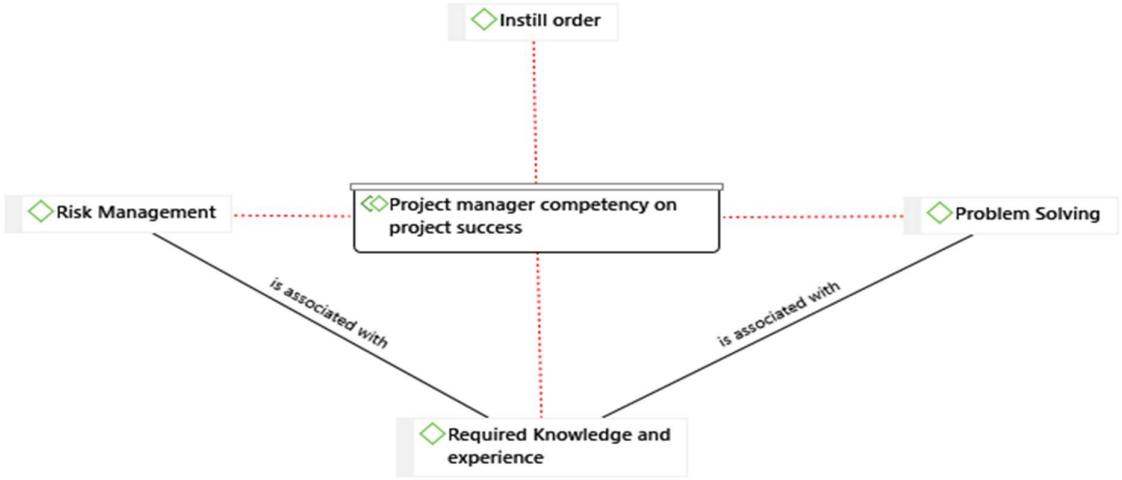

Figure 4.7 Thematic map for project manager competency on project success

4.5.5 Theme 5: Project size knowledge areas required for project success

Theme 5 was developed to understand whether the size of the project determines the knowledge areas required for project success. There were two consolidated codes this theme namely: Insignificant and Significant

4.5.5.1 Insignificant

Participants gave their views on the significance of the project size on the project success, there was a general consensus that project size is insignificant and that all knowledge areas are equally applied, regardless of the size of the project. For example, one of the participants indicated that for all projects, all knowledge areas are required and, regardless of size, all projects still require the same processes and efforts by project managers. The project size does not make one knowledge area less important than the other and in that way, project size cannot be used to determine the success of a project. Another participant added that from his or her perspective, project size does not matter, but rather, the consideration of project types should be considered when assessing the applicable knowledge areas.

"No, it doesn't depend on size. You find that you actually spend more time on smaller projects than you actually do on bigger projects. However, all projects are the same and require the same processes and efforts. Therefore, in that case your interactions with the different knowledge areas would differ but would not make one less important than the other. Project size does not matter." – ***Interview 2***

"…would not look more from the perspective of project size, but I would look more from the project type. In other words, for all the sizes of a project, which falls onto a similar type, you would find that they use similar knowledge areas and the size only varies the intensity of the engagement of each knowledge area. So, size does not matter" - ***Interview 6***

4.5.5.2 Significant

There was another group of participants who argued that the size of a project is actually important in determining whether the project will be successful or not. One of the participants explained that when a project is bigger, the complexity is a lot more, and the stakeholders are a lot more, so there is a need for more effort to ensure it is successful; another one said size matters in the application of the knowledge areas.

"When it is a much bigger project, a bigger hospital or a bigger healthcare facility the complexity is a lot more and your stakeholders are a lot more, so you spend a lot more time going through each process and the level of engagement becomes more intense"- ***Interview 3***

"I believe that it is your maturity in project management that will lead to recognizing what knowledge areas you need to draw from and be better able to tailor for the requirements of the project. So size does matter in the application of the knowledge areas"- ***Interview 4***

In summary, there are two contradictory sides from the participants, the first group believes that the size of the project is insignificant to its success because all projects follow the same stages, regardless of size, and thus require the same processes and efforts. Size would not make one knowledge area less important than the other. However, the second group advised that the size of the project would determine the appropriate knowledge areas required for a project whether the project would be successful or not.

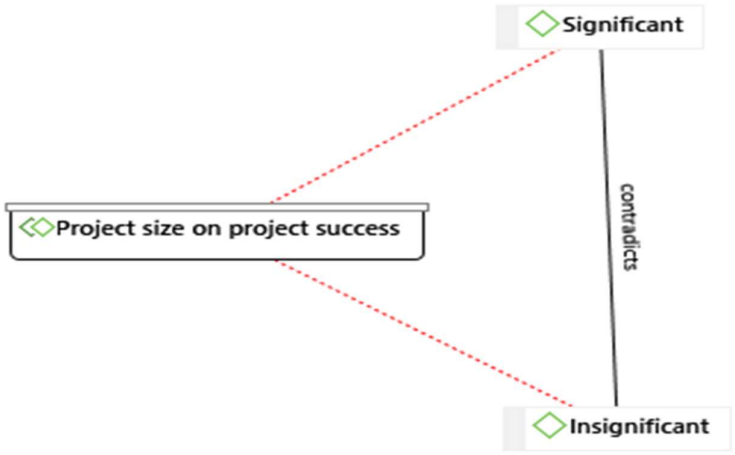

Figure 4.8 Thematic map for project size on project success

4.6 RESEARCH PROPOSITIONS

4.6.1 Main Research Proposition: Project management maturity has an influence on project success

From the six different cases it is evident that indeed project management maturity has an influence on the project success. Company Alpha's case shows that the company considers both project management maturity from the organisational perspective and project management maturity from the individual project manager perspective, which enables them to improve processes. Company Beta also supports the latter case, as they believe that project management maturity has an influence on project success. Findings from the interview conducted in this study confirm that, as a member of the company agreed, project management maturity does have an influence on project success.

Project management maturity for Company Gamma is taken seriously as it is linked to the ISO accreditations, but it is evident that the repeatability of processes is seen to increase the probability of success by the organisation. Confirmation also came through the interview where the member of the Gamma company stated that, "*It does have an influence because as you mature and not maturity in age but maturity in exposure in that particular field.* Company Delta shares the same sentiments with the others as they also believe that project management maturity has a great influence on project success; this

is despite the fact that the project management assessment yielded that they are still on the standardise stage.

Company Epsilon's maturity level is at the continuous improvement stage; these are the findings of the OPM3 self-assessment, based on a review of the systems and processes within the organisation. This is understandable since company Epsilon considers project management maturity to have an influence on project success. Company Zeta also considers project management maturity to have an influence on project success. The OPM3 self-assessment review and guidelines used in Company Zeta appear to have standardised, measured, controlled project management processes and are on the continuous improvement path. This has led to improved levels of project success in the organisation.

The proposition "Project management maturity has an influence on project success" is confirmed as per the cases reviewed for this study, together with the findings from the empirical data.

4.6.2 Sub-Proposition 1: The 12 PMBOK knowledge areas are not equally important for project success

From the cases, it is evident that all the companies have common ground in that they all use some of the PMBOK 12 knowledge management areas; it is also clear that they differ in opinion which of the knowledge areas are the most important. In the Alpha Company, the supporting pillar of the QMS system is the PMBOK. The most important knowledge areas, as observed in the organisation, including integration, schedule, cost, stakeholders, quality management. Similarly, Company Beta uses construction project management frameworks as established by SACPCMP identification of work with support from contracts such as PROCSA and JBCC.

Company Delta makes use of a QMS system, which is based on the PMBOK and the nine knowledge areas as a foundation. Although the PMBOK is used extensively in the organisation, where all knowledge areas are engaged, evidence is noted from the different management plans developed to manage all projects by all project managers, whereas Company Epsilon uses the SACPCMP identification of works and a company

specific project management system, which is tailored from the normal six project stages to five stages. Company Zeta aligns all project management practices to the PMBOK 12 knowledge management areas, six stage project stages and the PROCSA and JBCC contracting strategies.

It is difficult to conclude that the PMBOK 12 Knowledge areas are not equally important to project success considering the fact it differs from project to project which of the knowledge areas are more important; this suggests that these knowledge areas are all important for the success of a project.

4.6.3 Sub-Proposition 2: The triple constraints and stakeholder satisfaction are the core determinants of project success

Company Alpha has a good record of successful projects as it has reported an average of 93% rate for successful projects across the range of sectors. The criteria used to evaluate success includes on time, within budget and correct quality. Company Gamma's internal project reports also shows that an average project success rate of 98%, the criteria used is based on the triple constraints and stakeholder management. Company Zeta also shows high percentages in terms of performance, this can be attributed to the fact that all projects that are managed and executed by Company Zeta follow the same management processes. The project success rates are reported at 98% and evidence seen from the bi-monthly executive reports.

These cases confirm that the triple constraints, which are time, quality and cost, are crucial for the success of a project. When a project is delivered within the prescribed time, within the agreed cost bracket and the quality is that which the client required - that is a clear indication of the success of the project. Therefore, it can be confirmed that the triple constraints and stakeholder satisfaction are two of the core determinants of a project success.

4.6.4 Sub-Proposition 3: Project manager competency has an influence on the effective implementation of correct project management practices that enable project success

In Company Beta, project management staff employed in the organisation are educated and there seems to be a skills transferral programme in place in the organisation, each senior manager works with junior project managers as support in all projects. Company Alpha has also made sure they have competent project managers as they hire specialist project managers in the related project management sector, this has in turn, improved the project execution statistics in the organisation, and the Company Gamma has always had a management system that helps guide and direct the projects in the organisation.

From these cases, it is evident that all the companies have competent project managers which confirms the importance of a competent manager thereof to the success of a project, this is because the companies in the cases have shown statistics of very successful projects in their records.

4.6.5 Sub-Proposition 4: Leadership and top management support has an influence on project success and can sometimes mitigate the inconsistencies of the project management practices

The different cases show how important it is for a company to have adequate leadership and top management support. Company Alpha has leadership that is tasked with overseeing the planning, support, operations, performance evaluation, and improvement efforts of the projects; they also have specialist project managers in the related project management sector; this has in turn, improved the project execution statistics in the organisation. For example, the senior project manager dedicated to the organisation's healthcare portfolio has extensive experience, a Master in Project Management, a Master in Business Administration, and a PMP certification. This is similar to Company Gamma, which has always had a management system that helps guide and direct the projects in the organisation.

From the findings of the cases, it is evident that leadership and top management support has a critical influence on project success. In Company Delta, there is no support from management, the management of projects is done *ad hoc* and is not standardised across

the organisation and therefore leadership becomes more of a barrier than a support to the maturity of project management practices in the organisation; this is linked to a culture of lack of change. This also shows how important it is for there to be adequate management support.

4.6.6 Sub-Proposition 5: The project size determines the important project management knowledge areas required for project success

From the different cases, it is evident from the values of the projects that the companies work on a wide scope of project sizes. Company Gamma is involved in many sectors such as healthcare, commercial, residential, public infrastructure, educational and national projects. Project values range from R5 million to R8 billion and they have recorded a success rate of 98%, the values of the projects are a clear indication of the size of the projects; this shows that the size of a project does not have an impact on the success of a project. Company Beta is current actively involved in projects across sectors such as retail, commercial, airports, rail, and transport, industrial infrastructure, healthcare and educational, mining, residential. Company Beta reports high success rates with project values range from R50 million to R5.5 billion. From the cases, there are no records of failure due to the size of the project. It is then difficult to conclude that project size determines the project management knowledge areas required for project success.

4.7 CHAPTER SUMMARY

An evaluation of the six cases against the sub-propositions presented in chapter 3 was done. The first proposition is “The 12 PMBOK knowledge areas are not equally important to project success”. The cases show that it is difficult to conclude that the PMBOK knowledge areas are not equally important to project success, considering that the requirements are different from project to project, which of the knowledge areas are more important; this suggests that these knowledge areas are all important for the success of a project.

The second proposition was “The triple constraints and stakeholder satisfaction are the core determinants of project success." The cases confirmed that the stakeholder satisfaction and the triple constraints are crucial for the success of a project. This agrees with the proposition that the triple constraints are core success determinants in a project.

The third sub-proposition was “Project manager competency has an influence on the effective implementation of correct project management practices that enable project success”. It was apparent that most of the companies in the cases invest in competent project managers; this is an indication of how important a competent project manager is for the success of a project.

The fourth sub-proposition “Leadership and top management support has an influence on project success and can sometimes mitigate the inconsistencies of the project management practices”. The cases showed the importance and significance of good leadership and top management support to the success of a project; it therefore confirmed the fourth proposition.

The fifth sub-proposition was “The project size determines the important project management knowledge areas required for project success”. From the cases, there are no records of failure due to the size of the project, however the value of the projects the companies have done and their success rates indicate that the project size has no influence on the success of the project. Therefore, the proposition could not be confirmed.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The primary objective of the study is to develop a framework to improve the prevailing project management practices in construction projects within the Private Healthcare Industry. In this chapter, the study findings, managerial recommendations, and conclusions are provided. This chapter addresses the secondary research objective 6 (RO 6): To draw conclusions based on the empirical results and findings, provide managerial recommendations, and identify research gaps for future inquiry.

5.2 CREDIBILITY

The case study methodology affords a researcher a multitude of flexible approaches in conducting research. For the interpretivist type of case study, it is required that the validity and reliability of the study should involve four different tests on validity and reliability. The four tests include construct validity, internal validity, external validity, and reliability (Ebneyamini *et al.*, 2018). Construct validity includes the use of multiple sources of evidence, establishing a chain of evidence or having key identified informants. Internal validity includes doing pattern matching, explanation building, or time series on data analysis. External validity considers the use of replication logic in a multiple case study when designing the research design. Reliability considers the use of a study protocol or the development of a case study during the data collection phase of a study (Sinkovics *et al.*, 2008).

In this study, the four tests on validity and reliability were followed. Constructs validity was considered with the used of multiple sources of data. The study collected interviews as the primary source of data collection with the secondary method of observation, checklist and key informants in each organisation were identified who played key roles in each organisation as senior project management practitioners. In order to understand the dynamics involved with the management of construction projects, appropriate field experts were identified and chosen. It is based on the principles of judgment sampling that project managers with eight years and more experience were selected as the sample members. The selection of project management practitioners was further based on the number of projects in the construction industry the sample members have managed. The internal validity was ensured through the use of pattern matching in the analysis of data

and external validity used the replication method in multiple cases in the research design. Furthermore, a case protocol guided the collection of data and a case was developed for each of the six cases and a cross-case findings were discussed. Each case was carefully selected to ensure predictability in outcomes. The study reached saturation on six cases in line with Yin (2014) and Gentles *et al.* (2015) who advise that case study reaches saturation between four to 10 cases.

5.3 DISCUSSIONS OF THE STUDY FINDINGS AND CONCLUSIONS

A summary of the key findings is discussed in this section. The discussion provides a summary by each research proposition and conclusions.

5.3.1 Main study proposition: Project management maturity has an influence on project success

Project management maturity and project success are two concepts in research that do not have agreed definitions by scholars although widely research separately and together by scholars. This study defines project management maturity as the development of project management strategy, methodology, and approach to increase the probability of consistent project success and further provide the ability to replicate project management achievement (Kerzner, 2016; Ofori & Deffor, 2017; Wong *et al.*, 2016).

Previous findings on the relationship between project management maturity are contradictory with some researchers advising that project management maturity has no influence on project success ((Brookes *et al.*, 2014; Kwak & Ibbs, 2002; Jugdev & Thomas, 2002), although there is a school of researchers that has found positive relationship between two concepts (Berssaneti *et al.,* 2012; Muhammad *et al.*, 2016; Yazici, 2009).

Findings from the analysis of empirical data in this study revealed that project management maturity does have an influence on project success. Organisations have implemented QMS systems in the various organisations that are measured on a yearly basis for any deviation of the project management processes but this is the final stage gate as organisations have put in place processes that ensure that there is repeatability in processes and therefore leveraging from previous successes or otherwise. In

conclusion, it can therefore be confirmed that project management maturity has an influence on project success.

5.3.2 Research sub-proposition 1: The 12 PMBOK knowledge areas are not equally important to project success

The PMBOK knowledge areas were explored through literature. Knowledge areas are defined as a series of project activities and processes employed to achieve project objectives (PMBOK, 2017). The knowledge areas include project integration management, project scope management, project schedule management, project cost management, project quality management, project resource management, project communication management, project risk management, project procurement management, project stakeholder management, project health safety secure and environment management, and project finance management (PMBOK, 2017; PMBOK-CE, 2016).

According to Farrokh and Azhar (2013), the PMI's body of knowledge is a widely accepted project management methodology that is applicable in diverse industries and, because of that, provides project management best practices. Although PMBOK-CE (2016) states that the body of knowledge is not meant to be prescriptive but rather offers that not all knowledge areas are important to project success, ranking project integration management as a core function in all projects and schedule, cost and quality management as critical to project success. This is further supported by Pretorius *et al.,* (2012); Dermirkesen and Ozorhon (2017) who state that not all knowledge areas have the same influence on project success.

From the findings of the analysis of empirical data, it was evident that all companies considered the knowledge areas to be equally important to construction projects but some indicated a view of different weighting that might be required for different types of projects. In conclusion, sub-proposition 1 could not be confirmed. Findings from the cases indicated that knowledge areas are equally important.

For the purpose of this study an alternative sub-proposition is as follows: The 12 knowledge areas are of equal importance to project success.

5.3.3 Research sub-proposition 2: The triple constraints and stakeholder satisfaction are the core determinants of project success

Project success is a widely debated concept in literature. A review of the literature revealed that the definition of project success is ambiguous, problematic, subjective, and depends on individual perspectives (Hughes *et al.*, 2004; Ika, 2009; Pretorius *et al.*, 2012). Some scholars indicated that the triple constraints, namely, time, cost, and quality should be used to determine or measure project success (Berssaneti, *et al*., 2012; Pretorius *et al.*, 2012; Muller & Judgev, 2012; Serrador & Turner, 2014). In contrast, another school of thought advises that the use of the triple constraints is limited and should allow for more subjective metrics such as stakeholder satisfaction (Barry & Uys, 2011; Radujkvovic & Sjekavica, 2017; Serrador & Turner, 2014; Yong & Mustafa, 2017). Even with this view, some researchers indicate that for all measurement of project success, the triple constraints and stakeholder satisfactions are the base measure in any project (Cserhati & Szabo, 2012, Gomes & Romao, 2016; Sebestyen, 2017). It is for this reason that the triple constraints and stakeholder satisfaction were considered to be the core determinants of project success.

The findings from the analysis and interpretation of the empirical data collected in chapter 4 are in line with the review of literature and indicated that the triple constraints and stakeholder satisfaction are found to be the core determinants of project success used when measuring construction project performance. Therefore, meaning that a project has to be on time, within the allocated budget, with the required project quality, have met the stakeholder's satisfaction for the project to be considered successful. Some participants indicated inclusions of legislative and environmental compliance as new indicators of project success. In conclusion, it can therefore be confirmed that stakeholder satisfaction and the triple constraints are the core determinants of project success.

5.3.4 Research sub-position 3: Project manager competency has an influence on the effective implementation of correct project management practices for project success

The performance of construction projects are dependent on many variables of project stakeholders and project team members (Oberlender, 2014; Gudiene *et al.*, 2013; Singh & Singh, 2017). Historically the management of projects has been customarily done on an individual basis with the project manager bearing the ultimate responsibility for the achievement of the project objectives, although this role can be occupied by whomever

the client chooses. It is however not clear whether responsible parties are suitably skilled and experienced to fulfil this role. According to de Plessis and Oosthuizen (2018), project managers have an integral role in the successful completion of projects and are required to be suitably competent.

Findings from the analysis of empirical data indicated that project manager competency has an influence on the success of a project. Competency, as defined by the interview participants, includes both experience and education. The participants in the cases were all skilled and highly qualified professionals. Some of the organisations have structured project manager on-boarding programmes and hire specialists to handle the various projects in the specific related sectors. One of the organisations even had skills transferal programmes in place that paired more senior project managers with junior staff in the management of projects. It was evident from the inquiry conducted in the six organisations that with a competent project manager, a construction project is positively influenced for project success. In conclusion, it can therefore be confirmed that the competency of a project manager has an influence on project success.

5.3.5 Research sub-proposition 4: Leadership and top management support has an influence on project success and can sometimes mitigate the inconsistencies of the project management practices

Leadership in organisations has a strategic role that includes aligning the business objectives through project execution (PMBOK, 2017). According to Hyväri (2016); Cserhati and Szabo (2012); Muhammad *et al.* (2016); Mir and Pinnington (2014), leadership and top management's focus includes strategy and policy development; training project managers and capability development; and establishing stakeholder partnerships. Kuwaiti *et al.* (2018); Gomes and Romao (2016) stated that top management support is a critical success factor to projects therefore having an influence on project success.

Findings from the analysis of the empirical data show that it was evident that leadership in the organisations played a crucial role in the execution of projects. The findings of the study revealed that leadership and top management support indeed has an influence on project success. In conclusion**,** it can therefore be confirmed that leadership and top management support has a critical influence on project success.

5.3.6 Research sub-proposition 5: The project size determines the important project management knowledge areas required for project success

Historically, an organisation would develop a single project management methodology that manages all projects undertaken by the organisation and project management offices all follow this framework. A contrasting view has been proposed by Burgan and Burgan (2014) who advise that project methodologies should rather be based on the nature and project size and not be singular in application. Burgan and Burgan (2014) further state that projects' categorisation, such as size, should rather be used to determine the best project management approach best suited to the projects.

Findings from the analysis of empirical data revealed that the project size classification does not determine the knowledge areas required for project success. The organisations together managed projects ranging between R5 million to R8 billion with averages of project success of above 95%. No records of project failures could be attributed to lack of application of certain knowledge areas, which led to low levels of project successes in the different organisations. In conclusion, therefore sub-proposition 5 cannot be confirmed, as the findings for the cases indicated that the project size does not determine the knowledge required for project success.

For the purpose of this study a new sub-proposition 5 is as follows: The project size does not determine the important knowledge areas required for project success

5.4 RECOMMENDED FRAMEWORK FOR PROJECT MANAGEMENT PRACTICES IN PRIVATE HEALTHCARE INFRASTRUCTURE PROJECTS

The main objective of the study is to develop a framework that improves project management practices in construction projects within the Private Healthcare Industry. The Cambridge Dictionary defines a framework as a "system of rules, ideas, or beliefs that is used as a base in planning something" (Cambridge Dictionary Online, 2019). It can be inferred by this definition that a framework is not a plan but rather a set of principles that allow for the plan to be put together. As such, the framework in this study follows the same premise. The principles used to develop this framework are based on the literature and findings from the empirical inquiry of this study.

Project management maturity is associated with correct project management processes, policies, and replicability of positive project outcomes. In this study, the framework for improving project practices or having project management maturity was aligned to the PMBOK knowledge areas that required to be executed in line with the different project management process groups. Findings from the empirical analysis have shown that the PMBOK knowledge areas are equally important in construction projects, which is in contradiction from the review of literature and the sub-proposition of this study.

This importance is associated with the normal progression of each project, applicability of each knowledge area based on the process groups (initiate, planning, executing, monitoring and controlling and closing) and interdependency of the grouped processes when managing projects. No one knowledge area can be removed from a project and still achieve success, although, some processes even when not systematically planned, are inherent in the project processes (such as communication, HSSE, procurement, finance) and projects still achieve positive outcomes.

Findings from the study further indicated that there might be a need to give a different weighting to the knowledge areas with emphasis to those knowledge areas that are critical to project success. Knowledge areas identified as critical are project integration management, project cost management, project schedule management, project quality management and project stakeholder management. This is in line with the review of literature.

The stakeholder management and triple constraints were confirmed as the core determinants for project success in the study, which was in line with what was found in literature, particularly by Hughes *et al.* (2004) who state that project success should consider both the hard (actual: triple constraints) and soft (perspective of end user: stakeholder satisfaction) as measurements. The hard measurements account for the agreed premeditated evaluation criteria and the soft account for the abstract perception driven measures. Therefore, the success of a project can be evaluated based on these criteria. The framework incorporates these core determinants as applicable measures of project success. An additional determinant from the findings, is that of legislative and environmental compliance. These determinants have been incorporated into the

framework on the basis that when improving something, the evaluation should be measured on a set criterion or outcome.

Project manager competency, leadership, and top management support were also confirmed to have an influence on project success in this study, which was in line with the review and findings from the literature. For this study the project manager competency, leadership, and top management support are associated with project success in the framework, this is due to their ability to influence changes through the progression of the project. Furthermore, both project manager competency and leader and top management support are essential to correct project management practices and are therefore linked as enablers for the application of correct project management practices.

Table 5.1 presents the recommended framework that is intended to improve project management practices and increase the probability of project success in construction projects within the Private Healthcare Industry.

Table 5.1.

Recommended construction project framework

Project Management Practice	**Guiding Principle**
Project Integration Management	Sufficiently identifying and co-ordinating the various project actives from start to completion
Project Cost Management	Sufficiently planning and managing project cost
Project Schedule Management	Ensuring that project timelines are met and completed timeously
Project Quality Management	Correct specifications, delivered to stakeholder requirements
Project Stakeholder Management	Identify, include and management key role players for the project
Project Scope Management	Defining and controlling project activities
Project HSSE Management	Ensuring all health, safety, security and environmental concerns are managed correctly
Project Finance Management	Sufficient planning and monitoring of payments of suppliers and project team and is in line with company finance processes
Project Risk Management	Sufficiently identifying, assessing, mitigating and managing all potential risks
Project Procurement Management	Sufficiently planning and execution of the purchase and acquisition of products and services
Project Communication Management	Ensuring project information is properly communicated to all role players

Project Resource Management	Ensure correct recruitment and involvement of correct people required to deliver the project
Leadership and top management support	Ensure an enabling environment for correct project processes and procedures
Competent project manager	Ensure correct skills and experience of project managers
Project criteria: Time, Cost, Quality	Ensuring the correct project criteria is communicated and used to measure project performance uniformly
Project criteria: Stakeholder Satisfaction	Identify, and management of both internal and external stakeholder satisfaction
Project criteria: legislative and environmental compliance	Ensure that R158, NBR and other compliances are met

Table 5.1 Recommended construction project framework for project success

Figure 5.1 provides graphical representation of the guiding principles of the framework, which aims to improve the project management practices of organisations. These organisations are firstly required to have structured project management processes and procedures in place, with competent staff and appropriate leadership structures.

In order for organisations to improve the project management processes, it is important that leadership and top management play the key and overarching role, both on strategy levels and of the actual execution of projects. The corresponding principle that guides this, is having an enabling project management environment that sufficiently plans, controls and manages all project processes and activities. Competent staff has industry knowledge and experience from which organisations can leverage for improving project management practices within the organisation. The guiding principle to competent project management is the recruitment of experienced and qualified professionals and the continued training and mentoring of professionals.

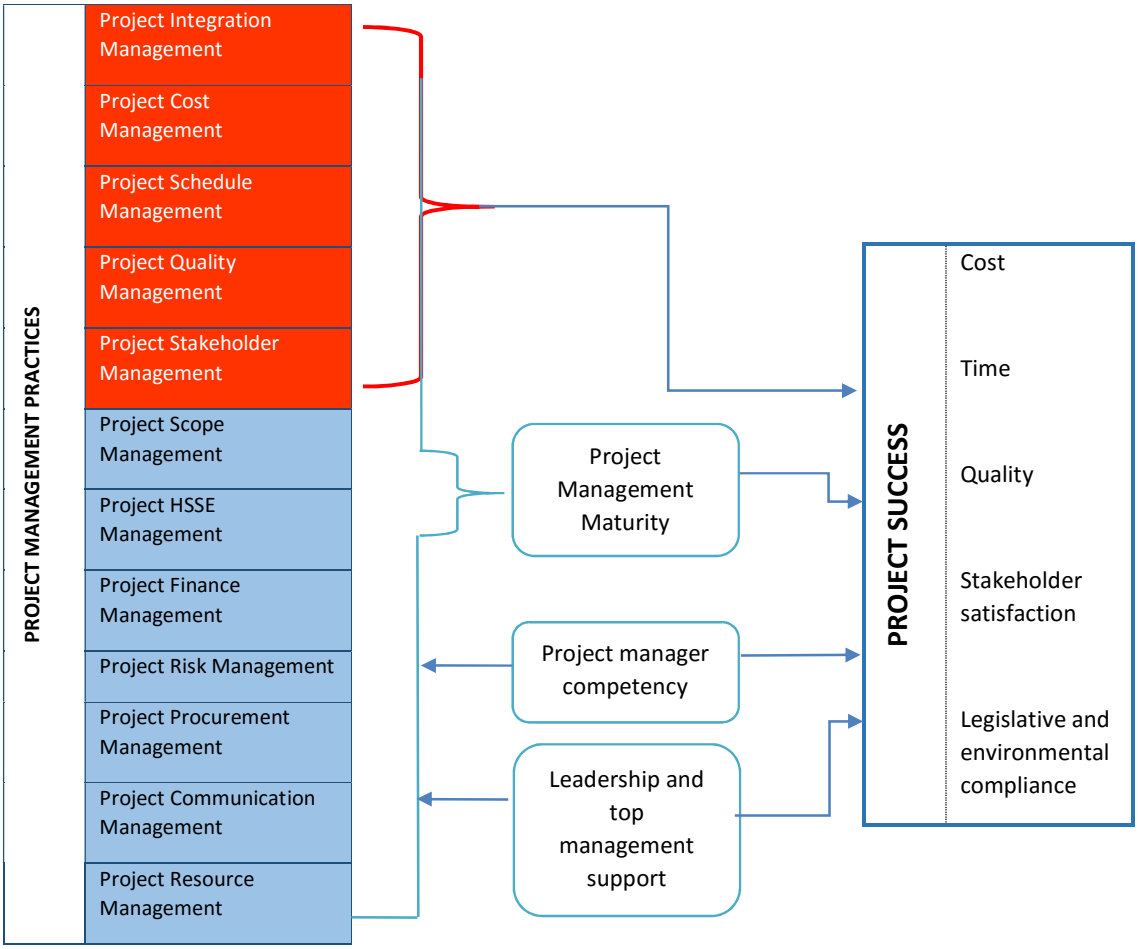

Figure 5.1 Recommended construction project framework for project success

5.5 MANAGERIAL AND FUTURE STUDIES RECOMMENDATIONS

In this study, the influence on project management maturity on project success was investigated. The research aimed to improve project management practices in the construction industry with specific focus on the Private Healthcare Industry.

First, due to the focus of a niche sector engaged in this study. It is recommended for future studies that the framework be used, in the current form or with modifications, in research in organisations that use project management to achieve business objectives and where the nature of project processes differs from that of construction, such as mining and IT. Second, it is recommended for further studies to review project management maturity based on other project management methodologies or frameworks and not the

PMBOK. The aim would be evaluating and proving the current industry practices according to best practice standards.

Findings from this study demonstrated the positive relationship of project management maturity and project success. For organisations in the construction industry, it is recommended that the project management body of knowledge be implemented in its entirety in order to achieve improved probability of project success. As demonstrated in the study, greater emphasis should also be given to project integration management, project cost management, project schedule management, and project quality management knowledge areas in the management of construction projects by top management. It is further recommended that management and leaders in construction organisations invest in structured project management systems, such as the quality management systems (QMS) as this system ensures continued project monitoring and control. This system further highlights the importance of the role of management in the execution of projects. From the study findings, it was further demonstrated that competent project managers have an influence on project success; it is then recommended that managers invest in training and mentorship programmes in the organisation that will allow for the transferral of skills between junior and more senior staff.

5.6 RESEARCHER REFLECTIONS

The researcher is a project management industry professional who has been employed as a construction project manager, consulting project manager and a manager working in the healthcare environment, managing the infrastructure projects. The researcher has more than nine years' experience working in the construction industry, with an undergraduate degree in quantity surveying and other post graduate qualifications. The researcher had no previous assumptions on the two concepts of project management maturity and project success.

5.7 STUDY CONCLUSIONS

In this chapter, the final conclusion of the study was discussed. The discussion encompassed a brief synopsis of the whole study, conclusions on the study propositions, presented the proposed project management framework, study limitations, managerial

recommendations and proposals for future studies. The study deliverables are based on the research objectives that were achieved in this study and include:

- To conduct a review of literature with a focus on the prevalent project management practices in construction infrastructure projects in order to identify the applicable project management maturity models to the study, identify the applicable critical success factors to the study, and identify previous research on the impact of project management maturity on project success;
- To formulate the study propositions based on the review of literature;
- To develop an interview guide and observation checklist based on the literature review, which entails ascertaining key project management practices that increase the probability of project success;
- To outline and establish the appropriate research design and methodology to be used in this study;
- To collect, record, analyse and interpret the empirical data to obtain results and finding of the study; and
- To draw conclusions based on the empirical results and findings, provide managerial recommendations and identify research gaps for future enquiry

The study concluded that sub-proposition 1 could not be confirmed and an alternative proposition was proposed as “The 12 PMBOK knowledge areas are of equal importance to project success”. Likewise, sub-proposition 5 was also rejected and an alternative proposition was changed to “The project size does not determine the important knowledge areas required for project success”.

The primary objective of this study was to develop a framework that aimed to improve the prevailing project management practices in construction projects within the Private Healthcare Industry and improve project success. This objective was met and the framework was developed by assessing the relationship between project management maturity and project success, specifically using the theoretical aspects of these two concepts. It was established from literature and the findings of this study that project management maturity focuses on processes, procedures, and also systems that manage and control construction projects. When organisations have project management maturity, they are in a position to execute all their projects perfectly.

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APPENDIX A: SEMI-STRUCTURED INTERVIEW GUIDE

- Question 1: Please give me more information about your work experience, with specific relevance to project management in construction projects in Healthcare Industry.
- Question 2: As a project manager which project management methodologies have you used? Can you please compare or contrast between the different methodologies you have used.
- Question 3: Are you aware of this PMBOK-CE methodology? Have you used this PMI PMBOK-CE methodology? Are all 12 knowledge management areas equally important in Healthcare construction projects?
- Question 4: Based on your understanding, theoretically does project management maturity influence project success? Please give a practical example of how project management maturity influenced project success.
- Question 5: What are the core determinants of project success in your projects? Follow up question if listed determinants are not aligned to time, cost, quality, stakeholder satisfaction?
- Question 6: How does competency of the project manager influence project success?
- Question 7: How does top management support and leadership influence project success?
- Question 8: Does your adherence and striving for project management maturity of the knowledge areas depend on the size of the project?
- Question 9: Do you have any general comments on the project management practices that may have an influence on project success?

APPENDIX B: OPM3 ASSESSMENT

Best Practice ID	SAM Question	Project Domain	Project - Knowledge Area PMBOK v5	Project - Process Group	Organizational Enabler	SMCI Stage	0- Not implement for outcomes of a best practice	1- Partially implemented for outcomes of a Best Practice	2- Fully implemented, not consistently, for outcomes of a Best Practice	3- Fully implemented, consistently, for outcomes of a
1005	Does your organization Standardize the "Develop Project Charter" process?	Project	04 Integration Management	1 - Initialize		Standardize		x		
1020	Does your organization Standardize the "Develop Project Management Plan" process?	Project	04 Integration Management	2 - Planning		Standardize			x	
1030	Does your organization Standardize the "Collect Requirements" process?	Project	05 Scope Management	2 - Planning		Standardize			x	
1035	Does your organization Standardize the "Monitor and Control Project Work" process?	Project	04 Integration Management	4 - Monitoring and Control		Standardize			x	
1040	Does your organization Standardize the "Define Scope" process?	Project	05 Scope Management	2 - Planning		Standardize				x
1050	Does your organization Standardize the "Define Activities" process?	Project	06 Time Management	2 - Planning		Standardize				x
1060	Does your organization Standardize the "Sequence Activities" process?	Project	06 Time Management	2 - Planning		Standardize				x
1070	Does your organization Standardize the "Estimate Activity Durations" process?	Project	06 Time Management	2 - Planning		Standardize				x
1075	Does your organization Standardize the "Create WBS" process?	Project	05 Scope Management	2 - Planning		Standardize				
1080	Does your organization Standardize the "Develop Schedule" process?	Project	06 Time Management	2 - Planning		Standardize				x

1090	Does your organization Standardize the “Plan Human Resource Management” process?	Project	09 Human Resources Management	2 - Planning		Standardize			x	
1100	Does your organization Standardize the “Estimate Costs” process?	Project	07 Cost Management	2 - Planning		Standardize				x
1115	Does your organization Standardize the “Estimate Activity Resources” process?	Project	06 Time Management	2 - Planning		Standardize			x	
1120	Does your organization Standardize the “Plan Risk Management” process?	Project	11 Risk Management	2 - Planning		Standardize				x
1130	Does your organization Standardize the “Plan Quality Management” process?	Project	08 Quality Management	2 - Planning		Standardize			x	
1150	Does your organization Standardize the “Acquire Project Team” process?	Project	09 Human Resources Management	3 - Execution		Standardize	x			
1155	Does your organization Standardize the “Manage Project Team” process?	Project	09 Human Resources Management	3 - Execution		Standardize			x	
1160	Does your organization Standardize the “Plan Communications Management” process?	Project	10 Gestión de las Comunicaciones	2 - Planning		Standardize		x		
1170	Does your organization Standardize the “Identify Risks” process?	Project	11 Risk Management	2 - Planning		Standardize				x
1180	Does your organization Standardize the “Perform Qualitative Risk Analysis” process?	Project	11 Risk Management	2 - Planning		Standardize		x		
1190	Does your organization Standardize the “Perform Quantitative Risk Analysis” process?	Project	11 Risk Management	2 - Planning		Standardize		x		
1195	Does your organization Standardize the “Identify Stakeholders” process?	Project	13 Management of Stakeholders	1 - Initialize		Standardize	x			

1200	Does your organization Standardize the “Plan Risk Responses” process?	Project	11 Risk Management	2 - Planning		Standardize		x		
1210	Does your organization Standardize the “Plan Procurement Management” process?	Project	12 Procurement Management	2 - Planning		Standardize			x	
1230	Does your organization Standardize the “Direct and Manage Project Work” process?	Project	04 Integration Management	3 - Execution		Standardize			x	
1240	Does your organization Standardize the “Perform Quality Assurance” process?	Project	08 Quality Management	3 - Execution		Standardize			x	
1250	Does your organization Standardize the “Develop Project Team” process?	Project	09 Human Resources Management	3 - Execution		Standardize	x			
1260	Does your organization Standardize the “Manage Communications” process?	Project	10 Communications Management	3 - Execution		Standardize			x	
1270	Does your organization Standardize the “Conduct Procurements” process?	Project	12 Procurement Management	3 - Execution		Standardize			x	
1290	Does your organization Standardize the “Control Procurements” process?	Project	12 Procurement Management	4 - Monitoring and Control		Standardize			x	
1300	Does your organization Standardize the “Control Communications” process?	Project	10 Communications Management	4 - Monitoring and Control		Standardize	x			
1310	Does your organization Standardize the “Perform Integrated Change Control” process?	Project	04 Integration Management	4 - Monitoring and Control		Standardize			x	
1320	Does your organization Standardize the “Validate Scope” process?	Project	05 Scope Management	4 - Monitoring and Control		Standardize		x		
1330	Does your organization Standardize the “Control Scope” process?	Project	05 Scope Management	4 - Monitoring and Control		Standardize			x	

1340	Does your organization Standardize the “Control Schedule” process?	Project	06 Time Management	4 - Monitoring and Control		Standardize			x	
1350	Does your organization Standardize the “Control Costs” process?	Project	07 Cost Management	4 - Monitoring and Control		Standardize			x	
1360	Does your organization Standardize the “Control Quality” process?	Project	08 Quality Management	4 - Monitoring and Control		Standardize			x	
1370	Does your organization Standardize the “Control Risks” process?	Project	11 Risk Management	4 - Monitoring and Control		Standardize			x	
1380	Does your organization Standardize the “Close Procurements” process?	Project	12 Procurement Management	5 - Close		Standardize			x	
1390	Does your organization Standardize the “Close Project or Phase” process?	Project	04 Integration Management	5 - Close		Standardize			x	
2035	Does your organization Standardize the “Manage Stakeholder Engagement” process?	Project	13 Management of Stakeholders	3 - Execution		Standardize		x		
7500	Does your organization Standardize the “Plan Scope Management” process?	Project	05 Scope Management	2 - Planning		Standardize				x
7510	Does your organization Standardize the “Plan Schedule Management” process?	Project	06 Time Management	2 - Planning		Standardize				x
7520	Does your organization Standardize the “Plan Cost Management” process?	Project	07 Cost Management	2 - Planning		Standardize				x
7530	Does your organization Standardize the “Plan Stakeholder Management” process?	Project	13 Management of Stakeholders	2 - Planning		Standardize	x			
7540	Does your organization Standardize the “Control Stakeholder Engagement” process?	Project	13 Management of Stakeholders	4 - Monitoring and Control		Standardize	x			

5170	Does your organization “Use Common Project Language”?				Organizational Project Management Policy and Vision			x		
1000	Does your organization “Establish Organizational Project Management Policies”?	Project			Organizational Project Management Policy and Vision				x	
1400	Does your organization “Staff Organizational Project Management With Competent Resources”?	Project			Competency Management		x			
1430	Does your organization “Establish Project Manager Competency Processes”?	Project			Competency Management		x			
1460	Does your organization “Tailor Project Management Processes Flexibly”?	Project			Organizational Project Management Policy and Vision		x			
1540	Does your organization “Include Strategic Goals Into Project Objectives”?	Project			Project Success Criteria			x		
1670	Does your organization “Know Inter-Project Plan”?	Project			Organizational Project Management Policy and Vision		x			
6980	Does your organization “Create an Organizational Maturity Development Program”?	Project			Organizational Project Management Policy and Vision		x			
2090	Does your organization “Adhere to Project Management Techniques “?	Project			Organizational Project Management Policy and Vision			x		
3070	Does your organization “Encourage Risk Taking”?	Project			Organizational Project Management Policy and Vision		x			
5180	Does your organization “Educate Executives”?	Project			Organizational Project Management Policy and Vision		x			

5190	Does your organization "Facilitate Project Manager Development"?	Project			Competency Management		x			
5200	Does your organization "Provide Project Management Training"?	Project			Project Management Training		x			
5210	Does your organization "Provide Continuous Training"?	Project			Project Management Training		x			
5240	Does your organization "Establish Internal Project Management Communities"?	Project			Organizational Project Management Policy and Vision		x			
5250	Does your organization "Interact With External Project Management Communities"?	Project			Organizational Project Management Policy and Vision		x			
5260	Does your organization "Customize Project Management Methodology"?	Project			Organizational Project Management Policy and Vision		x			
5270	Does your organization "Integrate Project Management Methodology with Organizational Processes"?	Project			Organizational Project Management Policy and Vision		x			
5300	Does your organization "Establish Training and Development Program"?	Project			Project Management Training		x			
5490	Does your organization "Recognize Value of Project Management"?	Project			Organizational Project Management Policy and Vision		x			
5500	Does your organization "Define Project Management Values"?	Project			Organizational Project Management Policy and Vision		x			
5520	Does your organization "Collaborate on Goals"?	Project			Organizational Project Management Policy and Vision		x			
5620	Does your organization "Establish Career Path for all Organizational Project	Project			Competency Management					

	Management Roles"?						x				
7005	Does your organization have an "OPM Leadership Program"?	Project			Organizational Project Management Policy and Vision		x				
7015	Does your organization "Educate Stakeholders in OPM"?	Project			Organizational Project Management Policy and Vision		x				
7025	Does your organization have a "Cultural Diversity Awareness"?	Project			Organizational Project Management Policy and Vision		x				
7105	Does your organization "Manage the Holistic View of the Project"?	Project			Competency Management		x				
7115	Does your organization "Manage the Environment"?	Project			Competency Management		x				
7125	Does "The Organization Manages Self Development"?	Project			Competency Management		x				
7135	Does your organization "Demonstrate Competency in Initiating a Project"?	Project			Competency Management			x			
7145	Does your organization "Demonstrate Competency in Planning a Project"?	Project			Competency Management			x			
7155	Does your organization "Demonstrate Competency in Executing a Project"?	Project			Competency Management				x		
7165	Does your organization "Demonstrate Competency in Monitoring and Controlling a Project"?	Project			Competency Management			x			
7175	Does your organization "Demonstrate Competency in Closing a Project"?	Project			Competency Management			x			
7185	Does your organization "Demonstrate Communicating Competency"?	Project			Competency Management			x			

7195	Does your organization "Demonstrate Leading Competency"?	Project			Competency Management		x				
7205	Does your organization "Demonstrate Managing Competency"?	Project			Competency Management		x				
7215	Does your organization "Demonstrate Cognitive Ability Competency"?	Project			Competency Management		x				
7225	Does your organization "Demonstrate Effectiveness Competency"?	Project			Competency Management			x			
7235	Does your organization "Demonstrate Professionalism Competency"?	Project			Competency Management			x			
8940	Does your organization "Create a Risk-Aware Culture"?	Project			Organizational Project Management Policy and Vision		x				
8980	Does your organization "Encourage Adherence to Project Management Code of Ethics"?	Project			Organizational Project Management Practices		x				
9100	Does your organization have "Project Management Case Studies Included in Induction Program"?	Project			Project Management Training		x				
9110	Does your organization ensure that "Project Management Training is Mapped to Career Development Path"?	Project			Project Management Training		x				