



**EVALUATING THE IMPACT OF PROJECT MANAGEMENT QUALIFICATION AND  
CERTIFICATION ON THE SUCCESS OF PROJECT FUNCTIONS WITHIN MAJOR  
CAPITAL ORGANISATIONS.**

**By**

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Department of Civil Engineering and Geomatics at the Cape Peninsula University of  
Technology**

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## DECLARATION

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## ABSTRACT

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This thesis aims to evaluate the impact of project management qualification and certification on the success of project functions within Major Capital Organisations (MCOs). Project management systems have been widely adopted by various industries as an efficient strategy for successfully managing and executing projects. Arguments have ranged from affirmation that project management education is worthwhile, to denial that there is no evidence that project management education and training improves the competency of a project manager or the project functions. This study therefore addresses the unanswered question which is 'What is the impact of project management qualification and certification on the success of project functions within major capital organisations?'.

The study addresses this by first identifying and bringing comprehension into various project management qualifications and certifications available on a global scale, then establishes the factors that influence the success of project functions within MCOs; and lastly evaluates the relationship between project management qualifications and or certification and project functions' success within these MCOs. It thus, adopted a mixed methods approach where both qualitative and quantitative data was collected through the use of survey questionnaires and interviews. The study then found that there is a strong correlation between project management qualification and certification and project function success. Hence, it was concluded that project management qualifications and certifications have an impact on the success of project functions within Major Capital Organisations.

Only three MCOs could be employed for the study due to possible time and resource constraints. This is because these MCOs are generally parastatals, which require many levels of signatories and a Delegation of Authority (DOA) before undertaking a study, while also a large fraction of these organisations have their own signatories in each region that are separate from the total entity. Therefore, greater research with other MCOS outside of parastatals or government-owned entities is advised in order to substantiate the findings of the study in a wider spectrum.

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## DEDICATION

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To my daughter "Xalati Nduvho Maluleke", who has given me a reason to step beyond my comfort zone and redefine my purpose in life ever since her birth. To my parents who didn't have the chance to learn like I did. To my husband, whom I hold in the highest regard.

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## LIST OF ABBREVIATIONS

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<b>Abbreviation</b>	<b>Meanings or Explanations</b>
MCOs	Major Capital Organisations
CIDB	Construction Industry Development Board
PMO	Project Management Office
PMI	Project Management Institute
ACSA	Airports Company of South Africa
SANRAL	South African National Road Agency
PRASA	The Passenger Rail Agency of South Africa
PMBOK	Project Management Book of Knowledge
ICT	Information Communication Technology
NQF	National Qualifications Framework
SAQA	South African Qualifications Authority
PMP	Project Management Professional
GAQM	Global Association for Quality Management
APM	Associate in Project Management
PPM	Professional in Project Management
CPD	Certified Project Director
IPMA	International Project Management Association
SOE	State-Owned Enterprise
NATMAP	National Transport Master Plan
TFR	Transnet Freight Rail
TNPA	Transnet National Port Authority
NADP	National Airports Development Plan
PrCPM	Professional Construction Project Manager
SACMCMP	The South African Council for the Project and Construction Management Professional

## CHAPTER 1: INTRODUCTION

The thesis navigation map is shown in Figure 1.1. Below, it demonstrates the study layout with the current chapter being introduction and outlines the path through to the next chapter until the end of the study.

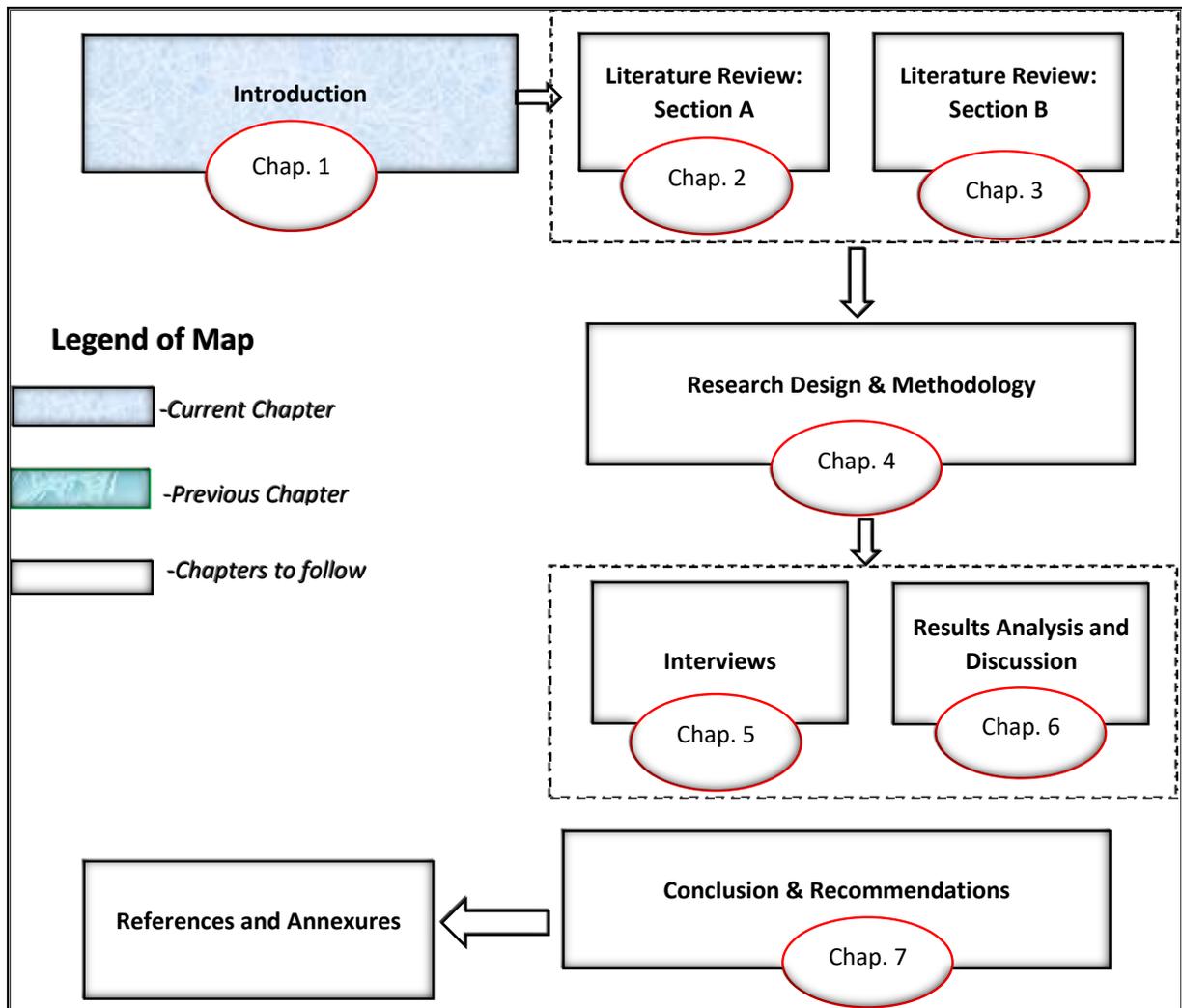


Figure 1.1 – Thesis Chapters Layout Map – Chapter 1

### 1.1 Introduction to Research

Since the inception of the project management concept in the 1950s as reported by previous studies, the adoption of project management systems has been widely adopted by various sectors as an efficient strategy to successfully manage and execute projects (Matheu, 2005). Various Major Capital Organisations (MCOs) in South Africa have also adopted project management systems. These organisations that are responsible for rolling out mega infrastructure projects like railway infrastructure, airports, roads, and buildings. These organisations perform within the same requirements, standards and budget levels and are rated within the same level as the Construction Industry Development Board (CIDB) ratings.

To attain the aim of this research study, the various project function success factors, various project management qualifications and certifications, along with their attainment requirements will be established through examining literature review data. Although the importance of project management strategies and education is well known and has been extensively explored in various studies, little attention has been paid to its impact on various project function performances. The extensive adoption of project management systems does not necessarily mean that the organisations using the systems are also investing in education about the same system. Nor does it mean that their project functions are failing or performing well, unless proven otherwise and substantiated by data.

There are certain organisations that have adopted project management systems for the management of projects, through their project functions, without necessarily requiring project management qualifications or certifications as a need within their project functions or structures. The question therefore becomes what impact do project management qualifications and certifications have on the success of project functions? Previous research studies have continued to prove that project management education has an impact on the success of projects' performance but there is less evidence on the impact of project management education on the success of project functions. It is therefore significant for this study to provide substantiated data on the impact that project management certifications and qualifications have on the success of project functions.

This chapter gives a brief structure of the significance of conducting the research to evaluate the impact of project management qualification and certification on the success of project functions within MCOs; also well known as Parastatals in South Africa. It highlights the problems and questions that led to the decision to conduct this study, while outlining why and how the study will be conducted. It also addresses the gaps that exist within the body of knowledge under these concepts.

## **1.2 Background**

This research study focuses on evaluating the impact of project management certification and qualification on the success of project functions within major capital organisations. Project management, like projects, is not a brand-new concept. It has existed for thousands of years, with the distinction being the complexity of modern systems and technology in recent projects and new project management concepts (Armstrong, 2015). Scholars have discovered that projects are more sophisticated today than they were when project management was initially introduced as a field in the early 1950s (Matheu, 2005). They usually include considerable capital investments, necessitating more accurate and rigorous project management functions (Armstrong, 2015). However, following project management methods and strategies has been proven to reduce risks while also being cost-effective and elevating success rates.

Quite a lot of research has been conducted previously on the factors that contribute to the success of projects (Blaskovics, 2016). Most of these studies concentrated on the project manager's impact on project success, as well as his or her training and education and its impact on project success. While the project manager is an important part of the project management process, he or she is only as good as the team he/she leads (Ramesh, Ramesh and Ramchandar, 2018). As a result, project management functions are fundamental to the success of projects. Most organisations are formed around project management training and education as interest in project management grows (Armstrong, 2015). Hence, it is important to research more on the various certifications and qualifications that are available within the project management industry to discover what relationships exist between them and project functions success.

Taylor (2016) defines project function as a division that is required to standardise and introduce a trend pattern in project execution which is the source of documentation, guidance, and metrics on project management and project execution practice. Project function is further defined as the body that integrates business strategies into projects that those strategies need. Project functions are an important component of project success. Figure 1.2 below summarises the key roles of the various elements that contribute to project success, including project functions. It shows that project management is all about doing the right things, in the right way, in the right order and with the right team. According to Taylor (2016), the "right way" is all about technique, practice, quality, and control, and you can only achieve those things with the right team. As a result, project management education cannot be based solely on the project manager as the primary contributor to project or project function success but should include all the key stakeholders within project functions.



Figure 1.2 – Project Management Elements (Taylor, 2016)

The Project Management Institute (PMI) is one of the institutions that has seen a rapid growth in project manager members' enrolment and output. This is evidenced by data published on their website, which shows an exponential rise in member growth of an average of 8.5 percent per year since 2017. The same is true for MCOs in South Africa. MCOs as previously described, are organisations that are responsible for rolling out mega infrastructure projects like railway infrastructure, airports, roads and buildings. These organisations include, Transnet, the Airports Company of South Africa (ACSA), South African National Road Agency (SANRAL), Eskom and The Passenger Rail Agency of South Africa (PRASA), among others. These organisations carry out capital-intensive projects, and as a result, they have adopted project management strategies to ensure the successful delivery of project deliverables. They are critical stakeholders and contributors to promoting and supporting urban growth and development.

MCOs provide highly significant structuring features that may impact city patterns of development, such as transportation systems, bulk infrastructural facilities, power infrastructure, and Information Communication Technology (ICT) infrastructure (Ovens, 2013). Given the extent of the influence, effectiveness and efficiency on urban and infrastructure development growth, efficient project management implementation and execution becomes essential. It is therefore imperative to study factors such as project management education that may have an impact on the success of project functions within each MCO project's functions and to adopt successful strategies across the board, where possible. Figure 1.3 below depicts how these MCOs interrelate as major land and infrastructure owners, as well as their impact on urban growth and development.

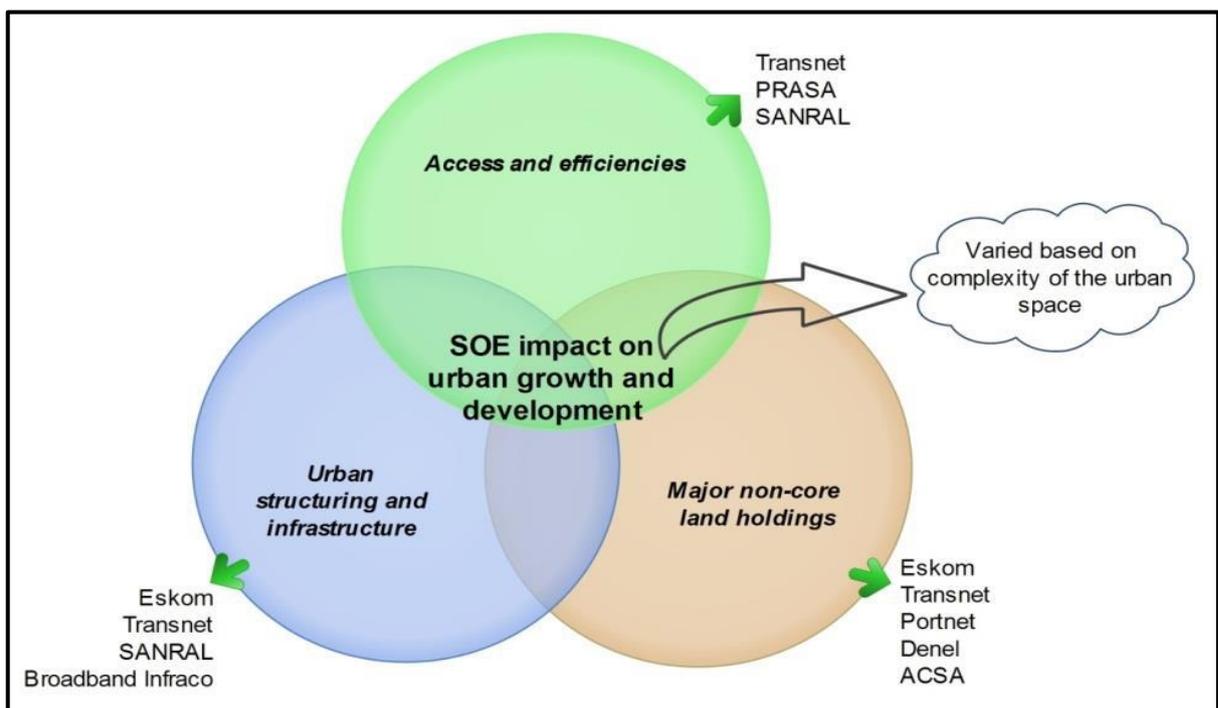


Figure 1.3 – MCOs which impact urban growth and development (Ovens, 2013)

In the same way, there has been significant growth and interest in urban growth development. The same is also true for project management qualifications and certifications across the country. However, less research has been conducted on the impact of project management education on the success of project functions, especially within MCOs that contribute towards the same goal of economic development. As a result, investigating the impact of project management qualifications and certification on the success of project functions within these MCOs is critical.

In conclusion, this section introduces and explains the reason for the study by drilling down into the background of project management and project function as the study and focus area, as well as into the background of the unfamiliar term "Major Capital Organisation" (MCO), which is also known as state-owned entities or parastatals. To sum it up, since its inception in ancient times, project management has evolved and gained momentum as a strategic performance and critical component of business across all industries, including the civil engineering industry. Statistics show that interest in project management education by both organisations and individual members, as highlighted in this section, is growing significantly, thus its knowledge informed implementation, which is regarded as crucial. This section thus emphasises the origin of the concept of study and the global path it is taking, in order to provide justification of why the study is significant. That is, whether MCOs, like other organisations, should have jumped on the wave of project management education interest, and whether it is worthwhile.

### **1.3 Research Problem**

To bring an understanding of the research problem statement, concepts from the research knowledge area, project management education and project functions, the study area, and capital organisations, must be explored, highlighted, and clarified.

Various scholars have discovered that there has been a growing interest in project management standards and methodologies since their inception, which has resulted in a demand for qualified Project Management Professionals (PMPs) in various organisations. Many organisations have implemented project management strategies for successful project execution and management of project functions. However, how project management education affects project functions within an organisation is still fairly unexplored. MCOs are also among the organisations that have implemented project management methodologies, resulting in the establishment of various project functions within organisations.

These organisations, also known as parastatals, are fully or partially owned by the state and oversee the execution of mega infrastructure projects. They directly or indirectly contribute to the country's economy through the direct or indirect provision of goods and services. Even

though they are all partly or fully state-owned, their operations, structures, policies, and processes differ from one another, so some appear to be performing better than others. The same holds true for those organisations' project functions.

It was also discovered through an extensive literature review that most studies have been conducted on the impact that a project manager has on the success of a project, while disregarding the impact of project functioning on its success, going forward. Many recent studies have shown that project manager education has an impact on project success rather than project function, and that the success of various projects has always been primarily based on the constraints of time, cost, and quality.

From the discussion above, the research problem can be precisely summarised as follows.

*'The impact of project management qualifications and certifications on the success of the organisation's project functions remains relatively unexplored'.*

#### **1.4 Research Question**

The intent of this study is to assess the impact of project management qualification and certification on the success of project functions. Several questions can be asked about the relationship between the variables in this study, but the following are asked to establish the main question of this study:

- *'What are the various project management qualifications and certifications available on a global and international scale, that project function members can pursue?' This question is intended to determine what knowledge and skills an individual possesses as a result of obtaining various certifications or qualifications from various institutions.*
- *'What are the factors that influence the success of project functions within MCOs?' This question is asked to establish a baseline measure of successful project functions, which will aid in the establishment of key performance indicators for addressing the main aim of this study.*
- *What is the relationship if any, between project management qualifications and certifications and project functions within major capital organisations? This question aims to establish if there is an existent relationship between the research variables and if any what kind.*

Once the question of project management qualification and certification, as well as the factors that determine the success of project functions, has been addressed, the relationship between project management qualification and certification and project functions must be established, in order to address the study's main aim, and thus the main question of this research can be asked as follows:

*'What is the impact of project management qualification and certification on the success of project functions within major capital organisations?'*

## **1.5 Aim and Objectives**

This study aims to evaluate the impact of project management certification and qualification on the success of project function within major capital organisations. To accomplish the aim of this study, the following objectives will be met:

- To identify and comprehend the various project management qualifications and certifications available on a global scale to address research question 1.
- To identify the factors that influence the success of project functions within MCOs to address research question 2.
- To evaluate the relationship between project management qualifications and or certification and project functions' success within an organisation to address research question 3.

### **1.5.1 Objective 1: To identify and comprehend various project management qualifications and certifications that are offered nationally and internationally**

The first objective will be to identify the various project management qualifications and certifications that an individual can pursue on a national and global scale, offered by various institutions. Then, in order to determine the knowledge and skills an individual possesses as a result of obtaining these certifications or qualifications, to investigate the curriculum and expected output of these courses.

This is done so that when objective 2 is addressed, the relationship between these skills and the factors that determine project function success can be described. This objective will be met by conducting a literature review of various institutions' manuals, websites, and publications, which will be supported by the findings of various scholars. Among these institutions are various South African universities, global accredited institutions, and learning areas.

### **1.5.2 Objective 2: To identify the factors that influence the success of project functions within MCOs.**

The second objective will be to identify the factors that influence project function success. To achieve the study's primary aim of "evaluating the impact of project management qualification and certification on the success of project functions within MCOs," it is necessary to address what determines the success of project functions. Many studies have been conducted on the success of project functions, and regardless of what influences or impacts its success, the factors remain related, and thus the factors that influence the success of project functions will be identified through examining the literature regarding these studies. Like any other area that

is deemed successful, certain elements must be met in order for it to be considered successful, and the same is true for project functions. This objective will establish a baseline measure of successful project functions, which will aid in the development of key performance indicators for addressing the study's primary aim.

### **1.5.2 Objective 3: To evaluate the relationship between project management qualifications and or certification and project functions success within an organisation**

The last objective will evaluate the relationship between project management qualification and/or certification and project function success. The findings from objectives 1 and 2 will aid in establishing the research design and methodology questionnaires which will then be used to evaluate the relationship between project management education and the success of project functions. A set of questionnaires for interviews and surveys in alignment with project function success factors will then be set out in such a way that its analysed results will outline the relationship between project management education and project functions.

## **1.6 Expected Outcomes**

The expected outcome of this research is to produce measurable results of the impact that project management qualification and project management certification have on the success of the organisation's project functions. To measure these, the following outcomes will be observed:

- The different types of project management qualifications and certificates that are available and valid in the civil engineering industry nationally and internationally will be identified and comprehended.
- Outlining and understanding the different factors that determine the success of project functions within an organisation.
- Exhibiting the relationship between project management qualification and certification and project function.

After the completion of this research, it is expected that a clear relationship between project management education and project function will be demonstrated and substantiated by the results of all data collected through the use of questionnaires, surveys, and interviews and intensively analysed. It is also expected to be clear whether investing in project management education for the success of the project function is worthwhile. Simultaneously, it is expected that the research will clearly identify the factors that play a critical role in the success of project functions, as well as revealing whether they have a relationship to project functions.

## **1.7 Research Context**

This study will only focus on MCOs in South Africa that are responsible for rolling out mega infrastructure projects in the civil engineering industry, such as railways, airport structures, roads, and bridges. Since they are mostly state-owned, these organisations are commonly referred to as parastatals. The project management qualifications and certifications that will be explored will include those offered by various institutions on a national and global scale. Thereafter, an evaluation of the impact of project management education on project function success will be conducted, based on all accredited qualifications and certifications that individuals hold within these MCOs.

## **1.8 Delineation and Assumptions**

The scope of this study will be limited to project functions within MCOs in the field of civil engineering, which specialises in the construction of mega infrastructures in South Africa such as railways, roads, buildings, and airport infrastructure. Transnet Freight Rail (TFR), the ACSA, and the SANRAL will provide the data used to address the study's aim and objective through the use of surveys and interviews. The sampled organisations are a representation of MCOs in South Africa and depict various types of mega infrastructure in the civil engineering industry.

The study assumes that these organisations use project management principles, methodologies, and techniques for project management and execution across various project functions, and that the project functions responsible for mega civil projects are established within these organisations, which serve as the research areas for this study. It also assumes that all participants will respond truthfully to the questionnaires, particularly if they are assured that their responses will be kept confidential, and that the truthful data gathered and substantiated results from the responses will not only benefit the researcher on this study but will also provide useful information to the organisations on the substantial value of project management education.

## **1.9 Significance of Research**

This study will be significant not only to MCOs, but also to any organisation in South Africa that is responsible for the execution of mega infrastructure projects, as it will provide verifiable evidence demonstrating the relationship between project management education and project functions, thus enabling the determination of whether investment in project management training or education is worthwhile.

It will also contribute to the field of project management education and its importance in project functions through research. Although several studies have focused on the association between project manager education and project success, only a few have investigated the success of

project functions rather than just the projects themselves as an independent goal. Those that focused on project functions did so primarily within the framework of the project manager as the primary role participant and contributor to project function success. As a result, there is a knowledge gap regarding the impact of project management qualifications and certifications on the success of project functions, rather than just being driven by a single portfolio, which will be addressed in this study.

### 1.10 Overview of Thesis Structure

Figure 1.4 below shows the way the thesis chapters and the relationship with one another is laid out.

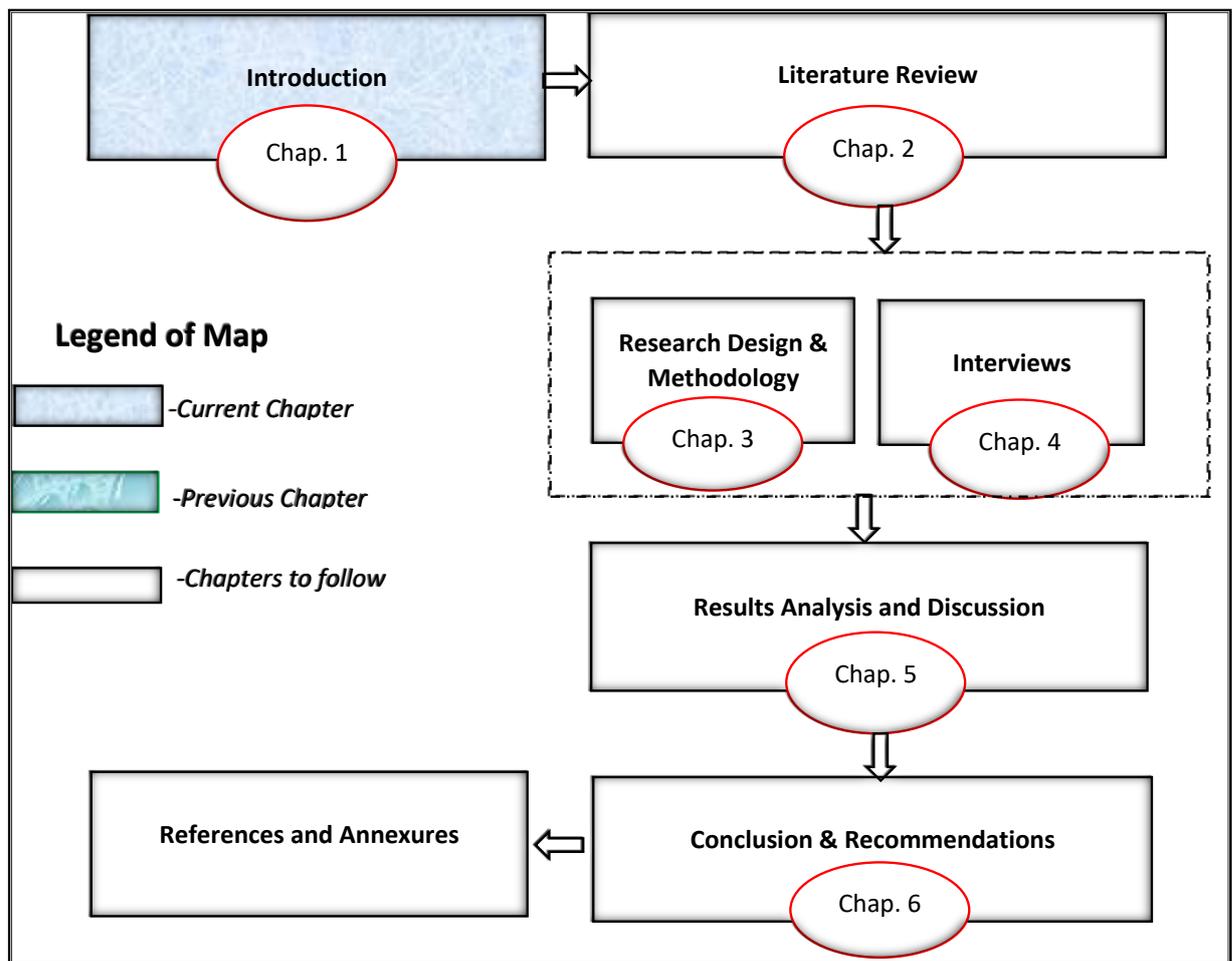


Figure 1.4 – Thesis Chapters Layout Map

- **Introduction**

This chapter is the heart of the study. It explains why researching the impact of project management qualifications and certifications on the success of project function is critical. It also highlights the study gap as well as what the study aims to accomplish. It explores the main aim of the study as well as the research questions and anticipated outcomes. It provides a

summary of each chapter of the thesis, while furnishing a map to aid navigation throughout the research.

- **Literature Review**

Various literature is reviewed and explored in this chapter based on the study's key knowledge and research areas, as well as their relationship and influence on one another. The chapter addresses the study's first two objectives while also providing a better reference for research methodology to be used to address the study's final objective and aim. The first sections of this chapter define project management as a distinct concept and gives its historical context. It then gives insight into various project management qualifications and certifications, as well as institutions of learning and their qualifying criteria. The definitions, roles, and responsibilities of project functions are then explored near the end of the chapter and then the chapter is concluded by looking at the study area, which is MCOs, and what their roles are in the country's economy.

- **Research Design and Methodology**

This chapter lays out the plan of how the research was conducted. The research design elaborates on the study's mixed methods of investigation which are quantitative as well as qualitative. The qualitative method employed entails the analysis of narratives based on data gathered during interviews; whereas the quantitative method employs structured questionnaires derived from literature reviews, to aid in the determination of project function success. This chapter demonstrates how data was collected for both quantitative and qualitative studies using the desk and field methods; as well as how the correlation analysis method was used to determine the relationship between the study's two variables. It goes on to describe the statistical probability sampling tests that were used to determine the study population.

- **Interviews**

The qualitative findings of the research are presented in this chapter. The findings are based on semi-structured interviews with project function heads from the sampled MCOs. The purpose of these interviews is to collect qualitative data from the organisation's project function leaders about the organisation's performance, as well as to probe their overall knowledge and understanding of how and what makes project functions successful.

- **Results Analysis and Discussion**

This chapter presents the study's findings from both the qualitative study conducted through interviews and the quantitative study conducted through survey questionnaires. These findings are presented graphically and in tables and are then discussed in terms of each of the study's

objectives, as well as in alignment with the research questions, comparison with expected outcomes, and finally addressing the study's main aim.

- **Conclusion and Recommendations**

The findings are discussed in conjunction with what was discussed in Chapter 6, but in summary form, and it concludes by answering the research question, "*What is the impact of project management qualification and certification on the success of project functions within MCOs?*" — as well as - whether there is an impact at all. Last, it presents the study's limitations and strengths, as well as making recommendations for future researchers who are interested in adding more to the body of knowledge on the subject.

### **1.11 Chapter Summary**

This chapter discussed the study's background, purpose, and objectives. The research problem, questions, and expected outcomes were also discussed, as were assumptions, research delineation, and the significance of the research. It was followed by a summary of each chapter of the research. All of this was discussed to demonstrate the significance of the study and the body of knowledge it seeks to contribute to the project and engineering management industries. Furthermore, this chapter serves as a wellspring of information, a point of reference, and a driving force for the remaining chapters of the study. Every chapter strives to address the study's goal, objective, and problems, as well as the research question and outcome.

The following chapter will examine the various contributions in the literature by various scholars who have contributed to the body of knowledge concerning project management qualifications and certifications, as well as project functions. It will also include a brief review of the concept of MCOs.

## CHAPTER 2: LITERATURE REVIEW: KNOWLEDGE AREA

The thesis navigation map is shown in Figure 2.1 below where it demonstrates that the previous chapter's introduction has been completed and that the current chapter will focus on the first section of the literature review, and then it introduces the next chapter.

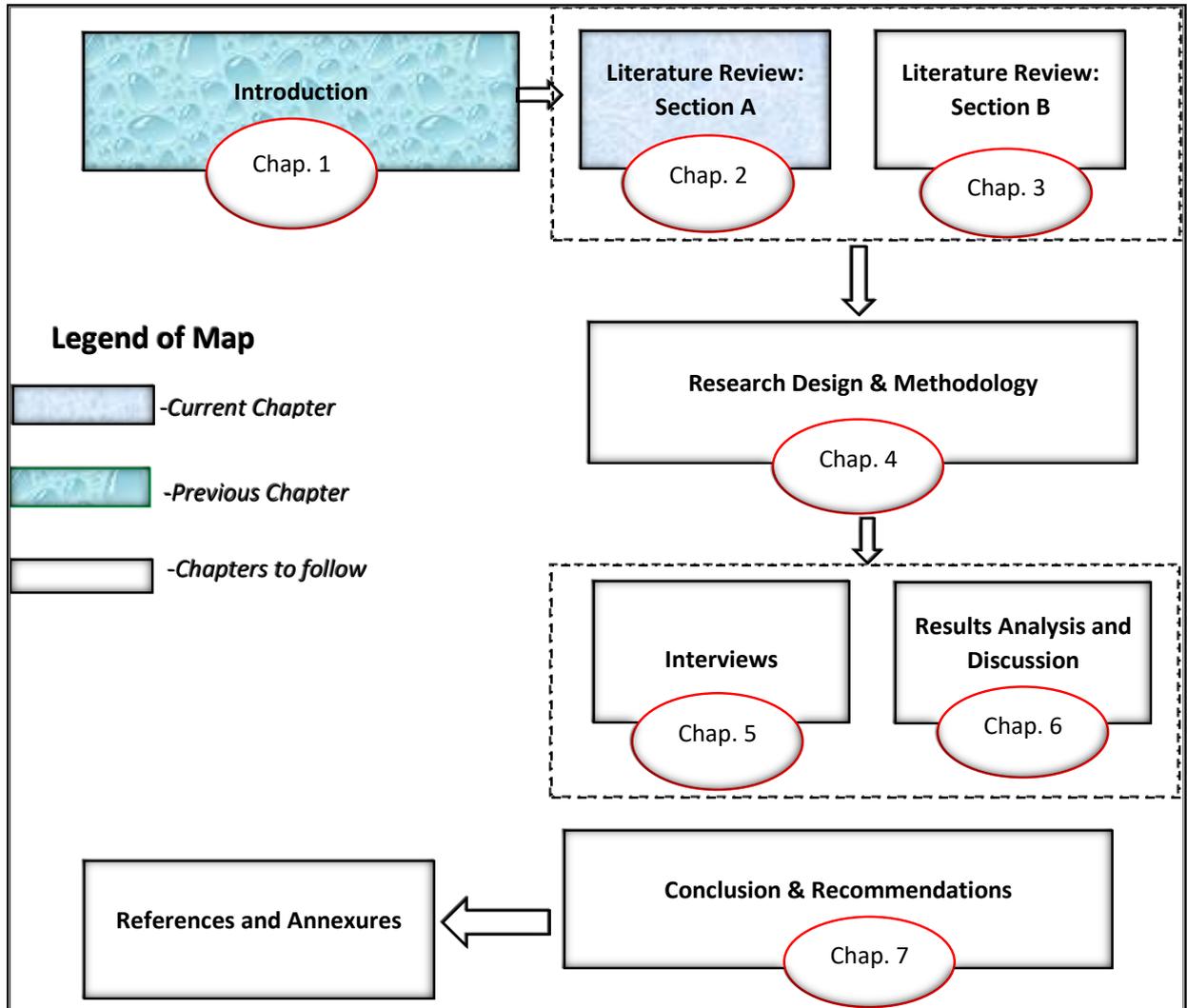


Figure 2.1 – Thesis Chapters Layout Map – Chapter 2

### 2.1 Chapter Introduction

This chapter of the literature review focuses on reviewing various literature on the study knowledge area being project management certification and qualification. Figure 2.2 below depicts the interaction between the knowledge and the research area of the study. This chapter explores the various definitions of project management while exploring its origin, evolution and life cycles. Project management in the civil engineering and construction industries is also explored in detail, including the various phases of project management that occur within those industries. Furthermore, it taps into the subject of project management certification and qualification and describes what makes them different from one another. Various types of

project management certifications and qualifications are reviewed and explained; as well as the nature of the various institutions that offer them.

This chapter concludes by looking at what other scholars or researchers have explored in this subject, including what is known and what is unknown, while exploring the knowledge gap that the study aims to address.

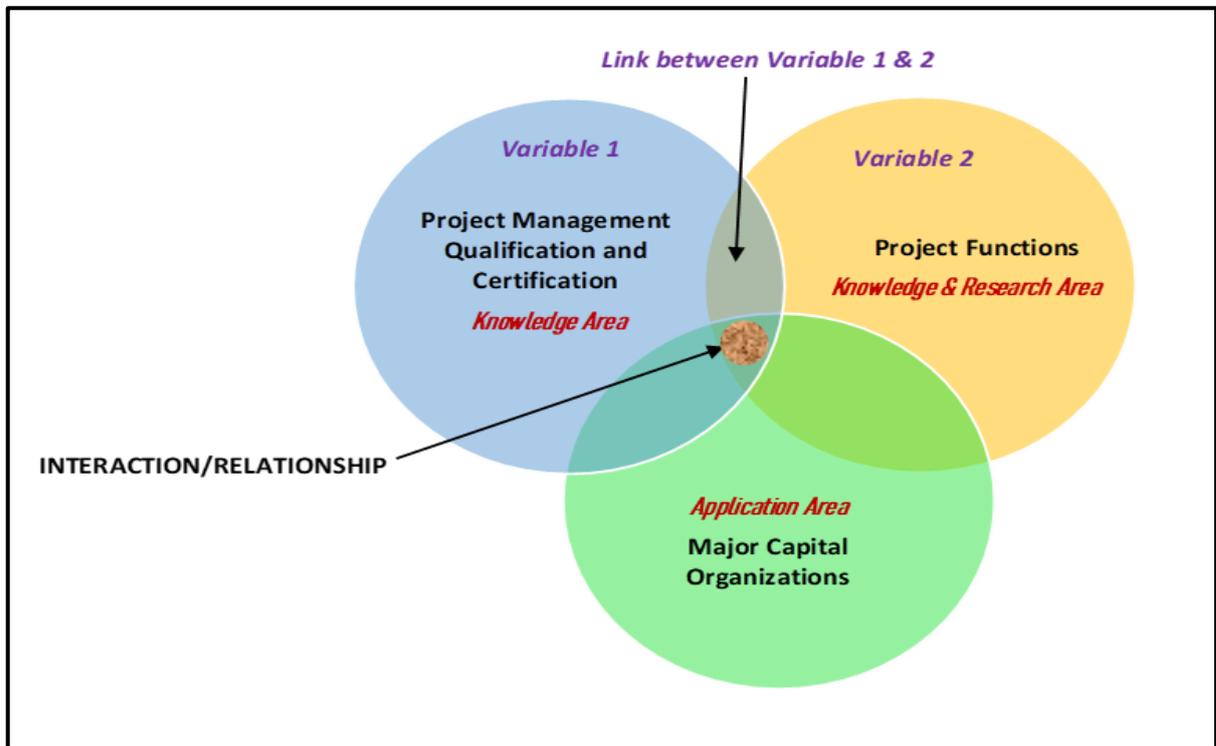


Figure 2.2 – Research Study Variables Relationship

## 2.2 Project Management Definition and its Origin

### 2.2.1 Section Introduction

This section explains the concept of project management. It examines a variety of literature that focuses on what project management is, its history and evolution, as well as the primary motivations for the adoption of project management principles and methodologies in various industries, including the civil engineering industry. It also describes the concepts and characteristics of project management as well as describing the life cycles of project management.

### 2.2.2 Defining 'Project Management'

Scholars and authors define project management in various ways, but they are conceptually related. A project must first be defined as a unified concept before project management can be defined. The Project Management Institute (n.d.) defined a project as a one-time attempt to create value using a unique outcome, with each project having a defined start and finishing

point. To achieve this, a unique outcome resource is allocated, as well as set expectations that must be met within a certain time frame. The institute explains that each project is different from others insofar as it does not fall into defined operational routines. This was supported further by Saiful (2022) in an article unpacking the definition of project management in which he emphasises that projects are temporary because they have a defined beginning and end and are not day-to-day activities or routine operations within organisations and are closed once the end goal is met.

Project management is defined simply as the management of projects. However, to expand on that, Darwish (2017) defined project management as *“the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholders needs and expectations”*. In Figure 2.3 below, he further illustrates the relationship in terms of the body of knowledge requirement for other management disciplines and project management. Although he stated that the figure is a conceptual view and is not proportional, it gives a clear view of the relationship between knowledge and practice within each managerial discipline. Furthermore, he stated that the key differences between ‘project management’ and ‘general management’, is that project management has a final deliverable and a limited timeframe, whereas management is an ongoing process. Therefore, a project manager requires a diverse set of skills, including technical expertise, as well as people management skills and business acumen (Project Management Institute, 2010).

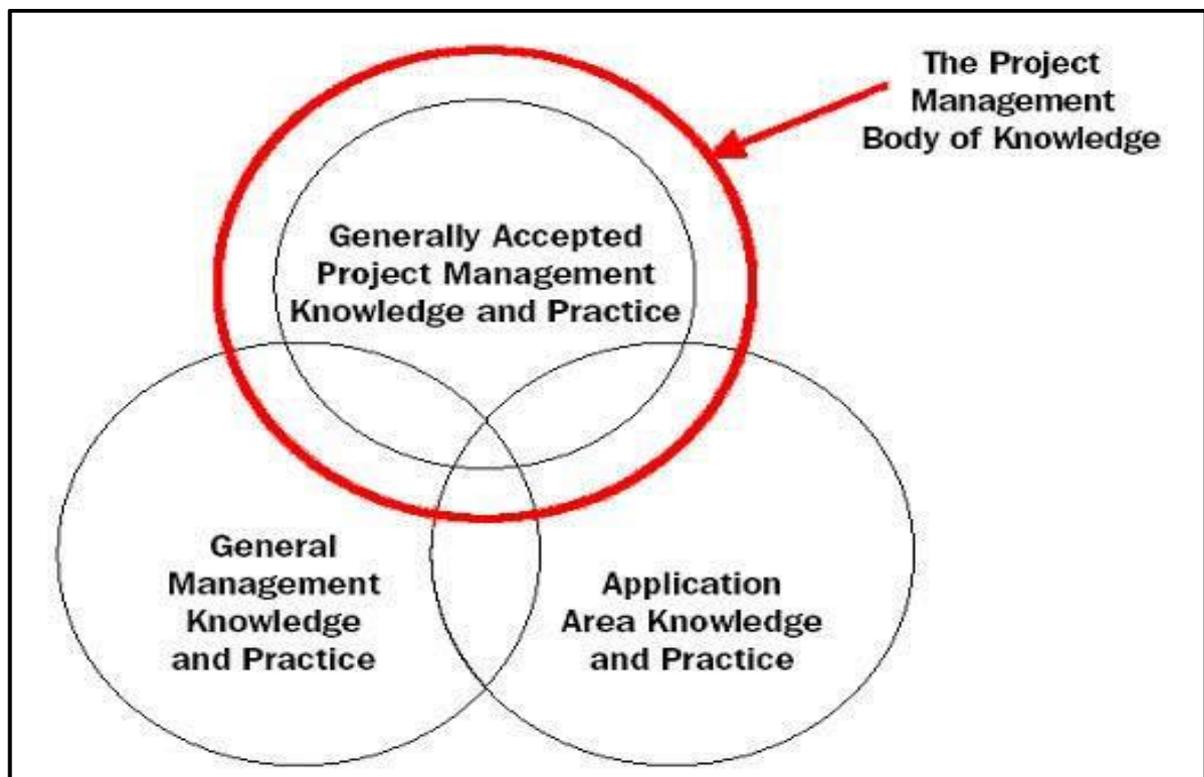


Figure 2.3 – The relationship between project management and other management disciplines (Darwish, 2017)

In a study to determine *'the impact of project management in achieving project success'*, Ramesh et al., (2018) agreed with other scholars by defining project management as a systematic approach concerned with the planning, organising, controlling, coordination, and managing of resources for successful execution of a project's objectives and aims. This is further supported by the Association of Project Management (APM, 2013) who defines project management as the *"Project management is the process by which projects are defined, planned, monitored, controlled and delivered such that the agreed benefits are realised. Projects are unique, transient endeavours undertaken to achieve a desired outcome. Projects bring about change and project management is recognised as the most efficient way of managing such change"*.

Similarly, the Project Management Book of Knowledge (PMBOK) 6<sup>th</sup> Guide Summary compiled by Miqdadi's, (2019) project management definition states that project management includes communication, negotiating, problem solving, and influencing the organisation. Implementing and integrating project management processes that have been identified is how project management is achieved. Project management can help organisations to complete projects more successfully and efficiently). All these definitions, as stated at the outset, differ in wording but are similar in concept. To summarise the definition of project management, Mnkandla and Marnewick (2011) expanded on the main concept of "the application of knowledge, skills, tools, and techniques," which is always found to be one of the most important elements of project management definitions, by elaborating on what it means in the context of project management. Their definition is as follows:

*'Knowledge' – refers to what the project manager knows about the management of a project including project processes, standards, regulations, procedures, understanding of projects' application area and knowledge of project environments.*

*'Skills' – generally refers to skills like leadership skills, technical knowledge, managerial skills, administrative skills, communication skills, negotiations skills and problem-solving skills, among many others. Sets of skills are unique based on the project and the people (Stakeholders, sponsors, and project team) involved.*

*'Tools and Techniques' – are normally used to convert inputs into outputs and are often referred to as software programs used to automate complex project activities or tasks. They include among others; reporting tools, estimation techniques and collaboration tools. They are optimally used to enhance productivity.*

Figure 2.4 below gives an overall overview of the definition of project management by expanding and supporting the above single term and other supporting mechanisms of the process. The figure below illustrates that by defining required inputs and outputs, while

considering all relevant constraints and mechanisms, the project management provides a single point of integrative responsibility of projects within an organisation, and thereby, project management expertise is spread across the project team (APM, 2013:3).

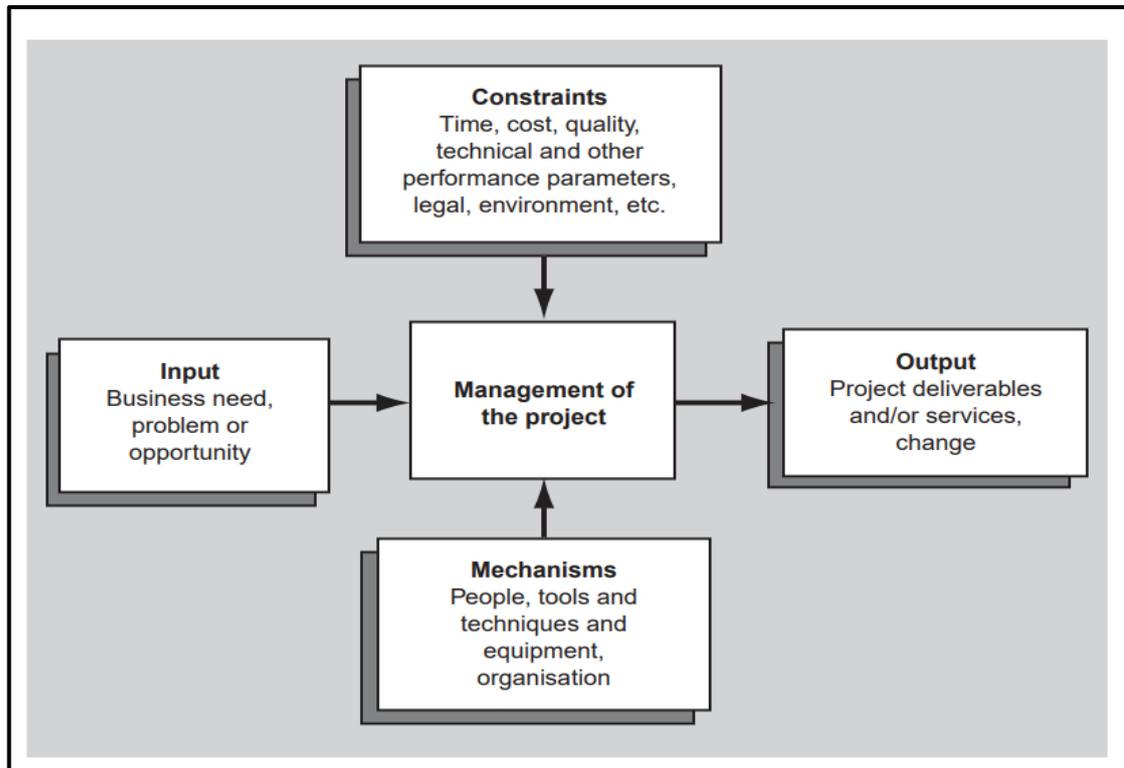


Figure 2.4 – Project Management Process (APM, 2013:3)

### 2.2.3 Life Cycle and Characteristics of Project Management

- **Project Management Life Cycle**

The project management life cycle is divided into phases and stages. However, depending upon the nature of project, some phases of most projects involve implementations of those phases and stages to a greater or lesser extent (Mathur et al., 2014) According to both Allen (n.d.) and Mathur et al. (2014), supported by various other sources and scholars, project management processes are divided into five categories: initiation, which is the project's defining phase; planning, which is where all the project's work is planned; execution, which is the actual execution of the project's work; managing and controlling, which is done as and when the work is being executed; and closing, which is the project's delivery and adjourning phase. Figure 2.5 below provides an illustration by Allen (n.d.) to further expand on his definition of project management processes supported by the relationship between these life cycles by Darwish (2017), illustrating how the project management life cycle processes interrelate with each other as shown in Figure 2.6 below.



Figure 2.5 – Project Management Life Cycle (Allen, n.d.)

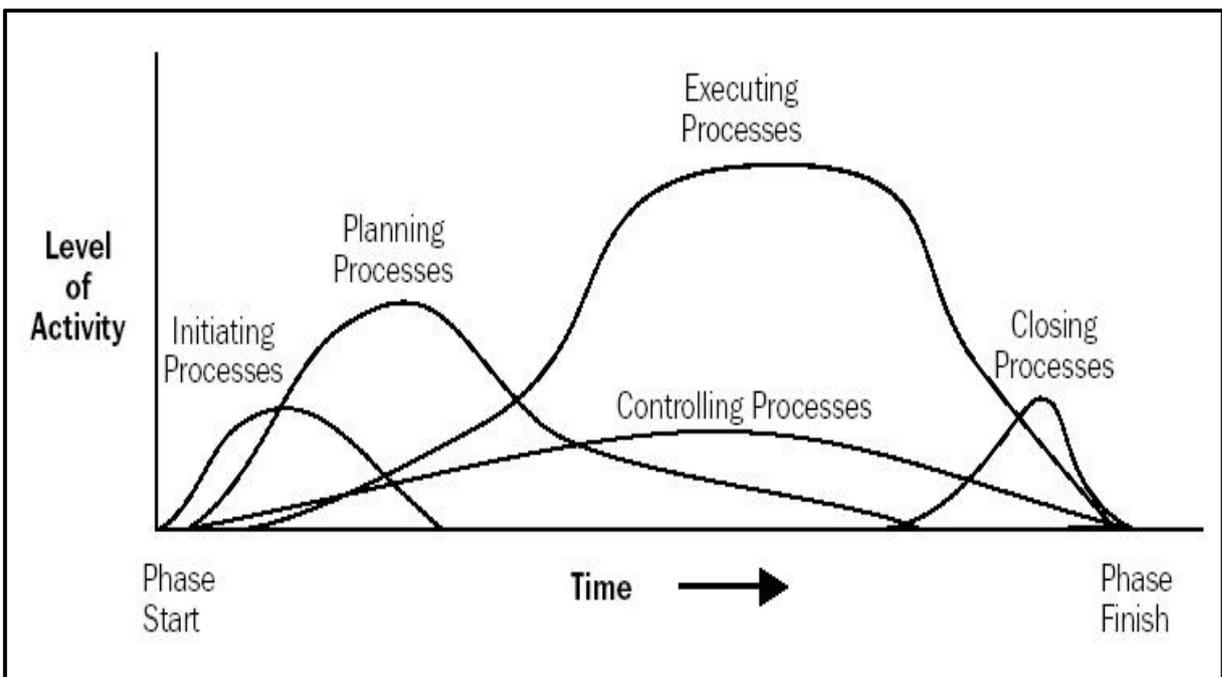


Figure 2.6 – Overlapping the Project Management Processes (Darwish, 2017:4)

In his book *“Effective Project Management,”* Ward (2018:10) used Figure 2.7 below as an illustration of how a project life cycle under the normal generic project life cycle, as shown in Figure 2.4 that shows how different industries use the same concept of project management, but with different terminologies. Line 1 is a technology industry model; line 2 is how clients perceive the model from line 1; line 3 is architecture and building projects life cycle; line 4 represents the product development industry; line 5 is the information technology industry; line 6 is the manufacturing industry; line 7 is the Civil Defense Policy Project Life Cycles; and line 8 is the Ministry of Defense’s Smart Acquisition Project.

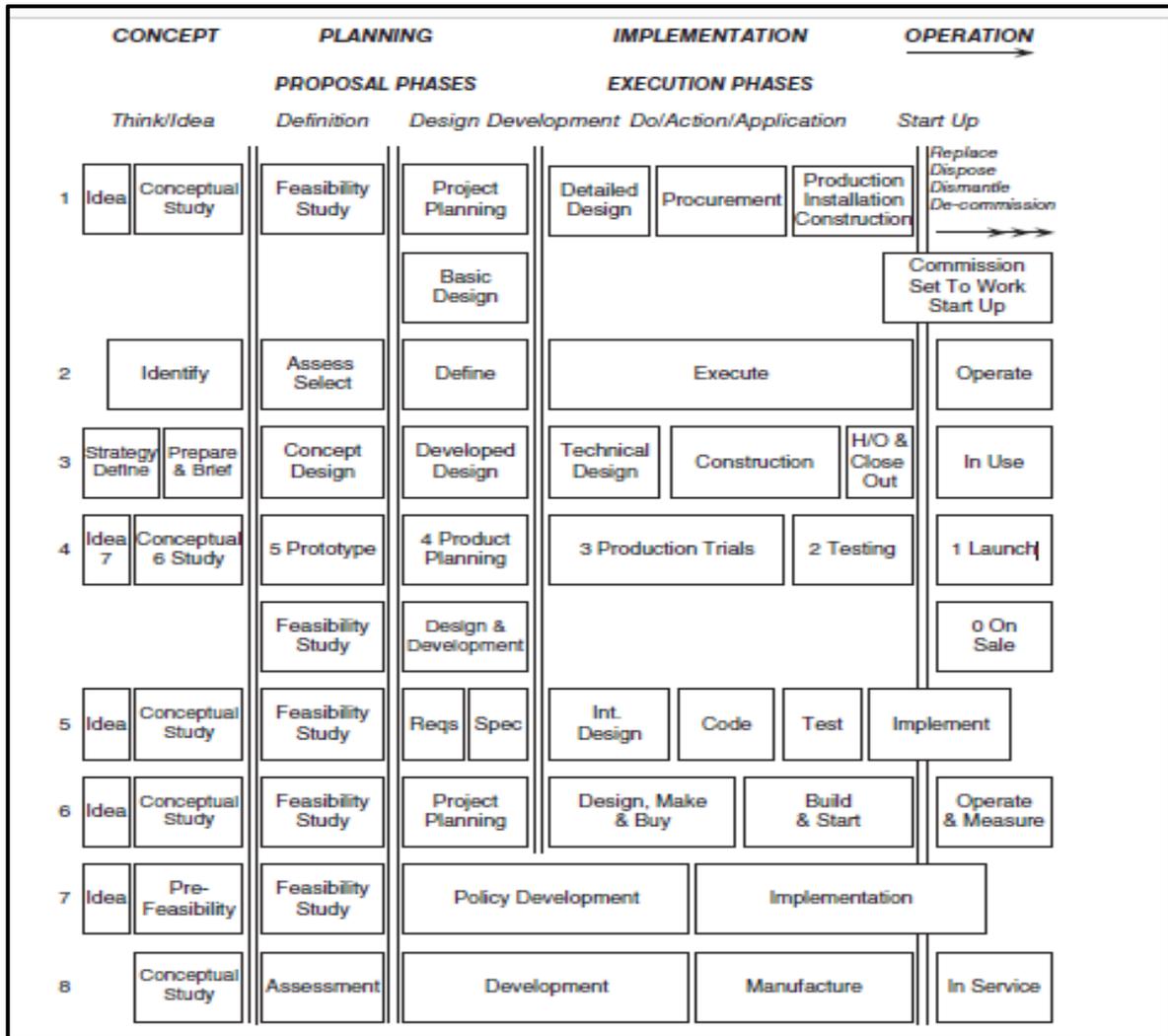


Figure 2.7 – Project Phases Terminology and Phase Definitions used in different business environments (Ward, 2018)

With all the various project management life cycle applied by different industries within the same definition of the application of knowledge, skills and tools, Peter Taylor, in his 2017 book on page 10 “*Leading Successful PMOs,*” stated that to sum it up in the simplest form, project management is all about doing the right things, the right way, in the right order, and with the right team (see Figure 2.6). He continues by saying that method, discipline, quality, and control are all essential processes of project management. Project management is a series of processes that run simultaneously with one another, to achieve a single end goal of completing an organisation’s various projects.

- **Characteristics of Project Management**

In the study titled ‘*The relationship between project management process characteristics and performance outcome*’, Mathur et al. (2014) categorised the characteristics of project management processes by using the conceptual model based on Barney’s VRIO framework

(Barney, 2007). The VRIO Framework (see Figure 2.8 below) stated that project management processes can have one or more of the following characteristics: Valuable, Rare, Inimitable and Organisational Support. These project management process characteristics were proven to have a direct impact on the outcome of project management processes, organisational performance and consequently provided a competitive advantage to the organisation concerned (Mathur et al., 2014:994).

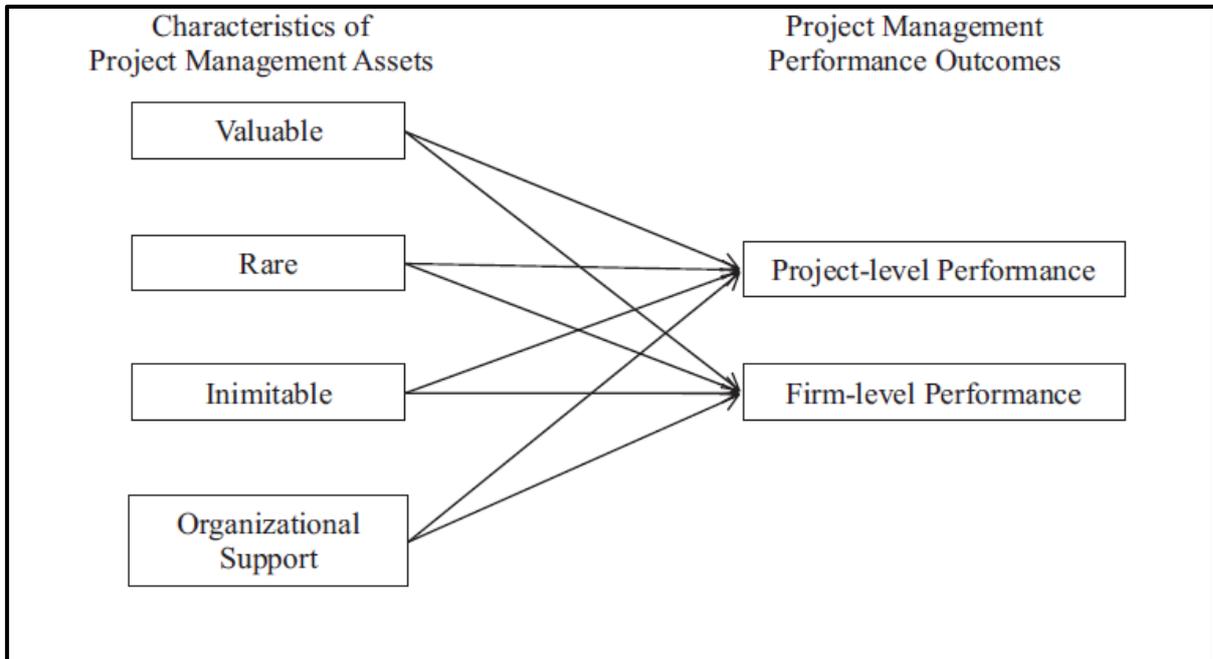


Figure 2.8 – Conceptual Model of Project Management Process/Assets and Project Management Performance Outcomes (Mathur et al., 2014:994)

### 2.2.4 The Origin of Project Management

Project management and projects are not new. Throughout history, large-scale projects of various magnitudes have been completed by successive generations through project management (Matheu, 2005). Projects existed before project management was recognised as a profession, even though their segments and foundations were not at all similar to project management today (Kabeyi, 2019). Project management has been carried out extensively for centuries, since the Egyptian era, but it wasn't until the last half-century that organisations began implementing methodical project management tools and techniques to assist with complex projects. A growing number of research studies have been conducted on project management and project success (Matheu, 2005).

Armstrong's (2015) study titled 'The value of project management certification in achieving project success' supported other authors by explaining that human beings have been using project management to effect change for thousands of years, the only difference being that the projects executed in modern societies are more complex and complicated. Organisations have been progressively using project and program approaches to achieve their strategic goals over

the last 60 years' as project complexity has increased and global economic conditions have changed (Turner et al., 2013).

### **2.2.5 Section Conclusion**

In conclusion, project management has been around for several decades and was officially recognised as an independent discipline in the 1950s, as evidenced by the literature review topics that have been explored. While the definition of project management has changed over time, it remains focused on the application of “knowledge, skills, tools, and techniques” for the successful completion of projects. Project management application concepts and life cycles are not restricted to a single discipline or industry but can be applied across the board if there is a plan to execute an activity with a beginning and an end, no matter how small or large.

## **2.3 Project Management in Civil Engineering Industry**

### **2.3.1 Section Introduction**

This section unpacks and comprehend the role of project management in the civil engineering industry. The industry in relation to project management is unpacked with the primary goal of comprehending the definition of construction management; while at the same time examining the breadth of the industry and its relationship with general project management; as well as to examine the existing body of knowledge and research on the subject within the industry.

### **2.3.2 Understanding Construction Projects**

Construction projects require extensive time and cost investment and therefore close management control is necessary to deliver within the projects specified timeline and budget (Munier, 2013). The development of a project includes various phases that require specialised services. To progress from the inception phase to the delivery phase, the job requires various disciplines to be maintained, such as finance, engineering, architects, legal services, insurance, contractors, a supply chain, manufacturers, general suppliers and traditional workers (Sears, Sears, Clough, Rounds & Segner, 2015).

Various skills, materials, and operations are required during the construction phase, and each construction project is unique, in that each structure is tailored to suit its environment, perform its specific function, and reflect the owners' personal taste and preferences. Even though the team moves from job to job the overall project's aims must predominate and the construction process must remain consistent.

Materials are procured, contracts are negotiated, costs are estimated, and even though changes occur frequently, they have to be handled using the same process; hence, the importance of understanding, and effectively implementing construction management processes throughout projects.

### **2.3.3 Understanding Construction Project Management**

Construction project management runs through the project's entire life cycle, from start to finish, with the project manager as the primary authority. The construction manager is the primary authority throughout the duration of a project (Munier, 2013). The construction industry affects the lives of everyone in the community and beyond and contributes significantly to the country's economy. It is diverse and extremely complex, and it affects every human being because it includes housing, non-residential buildings, heavy civil, utility, and industrial structures, and is divided into various fields such as electrical, concrete, excavation, piping, and roofing.

Therefore a project necessitates the involvement of numerous contractors of various sizes and specialties. While some contractors specialise in small-scale construction and are very specific, others are very broad and multidisciplinary and are known as general contractors who then subcontract specialty contractors to execute some parts of a construction project (Sears et al., 2015). A substantial amount of general knowledge of construction projects and practices is required to effectively manage construction projects. These include recognising the construction industry's size and impact, comprehending how construction projects transition from concept to reality, identifying the entities involved in the construction project and the delivery systems that connect these entities, and comprehending the role of the project manager in the construction industry (Sears et al., 2015).

Although many factors influence the success of a construction project, people are the most important factor influencing project management efficiency in construction or civil projects. People are the key to successfully completing projects and to overcoming the many challenges that arise in any engineering or construction project (Ward, 2018). While technical knowledge and equipment in engineering and construction are important, good people assist the project manager, provide the level of leadership and management skills that assist the project manager to lead and manage projects in such a way that the project objectives are met satisfactorily (Ward, 2018). Without a good project manager, even the most well-planned and high-quality project will be faced with numerous issues that hamper the development (Munier, 2013). Although his subordinates can assist him with technical tasks, dealing with human and organisational issues is difficult, thus necessitating the need for a capable project manager.

Although the project manager may be employed by the owner, designer, or contractor, he or she works for the project. For major projects, a team comprising of an owner's project manager,

a designer, and a contractor work together to manage the design, procurement, and construction. For small-scale projects, the owner may delegate overall project management to a design consultant or a professional construction manager, and/or appoint an owner's representative to act as an intermediary and represent the owner's interests (Ward, 2018). Oberlender analysed the various publications sponsored by the Construction Industry Institute in the second edition titled "Project Management for Engineering and Construction," published in 2000, and established the interface in the civil engineering or construction industry between project managers, project owners, designers, and contractors. He established that once the project owner has decided to invest in a project, a team will be formed within the owner's organisation to oversee the entire project.

Various project functions will be established, and roles will be assigned, including engineering, financing, and marketing teams, among others. The project head, who will then become a project manager and report to the business head or executive, will also be appointed. This project manager leads a team that includes a design project manager and a construction project manager. The primary mission of these two managers is to complete the works of the project in which the company has invested, and they are responsible for engineering, procurement, and construction phase management. Work managers, who are the leaders and supervisors of the team responsible for the actual execution of the works, will also report to the design and construction manager throughout, until the project is delivered.

#### **2.3.4 Typical Phases of Construction Project Management (Sears et. al., 2015).**

The planning and defining phase of a construction project is where the project owner determines the need for the project, its requirements, and the budget associated with it. This phase requires a broad definition of project characteristics and requirements, such as the project's size and location, layout, materials, and services. Even though a short design can suffice in some projects, detailed architectural and engineering works may be required. The most important step will be the owner's definition of the works, which includes preferences.

The second phase is the design phase, during which all the project's detailed engineering and architectural designs must be completed. It contains the final working drawing as well as the specifications. The procurement phase follows, during which all necessary purchases for project execution are made. The materials and equipment required for the projects are ordered, tracked, and delivered as planned. Finally, there is the construction phase, which is the process of finally completing the work according to the project owner's specifications and delivering the finished product. To deliver a satisfactory project, the final phase necessitates the involvement of all stakeholders, including general workers, as well as full supervision and management.

### **2.3.5 Section Conclusion**

To conclude, it's worth noting that, according to various authors of books on the construction or civil engineering industry, construction is a part of everyone's daily life and affects everyone, whether they're directly or indirectly involved in projects or only use the end product produced. Furthermore, the project execution process involves multiple industries and skills. It thus has an impact on every country's livelihood and economy in one way or another and continues to contribute enormously to its growth. Although each construction project is distinct, the project management process remains consistent and vital, and is not dissimilar to that of other industries.

## **2.4 Project Management Education**

### **2.4.1 Section Introduction**

This section of the literature review delves deeper into project management certifications and qualifications by highlighting the historical context and motivations that led to the development of project management education and training. It examines various existing qualifications and certifications on a national and global scale, as well as the expected learning outcomes of such fields, as part of the process. This is done to address the second objective of the study, which is *'to identify and comprehend the various project management qualifications and certifications that are available globally'*.

### **2.4.2 Project Management Education Background**

Changes in working life, such as new product and process technologies, shorter product life cycles, changing production conceptions, and optimisation tactics, are commonly thought to create strong increasing requirements for occupational abilities and credentials within the workforce (Bai et al., 2020). An increasing number of organisations are using project management to improve their strategic goals and achievement (Armstrong, 2015). Hence there has also been a demand for education and training within the project management field. Organisations will need to fill approximately 2.2 million additional project-oriented roles every year through 2027 and as a result, there has been a high demand for project managers with relevant experience (PMI, n.d.).

The International Project Management Association (IPMA) in its meeting in 1995 committed itself to establishing the qualification of project managers, the certification of project managers, and accreditation of qualifying and certifying bodies. The main aim of this meeting was to make project management a global profession (Turner, 1996). Rodney Turner was appointed as the Project Manager and that led the establishment of this program to outline the objectives,

which include the setting out of the curriculum for the project management qualification program, in relation to the PMBOK guide.

In his report, Turner (1996) explains that because there will be diverse needs for different nations and industries, it will be impossible to measure project management specialists against a single consistent standard. However, it is believed that some progress can be made towards a wide mutual agreement on a small number of common project management standards which, with appropriate, local, and ideally minor improvements, can serve as the foundation for future standards. It was also stated in the report that bodies that offer this qualification and certificates will also be able to include Higher Learning Institutions as well as Professional Associates and Institutes, inclusive of national institutions (Turner, 1996).

There are various institutes and associations that offer accredited certificates in project management. This includes the PMI, the IPMA, the Global Association for Quality Management (GAQM) and Global Information Assurance Certification (GIAC) among others. These associations and institutes also collaborate with various higher learning institutions on national level to offer project management courses for various levels of certification.

#### **2.4.3 Project Management Qualifications**

Qualities or accomplishments that qualify or fit an individual for a specific position or function are referred to as qualifications (Soanes & Stevenson 2008). The Introductory Guide to the National Qualifications Framework (NQF, 2007) defines qualification as *“A package of standards or units judged to be worthy of formal recognition in a certificate”*.

These qualifications can then be categorised into a ‘qualifications framework’, based on a set of criteria for the levels of learning achieved. It goes on to say that a qualification can be a single module or unit if it is deemed worthy of formal recognition, and that the term can also be formally applied to a large program that leads to a recognised, historically grounded form of certification such as a degree.

The National Qualifications Framework Act 67 of 2008 in South Africa defines qualifications as all qualifications that meet the minimum requirement and are registered and accredited as national qualifications in accordance with the South African Qualification Association (SAQA, 2012). SAQA (2012) therefore states that ‘the learning outcomes of all South African qualifications should include critical cross-field or generic skills to promote lifelong learning, as well as discipline, domain-specific or specialised knowledge, skills, and reflexivity’.

The different NQF levels of qualifications that can be obtained in South African institutions of higher learning are shown in Table 2 below. This is supported by a Government Notice issued on October 7, 2007, that divides qualifications into two categories: undergraduate and

postgraduate. Higher certificates, advanced certificates, diplomas, advanced diplomas, and bachelor's degrees are all examples of undergraduate studies. Postgraduate degrees include postgraduate diplomas, bachelor's degrees with honours, master's degrees, and doctoral degrees.

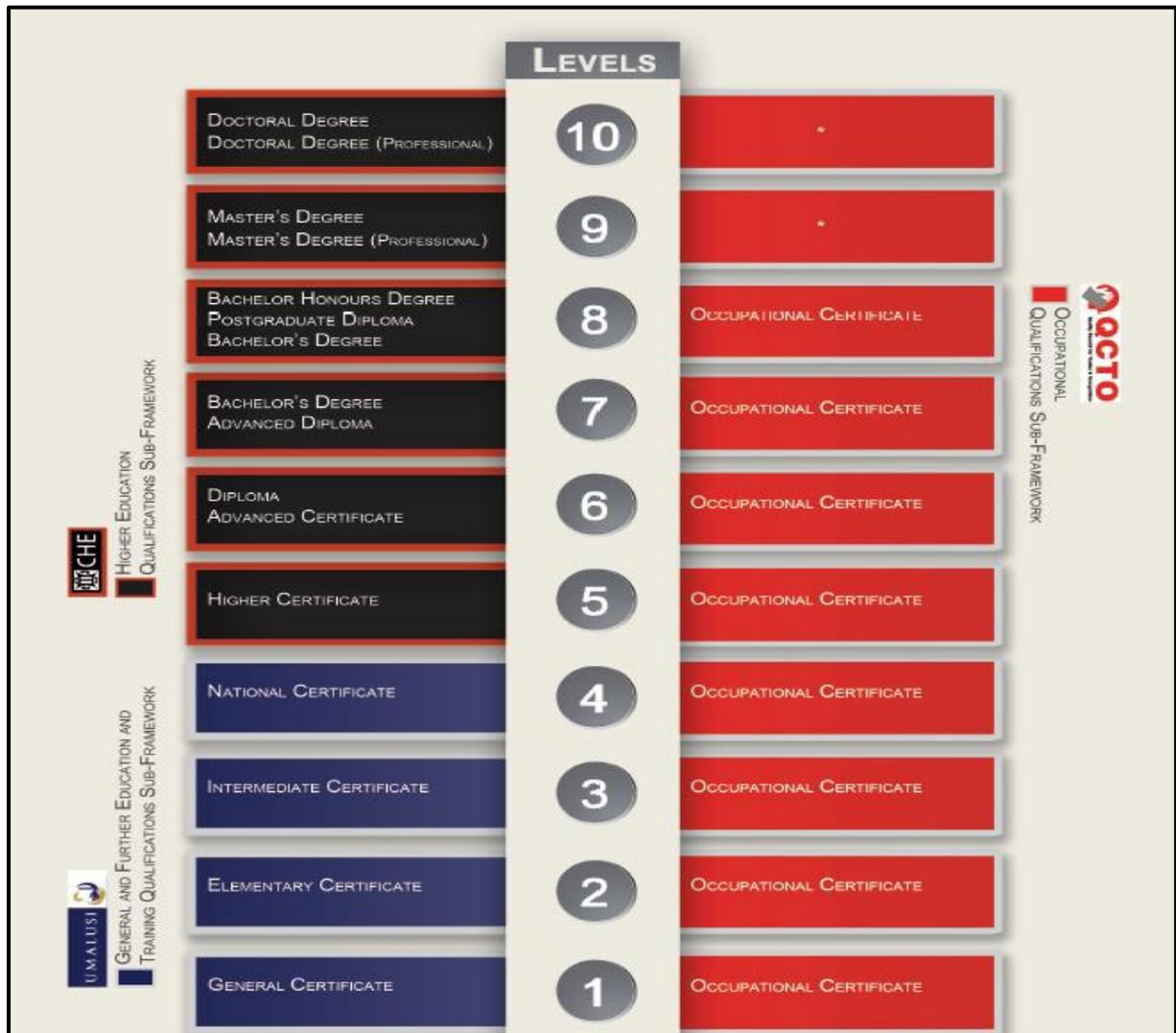


Table 2.1 – SAQA Qualifications National Framework (SAQA, 2012)

Furthermore, there is a relationship between the knowledge, skills, tools, and techniques, which are aspects of the project management definition, and the qualifications, certifications, and training that are offered by academic and professional institutions for the various levels of qualifications offered (Mnkandla & Marnewick, 2011). As a result, to ensure that these institutions provide a comprehensive curriculum, theoretical knowledge, training, and work experience must all be included. This will guarantee that no aspect of project management is overlooked.

#### 2.4.4 Project Management Certification

Project management has become more complicated as projects become more complex and dynamic. The complexity and diversification of projects aids in the creation of various

certification bodies and the production of a diverse variety of knowledgeable books (Zafari, 2019). Cambridge Dictionary (n.d.) defined certification as ‘*the process of giving official or legal approval to a person, company, product, etc. that has reached a particular standard*’. This is further supported by Mnkandla and Marnewick (2011) who defined certification and expand it in the context of project management as the process of recognising someone or something for meeting a set of criteria, including the elements of skills, knowledge, and competency, as the main criteria. There are various types and levels of certifications offered by different institutions or associations which are elaborated further below.

- **The Project Management Institute**

Figure 2.9 below shows are the various project management certifications offered by PMI. The level of experience required for these certifications varies. The first section of the courses (0–3 years’ experience) prepares students for the introduction to projects and agile environments that require little or no prior experience and no higher learning qualifications (PMI, n.d.). The second section (3+ years’ experience) generally requires at least 3 years of project management experience, and aids in the advancement of a project leader’s career by demonstrating that the applicant has the specialised skills that employers actively seek, such as commitment to excellence and the ability to perform at the highest level.

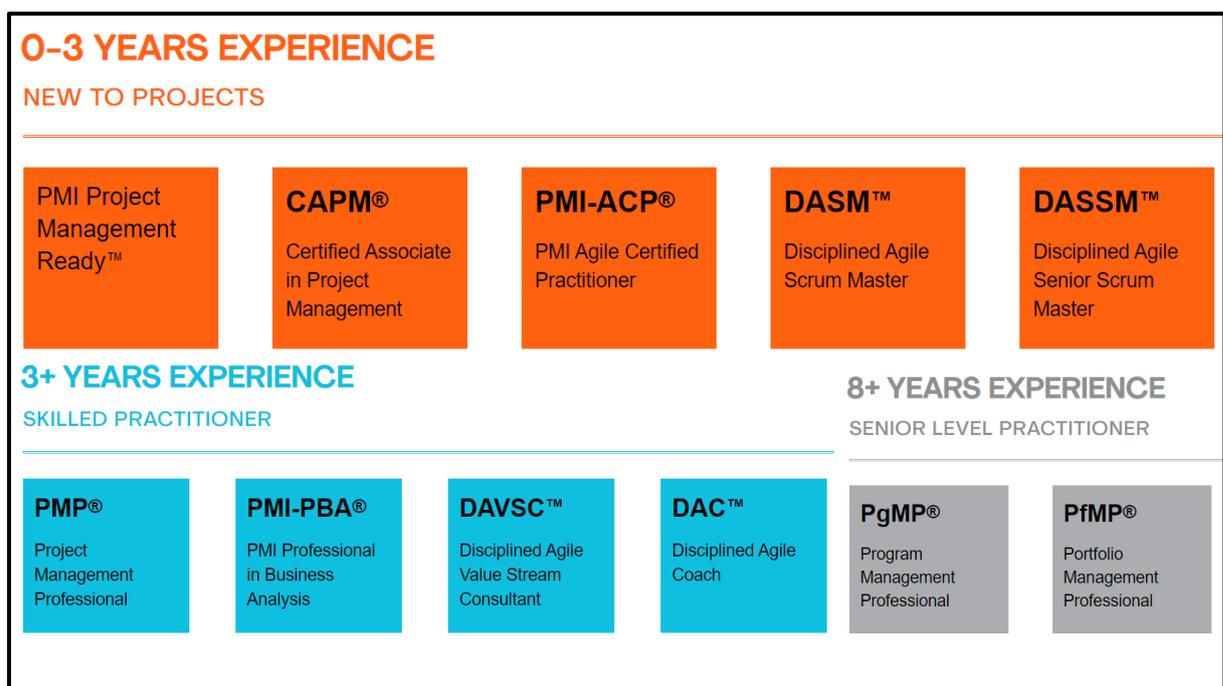


Figure 2.9 – PMI Certifications Framework (PMI, 2022)

- **Global Association for Quality Management (GAQM)**

The GAQM (n.d.) offers three levels of certification, as shown in Figure 2.10 below. The Associate in Project Management (APM) certificate is an entry-level certificate that does not

have minimum academic requirements or experience for an individual to pursue. It demonstrates that a student has learned the fundamentals of project management (GAQM, 2022). The Professional in Project Management (PPM) certificate is the next step up, and it gives project managers the skills to execute, control, and complete projects, as well as manage project schedules, develop project measures, implement project control, and lead teams. The PPM certifications are highly valuable for project timelines, as it allows managers to develop project metrics and methods to project control and gives them the necessary knowledge on how to create, lead, and encourage project teams because it concentrates on major trends in project management and on the requirements needed for project managers to perform (GAQM, n.d.)

The last level is the Certified Project Director (CPD), the most prestigious project management certification, which is offered to the most senior and executive managers to equip them with the skills to manage highly complex projects, including risk management, quality assurance, budgeting, and scope management. Executive managers who oversee multiple project managers or multiple large capital investment projects could benefit very much from this certificate (GAQM, n.d.).

Associate in Project Management (APM)	Professional in Project Management (PPM)	Certified Project Director (CPD)
<p>Project management isn't just for construction engineers and military logistics experts anymore. Today, in addition to the regular duties of your job, you are often expected to take on extra assignments and to get that additional job done well, done under budget, and done on time. This E-Course and Certification is not intended to take you from a supervisory or administrative position to that of a project manager. However, the Associate in Project Management (APM)™ Certification will ...</p>	<p>Projects and project management has become the foundation for success in the public and private sectors. Enterprises achieve their goals through projects and effective project management. Successful project management requires achieving the scope (e.g., intended result), cost and schedule. In addition, the increasing complexity of work and demands for "more with less" place special demands on the project manager. These programs go beyond the "What is project management and practices" to ...</p>	<p>The Certified Project Director (CPD)™ is globally recognized and is considered to be the most prestigious level of project management credential, which is designed for senior and experienced project management executives, who want to go beyond the PPM, and other business / project management certifications. The CPD certification allows experienced senior managers and executives to acquire new skills and advanced techniques in managing and controlling today's complex project and management ...</p>
		

Figure 2.10 – GAQM Project Management Certifications (GAQM, n.d.)

- **International Project Management Association (IPMA)**

The IPMA uses a system profile called the 4-L-C level to categorise the certification offered by the institution. The certifications range from level A, being the highest level of competence down to level D, being the lowest level. These levels also differ in terms of the level of

competency each level demonstrates at the end of the course, in order to assist the project management body or organisations.

The Certified Project, Program, and Portfolio Director is a Level A certificate that is built around the project team leadership expertise that is required in project management. At a strategic level, it includes very complex projects throughout the project life cycle. Level B is the Certified Senior Project, Program, and Portfolio Manager, which is based on the level of project leadership and complexity displayed throughout the project's life cycle. Level C is a Certified Project Manager, who is responsible for managing others in projects of moderate complexity, throughout the project life cycle and applying project management knowledge. Finally, there's Level D, which is the Certified Project Management Associate level which is built on a foundation of knowledge across all relevant competencies.

		Domain		
Level		Project	Program	Portfolio
	A	Certified Project Director	Certified Program Director	Certified Portfolio Director
	B	Certified Senior Project Manager	Certified Senior Program Manager	Certified Senior Portfolio Manager
	C	Certified Project Manager		
	D	Certified Project Management Associate		

Table 2.2 – IPMA 4-L-C System Profile (International Project Management Association (IPMA), 2016)

- **Globa Alliance for the Project Professions (GAPSS)**

GAPSS focuses on the transportability and alignment of project, program and portfolio leadership and management standardization and transportability on its role as an independent reference benchmark. It is run entirely by volunteers, primarily during the Thought Leadership Forums that are hosted by the organisation. These two-day events are held three times a year in different parts of the world to encourage broad global participation. Members and their representatives gather at these events to share their ideas, knowledge, and experience; to discuss and debate; and to contribute to a better understanding of project, program, and portfolio management. Their primary goal is to facilitate the mutual recognition and transferability of project management standards and qualifications by providing the global project management community with a reliable source of comparative information (GAPSS, 2023).

## **2.4.5 The review of Project Management Certifications by Different Scholars**

The first institution to introduce the world's first project management certification was PMI in 1984, followed by other associations, including IPMA who introduced their first project management certification in the early 2000s (Blomquist, et al., 2018). Project management has progressed towards professionalisation by virtue of certification. To improve the efficiency of the employment selection process, recruiters have been using project management certifications as a standard of competency for potential candidates. This process has increased the value of project management certification for those who invest in it, resulting in a global demand for certification (Blomquist et al., 2019). The most common globally recognised certifications are described below, but a more detailed description is also provided below, based on the literature review of studies by various scholars.

- **PMI – Certified Associate in Project Management Certificate**

The CAPM certificate is offered by PMI as an introduction to project management. It is designed in such a way that it provides a basic understanding of project management, especially for undergraduate or new graduate students, as well as any project team member who intends to demonstrate project management knowledge or is planning to add project management into their current roles or capabilities (Remer & Ross, 2014; Zafari, 2019)

- **PMI – Project Management Professional Certificate**

The PMP is one of the most widely recognised certifications in the world. According to one study, a PMP holder can earn 20 percent more than a non-PMP manager. It's because of the PMBOK's standards and a high-quality certification process (Zafari, 2019). A PricewaterhouseCooper (PWC) article published in 2022 backs up the above statement, stating that the PMI's PMP is the most important industry-recognised certification for project managers. Project managers with PMP certification can be found in almost every country because, unlike most other certifications, it has no geographical restrictions and is recognised worldwide. PMP certification allows a person to work in any industry and in any location within the project 'management field (PWC), 2022). There are more than 1 million PMP holders in the world (PMI, 2022). The PMP certification now includes prediction model, agile, and hybrid approaches, demonstrating project leadership experience and expertise in any mode of operation. PMP certification signifies that the candidate has gained sufficient knowledge and experience to apply project management methodology to well-defined project requirements and deliverables. It also shows that the candidate is capable of carrying out their responsibilities as project manager for all aspects of the project on time, on budget, and within the scope constraints (Remer & Ross, 2014).

The PMI states on its website that the PMP certification is held by over 1,000,000 people all around the world. PMP certification was created by a project manager for all project managers, and it certifies that you are one of the best regarded individuals for managing people, strengthening technical fields, and managing business operations (PMI, n.d).

- **PMI – Program Management Professional (PgMP) Certificate**

Unlike the CAPM and PMP certifications, which are designed for project managers who have managed a limited number of projects or not in the case of CAPM; the PgMP certificate covers a broader range of expertise than the CAPM and PMP certifications. It is designed for project managers who have successfully managed multiple projects that are related and aligned the catered resources with the objectives of the organisation (Remer & Ross, 2014). Furthermore, it demonstrates one's ability to handle interrelated projects and navigate complex activities that span functions, organisations, regions, and cultures, as well as aligning results with organisational goals (Zafari, 2019).

- **PMI – Portfolio Management Professional (PfPM) Certificate**

The PfMP is PMI's newest certification offering, created in response to the growth of formal portfolio management and the lack of a globally recognised portfolio management certification. Portfolio management covers the management of multiple various programs that are made up of various projects. Portfolio managers are in charge of the overall focus over the projects they are in charge of. (Remer & Ross, 2014; Zafari, 2019).

PMI also offers four specialised project management certifications, including PMI Agile Certified Practitioner, PMI Risk Management Professional, PMI Scheduling Professional, and OPM3 Professional, in addition to the general project management certifications described above (Remer & Ross, 2014).

- **IPMA – Certified Project Management Associate (IPMA Level D)**

As mentioned in the previous section, the Certified Project Management Associate, or level D certificate, is the entry level certificate from IMPA. This is the certificate for candidates who have little or no project management experience. It is designed in such a way that the exam assesses project management competency in accordance with the IPMA Baseline standard. Remer and Ross (2014) stated that IPMA offers competency in project objectives, teamwork, scope, deliverables, and report compilation.

- **IPMA – Certified Project Manager (IPMA Level C)**

Candidates for the IAPM Certified Project Manager or IPMA level C certification must have a basic understanding of project management, including planning, organising, and executing various projects (Zafari, 2019). Unlike the level D certificate, this certificate is for project managers who have prior project management experience. Technical experience, as defined by the IPMA Baseline standard, is required of the candidate (IPMA, n.d). Aside from the standard exam, a candidate must also pass an interview test before being certified as competent (Remer & Ross, 2014).

- **IPMA – Certified Senior Project Manager (IPMA Level B)**

Project managers who have extensive project management experience, including managing other project managers and program management, are awarded the Certified Senior Project Manager, or IPMA Level B, certificate. Apart from the exam, potential candidates must have managed complex project elements, and they must also complete an interview and a project report before being certified as competent (Remer & Ross, 2014).

- **IPMA – Certified Projects Director (IPMA Level A)**

The Certified Projects Director, or IPMA Level A, is the most advanced and highest level of certification, requiring a candidate to have worked as a project manager for many years, to have managed experienced project managers, as well as very complex projects, programs, and portfolios, and to have consistently ensured that the organisation's primary objectives were aligned through effective project management. A pre-requisite for successfully completing the certificate apart from the extensive examination is an interview and project reports (Remer & Ross, 2014).

#### **2.4.6 Investing in Project Management Education**

In a journal of Contemporary Management in a section titled "*Project management training: the root cause of project failures?*" Mnkandla and Marnewick (2011) stated that people and process are two of the most significant factors that contribute to project failures, and among the people factors; lack of effective communication between the team and clients, management support for the team, and involvement are the most important contributors. They also claim that, despite the importance of project management training, the rate of project failures is unrelated to the amount of training given. Furthermore, training, education, and certification in project management do not always prepare people to deliver as effectively as expected in real-world projects; unlike other management disciplines where training and education provide people with the necessary skills to perform. This is further supported by Walker (2008), who stated that project management certifications are overly theoretical and

require more practical experience before project managers can be certified competent to manage real world projects.

Mnkandla and Marnewick (2011) argued that, even though the project management definition emphasises the application of knowledge, tools, skills, and techniques; institutions place a premium on the acquisition of knowledge for their candidates, while overlooking other important aspects such as skills, tools, and techniques. These institutions assume that the necessary skills, tools, and techniques are acquired naturally or through other means.

In addition; in a study to investigate whether organisations get their money's worth by investing in project management certification, (Joseph & Marnewick, 2018) stated that project management certification is seen as a step towards professionalising the project management discipline and that the intentions behind the inception of project management certification was to provide individuals with the necessary skills and knowledge required to manage and execute projects successfully. However, they agreed with the argument put forward by Mnkandla and Marnewick's (2014)'s study wherein it was revealed that project management certifications have no impact on IT project performance in South Africa. Furthermore, it was discovered that certifications need to be redesigned to keep project management professionalisation on track and consistent. Certifications are created to assess an individual's ability to perform a specific job after passing a certification exam. They're used to legitimise and promote a particular field or discipline. Most project management certifications are based on PMBOK, making PMI certification arguably the most widely accepted project management standard (Joseph & Marnewick, 2018). Simultaneously, the Organisation for Standardisation (ISO) developed ISO 17024, which is used as a global benchmark for personnel certification programs that follow the same standard, ensuring that certification skills can be translated across national lines. Only six project management certifications are recognised by the ISO, implying that not all project management certifications are reliable, consistent, or even theoretically correct.

Some researchers, on the other hand emphasise the importance of investing in project management education and/or training for the benefit of both the individual project manager and the organisation. Project managers see project management certificates as a way to stand out and get ahead while improving their salaries, according to (Mahaney & Greer, 2004). Some organisations see project management certificates as a way to improve project success rates, so they encourage their employees to pursue these certificates. Mahaney and Geer (2004) found that most people pursued project management certifications because having a PMP certificate makes it easier to find work and has a higher market value, while most companies now require PMP as a pre-employment condition. They further stated that

credibility, knowledge validation, and a sense of accomplishment are just some of the benefits of project management certifications. The results of their study are shown in Table 4 below.

Item	Frequency
Easier Job Search	13
Requirement	10
Affirmation of Knowledge	7
Provided a sense of Accomplishment	5
Credibility	4
Affirmation of Abilities	4
Job Security	3
Self Assessment Tool	3

Table 2.3 – Benefits of Project Management Certificates for Project Managers (Mahaney & Greer, 2004)

The benefits of project management certification for organisations include the fact that it produces better and improved project managers who are forced to study and learn PMBOK and its applications rigorously, as part of their exam preparations. Employee skills assessment, where employers can assess project managers' weaknesses, higher billable rates, where organisations can charge clients more, based on the level of competency evidenced by the certifications that the project manager provides. The project manager also provides a common project management language that speaks to the elements of PMBOK and also contributes to the improvement of project managers' confidence (Mahaney & Greer, 2004).

Müller and Turner (2007) discovered that whether a project manager has a project management certificate or not has no impact on project success in a study. The certificate, on the other hand, does have an impact on high-performing projects, leading to the conclusion that project management certification improves an already high-performing manager, and that before a junior project manager can pursue certification, their other competencies must be improved. This was further supported by (Catania, et al., 2013) in a study of project management certification and experience, and their impact on triple constraint, but they found no evidence to support that project certification has any impact on project success; and also provided evidence that certification only provides project managers with the skills of the profession; but does not guarantee that the person certified is an expert in the field or that his or her projects will succeed.

### **2.4.7 Section Conclusion**

This section looked at the various project management certifications and qualifications that were available from various organisations. During its investigation, it discovered that some certifications and qualifications are recognised globally, while others are only valid within national standards and each one's value varies from one organisation to another. Also, it was found that various scholars, as evidenced by their studies on various industries and institutions, have differing opinions and findings on whether investing in such education is worthwhile. The impact of project management education has also been investigated further in areas where it should have had an impact, which ranged from projects to project functions, offices and organisations.

### **2.5 Chapter Summary**

The purpose of this chapter was to scrutinise the study's knowledge area, project management certifications and qualifications, and to provide an insight into its role in civil engineering and construction industries. It was found that these certifications and qualifications are designed to provide skills, knowledge, tools, and techniques for project management, coordination, and control, among other things. The main goal of the exercise was to gain a better understanding of why people should invest in project management and of the value that comes with having either certifications and/or qualifications, thus providing a clear picture of the independent variable of the study.

This was also used in the research analysis, where the relationship between the study's independent variable, project management certification and qualification, and the dependent variable, project functions, were examined using skills, knowledge, tools, and techniques, as well as taking into account the accreditation and recognition they possessed. It is also noted that in the civil engineering industry, the impact of project management education on the success of project functions within organisations remains largely unexplored. Most of these studies are based on the information technology industry and mostly outside the South African environment, which leaves a gap that this study aims to fill.

## CHAPTER 3: LITERATURE REVIEW: RESEARCH AREA

The thesis navigation map shown in Figure 3.1 below shows that the first chapter introduction and the second chapter which covers the first section of the literature review has been completed and the current chapter focuses on the second section of the literature review; as well as the path through to the end of the study.

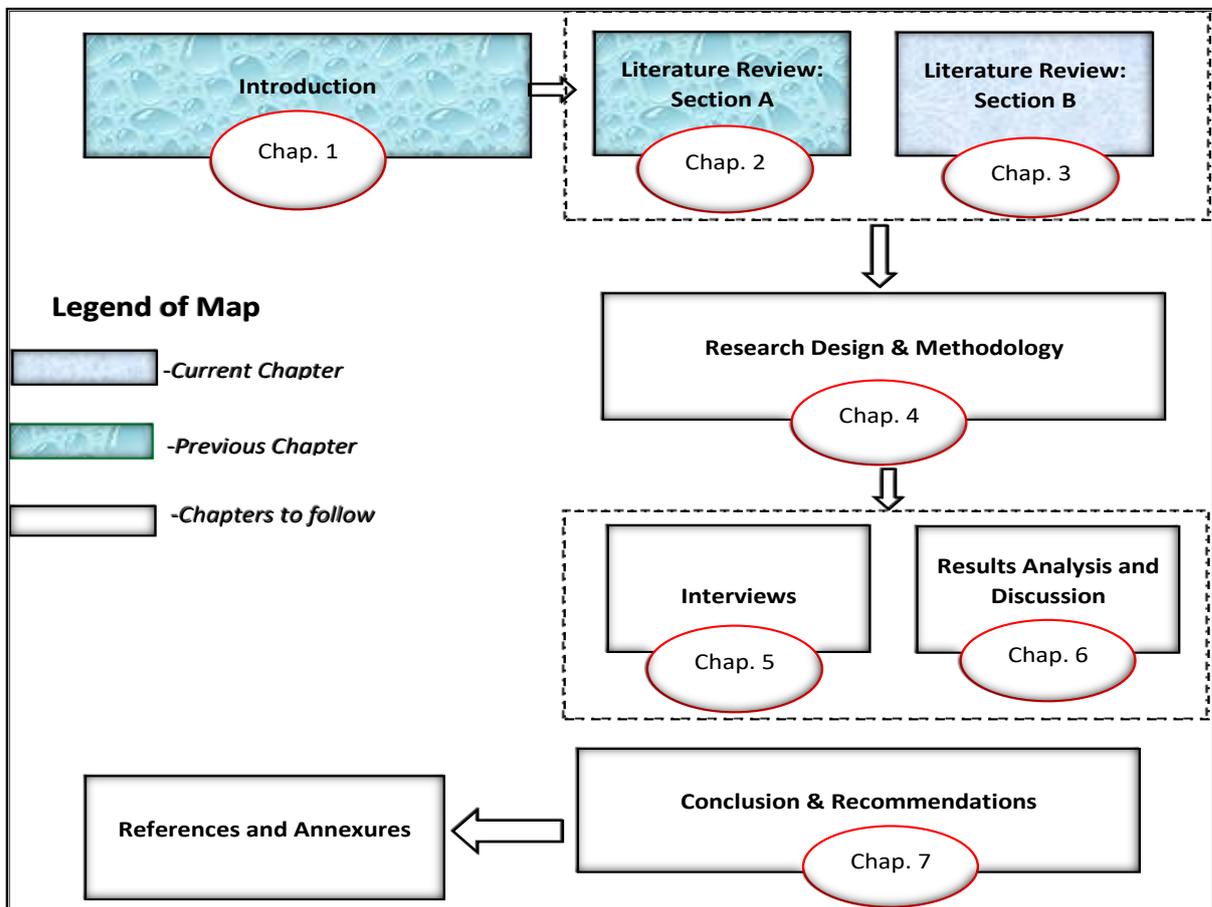


Figure 3.1 – Thesis Chapters Layout Map – Chapter 3

### 3.1 Chapter Introduction

The second section of the literature review; this chapter, focuses on project functions, the study's dependent variable, which is also the application area (see Figure 2.2 of the previous chapter). It discusses how project functions are structured and on what terms within various organisations, as well as the roles and responsibilities of project functions within an organisation and the factors that influence their success. The final section of this chapter delves into the study's research area, which is MCOs. It clarifies what types of MCOs exist in the general and civil engineering spectrums in South Africa, as well as how organisations are classified as MCOs, among so many large corporations. It delves deeper into the MCOs sampled for this study in order to determine their urban and economic roles in the country, as well as in the civil engineering industry.

## **3.2 Project Functions**

### **3.2.1 Section Introduction**

This section defines and brings an understanding to the research's main area of study, project functions, by defining what a project function is as well as explaining the meaning of some related terms used by different organisations, such as project team, structure, department, or office. It tackles one of the objectives of this study, which is ' *to evaluate the impact of project management qualification and a certificate on the organisation's project functions*', by defining what Project Function is, as well as its roles, responsibilities, benefits and values within the organisation. Furthermore, it looks at the factors that influence project function success within and across organisations. It is worth noting however, that most studies in this field use the term Project Management Office (PMO), which is like using the term project functions. This is also stated in the APM 7<sup>th</sup> Edition, which states that while there is a growing consistency of the term PMO, various names are given to a part of an organisational structure whose main function is to provide support, programs, and portfolios. Therefore, the impact on this application area will be assessed regarding the preceding section on project management qualification and certification.

### **3.2.2 Project Functions Definition and Roles and Responsibilities**

Peter Taylor, author of the book "*Leading a Successful Organisation*," (2017), which aims to describe methods and understanding on how to build the best PMO for an organisation, gives a good introduction to the PMO definition by stating that it is typically up to the organisation to decide what to call their PMO or project function, based on what their organisation consists of as well as the outputs of that PMO. Taylor defines project functions within an organisation as a department or group that maintains the standard of the project management process within an organisation. This department or group aims to standardise and streamline the project execution process by providing documentation, guidance, and metrics for project management and execution, as well as connecting business strategies to the projects that those strategies necessitate. PMO is also defined by Taljaard (2018) as the entity group or department within an organisation that is responsible for defining and maintaining project or program management standards. To achieve project management scrutiny, management, and assistance, many organisations today have realised the need for a project function or a PMO.

The organisational structure that is in charge and responsible for the management and controlling of the various projects simultaneously within organisations is referred to as the PMO or the Organisation's Project Functions (Duarte et al., 2019). PMO was further described in an interview conducted by these researchers in 2006 with Mr O. Zózimo, who published and edited journals for over 20 years, as a structure within an organisation that supports

management of the project on a systematic review level, providing tools, information, methodologies, and recommendations to project managers. Studies have also highlighted PMO as the knowledge broker between projects and high-level management (Pemsel & Wiewiora, 2013). PMO serves as a significant knowledge agent between projects and higher-level management (Khaksefidi & Miri, 2015).

To summarise, Taylor (2017) defines project function is a group or department within a business or organisation that owns project-based activities that split throughout operational activity in order to achieve the benefits of standardising and following project management policies, processes, and methods, as well as serving as a source of guidelines, documentation, and metrics for managing and executing projects in an organisation. PMO basically serves as a link between strategy and result within an organisation (Valle & Soares, 2012).

Project functions or PMOs have a wide range of responsibilities, from project management oversight to providing adequate project management support functions to being directly responsible for project management. Their primary role is to complete projects that comply with business objectives and achieve the organisation's goal within the provided resource constraints because projects are repetitive, permanent, or semi-permanent functional activities that are required to produce unique products with a defined beginning and end, to bring about beneficial change (Taljaard, 2018). The size of the organisation has no bearing on the functions of the PMO (PM Solutions, 2016). Also, according to Taljaard (2018) there are no one size fits PMOs however the typical roles and responsibilities are similar or somewhat related. These roles are compilation of project management framework, portfolio management and optimisation, project governance, stage-gate support and knowledge management, project related training, resources management and operational support, communication and transparency as well as organisational strategy.

### **3.2.3 The Value and Benefits of Project Functions**

According to Taljaard (2018), project functions within organisations are strategic drivers of organisational excellence that improve project execution management practices, governance, and strategic change leadership. Their benefits expand to include enabling strategic change and driving successful business outcomes. Without a PMO, services that would never be justified for any project can be accessed. These include managing interdependencies, collecting, analysing, and presenting project progress, becoming a centre of excellence that improves processes, tools, and techniques through training and support, and providing specialised skills such as risk, planning, and finance (APM, 2019). One area of knowledge that is mostly emphasised by the PMI is the process integration benefit that the PMO provides for the organisation. The benefits of establishing and implementing project functions within an organisation often include providing consistent and comparable use of tools and techniques,

improving staff professional competence in project management, uniformity of tools and techniques, improvement in the organisation's performance and design, empowering and producing skilful and high performing project teams, improving profits, and providing organisational competitiveness and promoting external recognition.

### 3.2.4 Different Forms and Operations of Project functions

The APM Body of Knowledge, 2019 7<sup>th</sup> Edition, illustrates various types of project functions or PMO. In Figure 3.2 below, it demonstrates that the PMO can be established in three different ways within an organisation. The first option is an embedded PMO, in which the PMO's functions are controlled by the project manager and only the organisation's larger elements, such as processes, are the responsibility of higher-level authorities. The second option is a Central PMO, in which the PMO's functions are located outside of the team because they manage multiple projects, and the third option is a Hub and Spoke PMO, in which the PMO's functions are more hybrid with a centralised enterprise or portfolio.

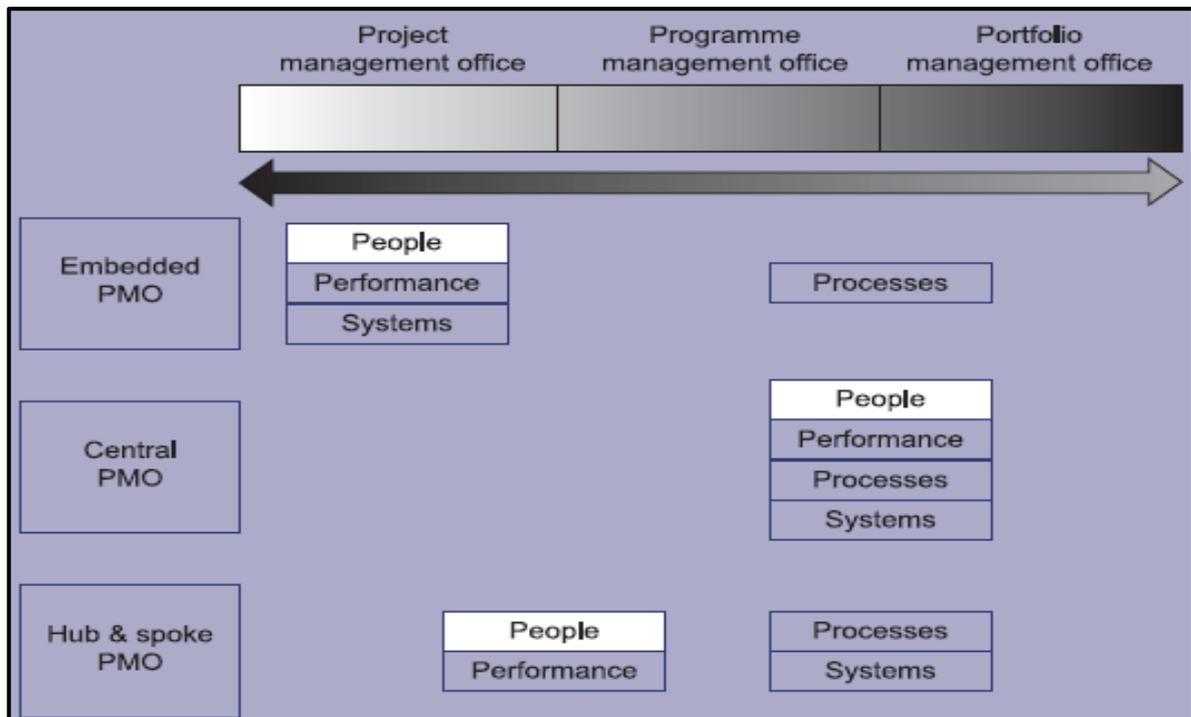


Figure 3.2 – Different Forms of PMO (APM, 2019:71)

There is a requirement for specialised skills within the project team, depending on the type of PMO that an organisation adopts, but there are generic skills that are useful to have within any PMO, including data analysis, facilitation skills, problem solving, training, and coaching, and auditing skills to confirm compliance (APM, 2019:71). Departmental PMOs, Special-purpose PMOs, Outreaching PMOs, External PMOs, and Enterprise PMOs are some of the most common PMO types, depending on the structure (Taylor, 2017). The level of control and influence that project functions have on organisations is determined by the type of organisation

and governance structure, but it can operate in one of three ways: as a supportive project function that serves only as a consultant, as a controlling project function that requires and enforces compliance with set standards and procedures, or as a directive project function that takes full control and manages all projects (Taljaard, 2018).

Taylor (2017:23) uses the model in Figure 3.5 below to expand on the understanding of the three operational methods of project functions of PMO. The supportive PMO is defined as a method that aims to assist project managers by providing support in the form of guidelines, best practices, knowledge, and expertise. The goal of this method is to bring all project managers together and provide a platform for sharing project management information with a larger group, while also empowering project members to solve common problems. Organisations that want to have stronger disciplines across all project activities, methods, procedures, and documentation usually implement controlling PMO. This is done to ensure that the methodologies used are consistent and that regulations are followed. Directive PMO methods are typically used by organisations that prefer to assign new project managers to each new project from the PMO itself, with all reporting directed to the PMO rather than any other high-level authority. This method governs projects by providing project management experience and resources, while lowering costs through centralisation. Then lastly, the combination of two or all methods is then called the blended method, which is usually preferred by most organisations.

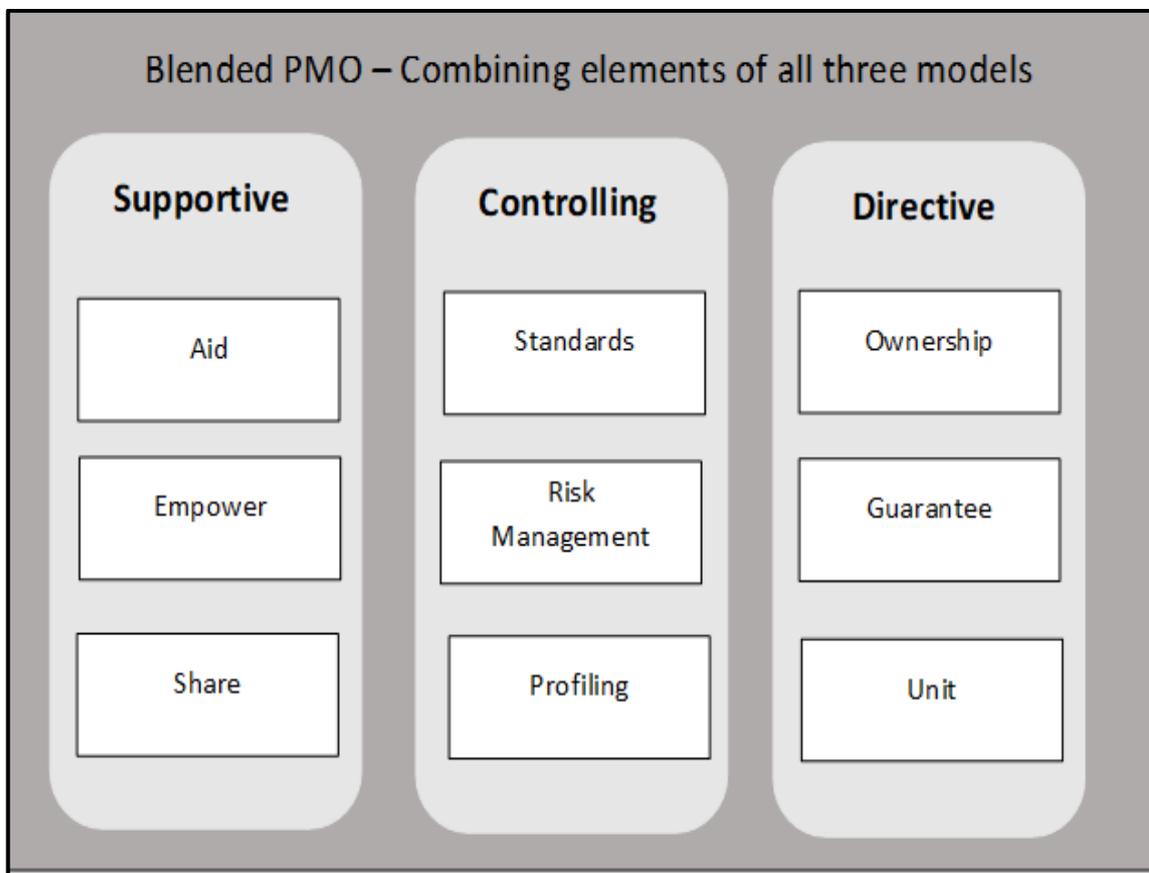


Figure 3.3 – PMO Models of Operation (Taylor, 2017:23)

### 3.2.5 Factors that Influence the Success of Project Functions or PMOs

In their study on understanding PMO success, Kaul and Joslin (2018) state that the fact that PMO or project function achieve their goal is unquestionably considered successful; however, because PMO provided both direct and indirect benefits, a distinction is required. Success in projects and project management, as well as quantifiable performance, are among the direct benefits. Indirect benefits might include, for instance, an improved knowledge-sharing culture. Successful PMOs may be those that are more advanced in terms of PMO capabilities (defined as personal competencies, tools, and techniques) and those that can adapt to organizational changes. According to the authors, PMO success can be defined as the achievement of PMO-related targets or goals. Figure 3.4 below is how depicts the relationships between PMO performance, PMO value, PMO benefits, and PMO success, in the same way that Kaul and Joslin (2018) emphasize that there is no PMO success without the existence of the others.

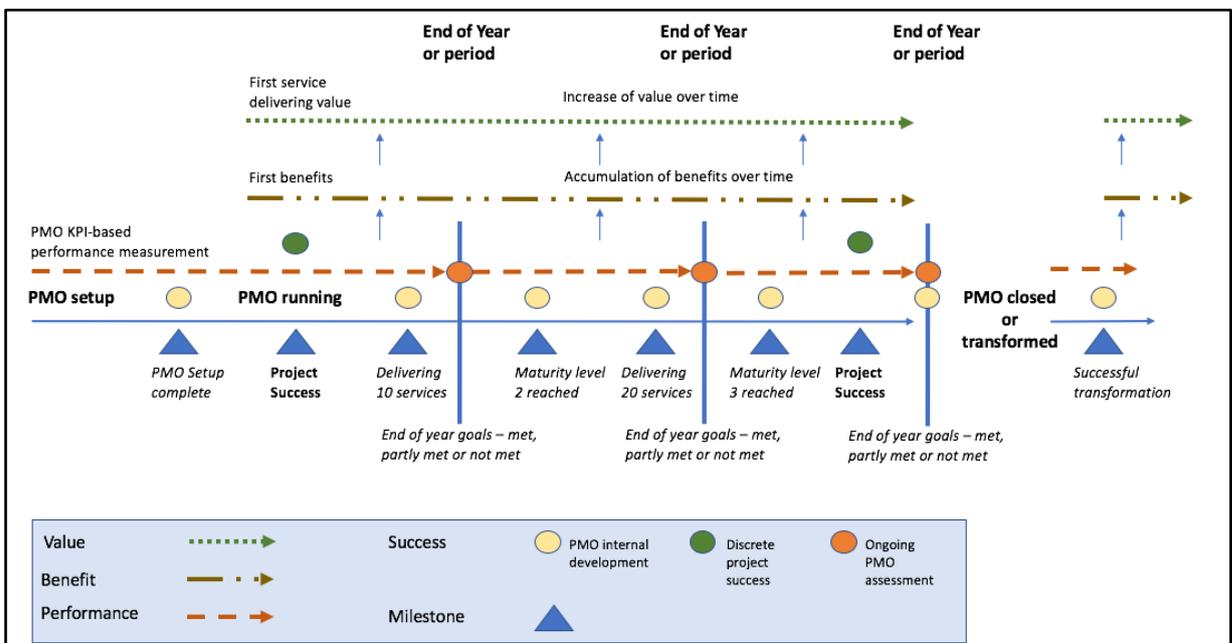


Figure 3.4 - Relationships between PMO performance, PMO value, PMO benefits and PMO Success. (Kaul and Joslin, 2018:14)

Hobbs and Aubry (2016) determine the success of PMO using the framework of external forces, internal forces, control, and flexibility (see figure 3.5 below). This framework's strength is that it provides multiple concurrent views of performance along two dimensions: control versus flexibility, and internal versus external focus. The findings show a wide range of performance criteria for evaluating PMOs that all exist at the same time. These elements are classified in groups as human resources, openness, and rational goals..

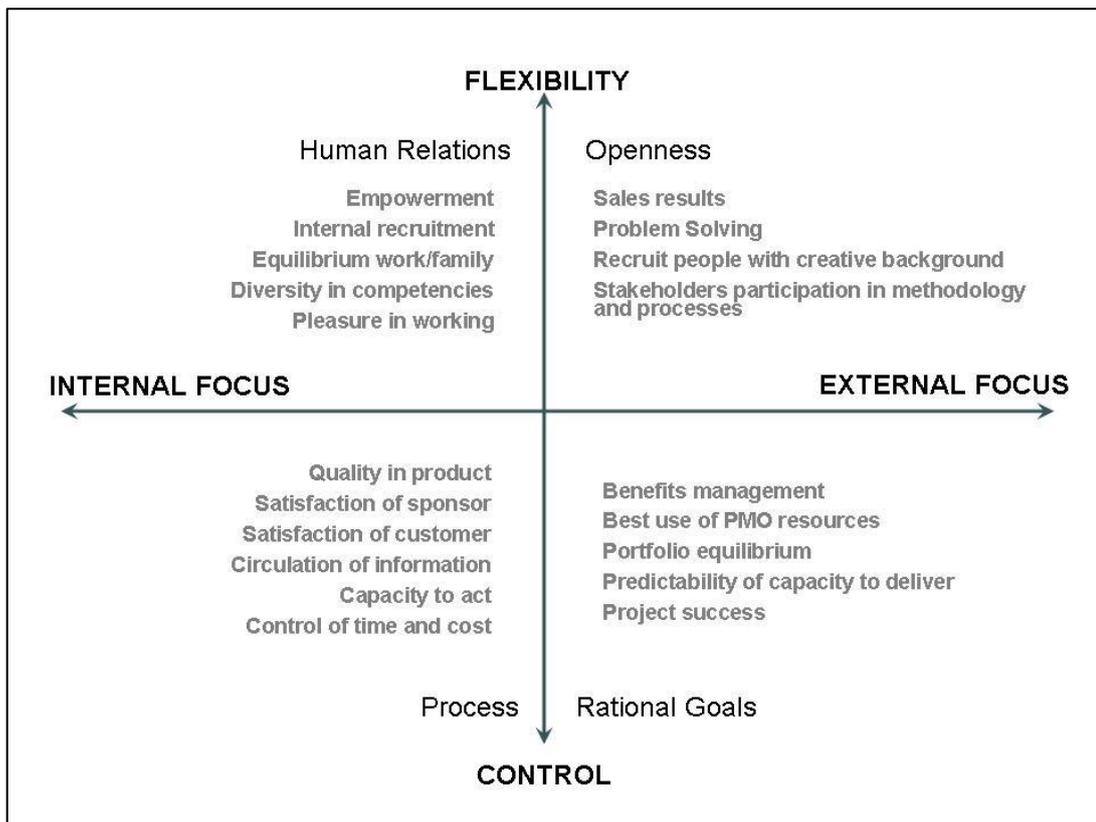


Figure 3.5 - Criteria to assess the PMO's contribution to organisational performance (Aubry and Hobbs, 2016:4)

Valle and Soares (2012) conducted a study to identify and analyse the success factors of PMOs. This research included interviews with 64 ISO 21500-certified international project management experts from 21 countries, including South Africa. Figure 2.14 shows a model that was developed as a result of the research that serves as a reference for the top 16 success factors of a PMO. These success factors are classified into four groups namely, Organisational factors, Structural Factors, Strategic Factors and Personal Factors.

- **Organisational Factors**

One of the success factors is the organisation's project management maturity. A successful PMO becomes a unit of process standardisation, data collection, processing, and support for systematic decision making and standardised reports, once it has been established. Then there's top-down commitment, which necessitates organisations providing resources for project management training, education, and skills, as well as top management, that cultivates a project management culture. The PMO's power factor, which includes not only knowledge but also results and the ability to apply that knowledge to achieve set goals, is followed by the PMO members' competency factor, which includes not only knowledge but also results as well as the ability to apply that knowledge to achieve set goals (Valle & Soares, 2012).

- **Structural Factors**

The proper placement of the PMO in the hierarchy and organisation chart is critical to the PMO's success. PMOs that are positioned at a much higher level, allowing for a proper level of relationship with executives in support of the decision-making process, are more likely to succeed than those that are not. The PMO's functions, positioning, and sizing, as well as the organisation's, should all be considered during its implementation.

The PMO should be large enough to handle the function, scope, outcomes, and functions of the organisation. The structure of the organisation by projects is also one of the structural factors of the success of the PMO; in such a way that it provides an efficient link when an organisation is organised by projects. The other structural factor is structured information systems, which allow for good communication between project professionals while also allowing for information sharing and adequate senior management decision-making (Valle & Soares, 2012).

- **Strategic Factors**

The PMO should be a part of the organisation's strategic planning, with one of its responsibilities being to manage portfolios and programs, which are collections of projects. The PMO is implemented as part of a strategic plan with a clear vision to turn corporate strategies into project results. Another PMO strategic success factor is knowledge management within the organisation, which includes capturing and analysing valuable lessons learnt at project completion. The benchmarking of internal and external auditing, as well as the performance metrics to be monitored over time, are other success factors. (Valle & Soares, 2012).

- **Personal Factors**

Implementing the PMO as a project, where the existence of the PMO and its functions within the organisation is well-known and its performance is measured, is one of the personal factors that can be used to measure the success of the PMO. The time factor for implementation is also one of the most important factors, as the success of the PMO is determined by the amount of time spent on it, not just the period but also the timing. Even more important is the fact that one of the factors that encourages project participants within the PMO to meet and exceed individual and collective project goals, is recognition and reward (Valle & Soares, 2012).

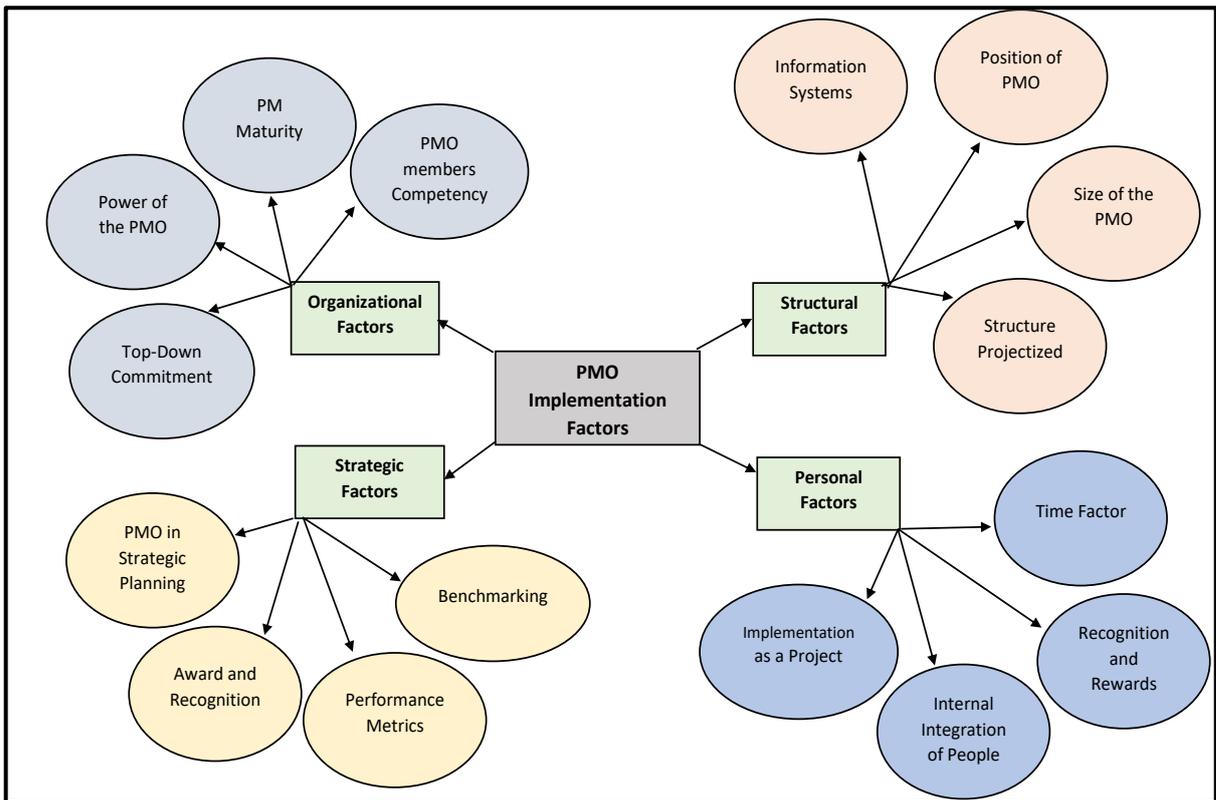


Figure 3.6 – Model of relevant success factors to implementation of PMO (Valle & Soares, 2012:10).

Taylor (2017:51) established the key factors of PMO success using a 360-degree circle in which he interviews experienced PMO leaders leading some of the world’s most successful PMOs, project managers who work in successful PMOs, PMO team members, and C-Level executives who fund the entire PMO World in his book “*Leading a successful PMO.*” The findings of these studies revealed consistent factors that contribute to the success of a PMO, which also aligns with Valle and Soares (2012), as discussed above. Figure 3.7 below shows these success factors classified into Ps, a system used by Siemens where he worked at and is, one of the world's best PMOs.

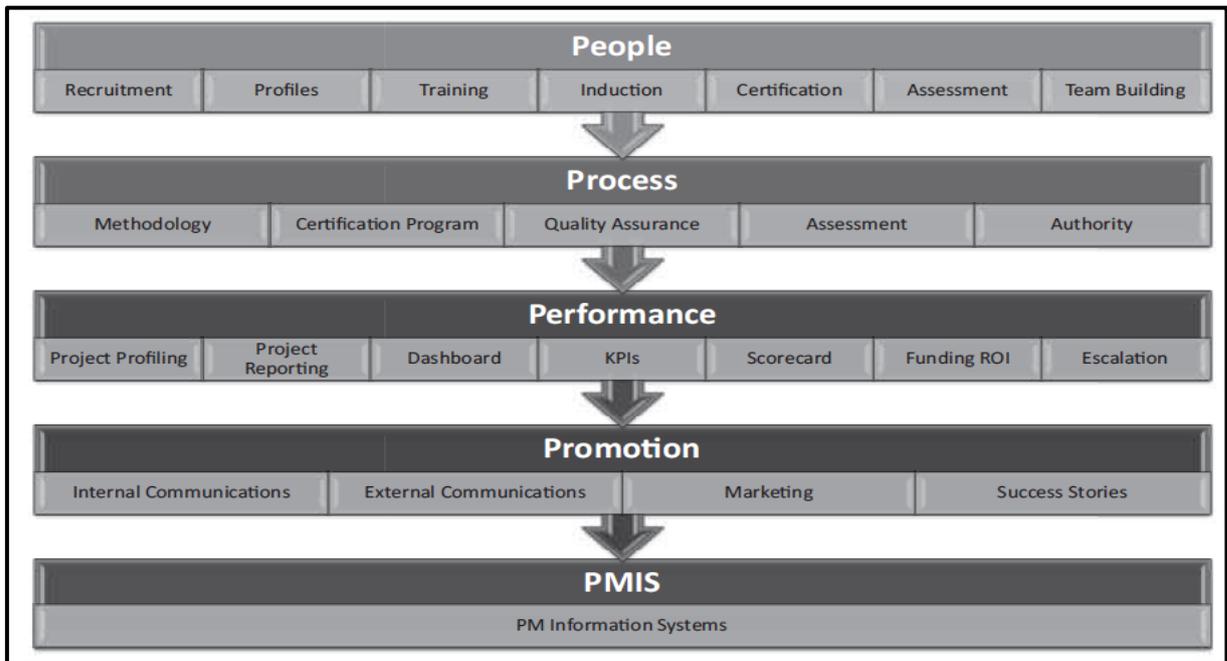


Figure 3.7 – Key Factors that makes a PMO a success (Taylor, 2017:58)

### 3.2.6 Section Conclusion

Kaul and Joslin (2018) evaluate the success of PMO by aligning it with its performance, value, and benefits, as well as its direct and indirect contribution to the organization (Figure 3.4). This is accomplished while Aubry and Hobbs (2019) employ the framework of external vs. internal forces, as well as flexibility and control, as illustrated in Figure 3.5. This is even more intriguing because they group these factors so that they can be accessed individually within a group. This is the same approach used by Valle and Soares (2012), in which the factors determining project function success are grouped and accessed individually (Figure 3.6), and these PMO success factors are similar to those of Aubry and Hobbs (2019). Taylor (2017), too, employs a P-method to group the same factor as the other authors, while the factors remain constant.

To conclude this section of the chapter, it is worth mentioning that even though most organisations have project functions, the term used varies from one organisation to the next. In today's complex business world, project functions or PMOs are the strategic driver of an organisation's excellence through strategic initiatives (Taljaard, 2018). As various authors and studies have shown, the factors that influence the success of these project functions are not specific to specific business requirements but are consistent across boards. The project functions' benefits, values, roles, and responsibilities are also generally the same; they provide project management support, project management oversight, and, in some cases, overall project management (Taljaard, 2018).

### 3.3 Major Capital Organisations (MCOs)

#### 3.3.1 Section Introductions

This section of the literature review seeks to provide insight into what MCOs are, what roles they play in the civil engineering industry, and the economic impact they have on the country. It will drill down into the existence of project functions within these organisations, as well as how projects are managed and executed within them.

#### 3.3.2 Understanding Major Capital Organisations and Projects Development

Major Capital Organisations (MCOs), also known as State-Owned Enterprises (SOEs), are self-contained entities that are partially or entirely owned by the government. They carry out specific tasks, operate according to specific Acts and have a direct impact on the economy of the country). They have a significant impact on urban growth and development, as well as on the economy of the country, and they are organised into categories based on that impact, as shown in Figure 3.8 below, which include power generation, transmission, and distribution, ICT, transportation, major land owners, and development support providers (Ovens & Associates, 2013)

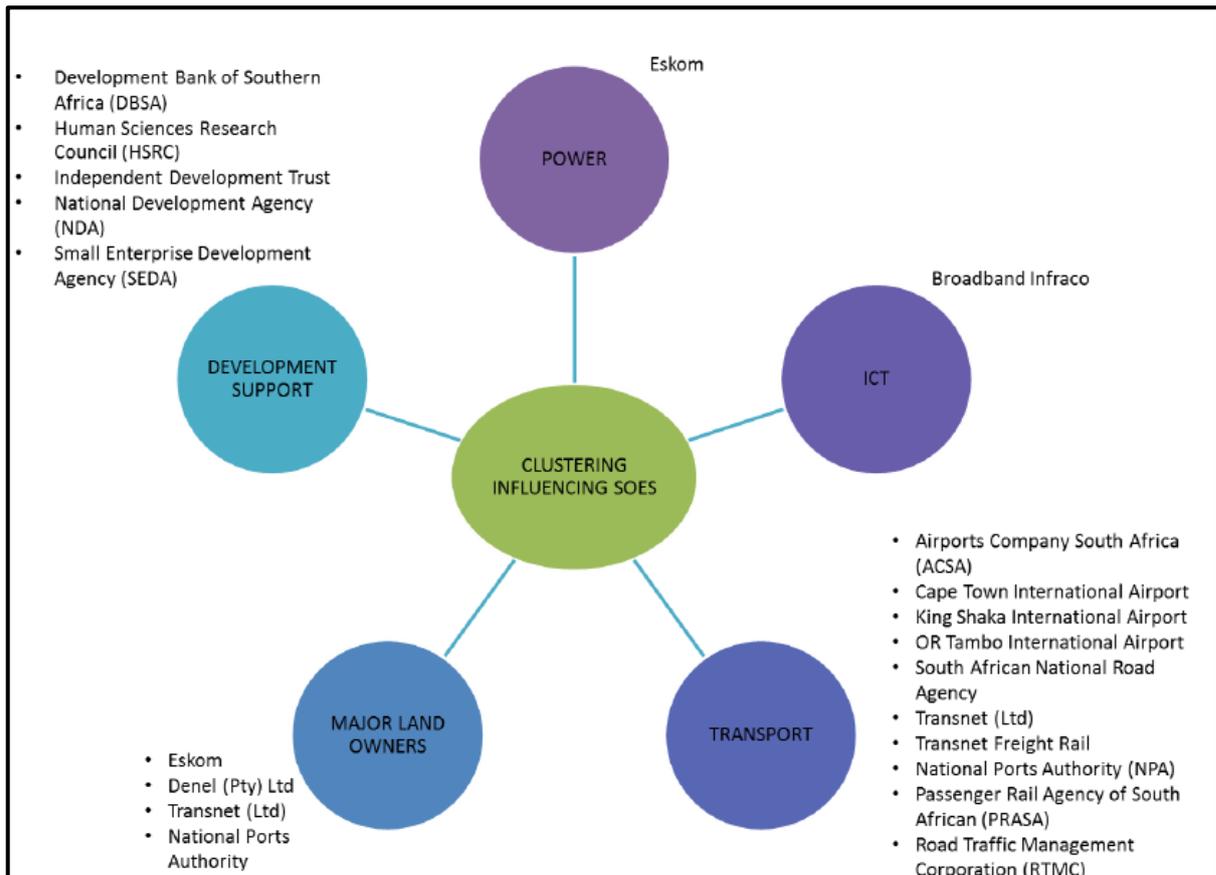


Figure 3.8 – Categories of SOEs which influence urban growth and development (Ovens & Associates, 2013:5)

The MCOs that include the civil engineering industry, which is primarily infrastructure development, construction, and maintenance, are the focus of this study. The government's chapter 6 of the Transport Infrastructure document for 2022 provides an overview of the state of transport hard engineered, designed, and constructed infrastructures and includes interventions that are required to align road, rail and air, maritime and pipeline transport with the National Transport Map 2050 Spatial vision (Department of Transport S.A., 2016). This is an overview of the contributions of MCOs such as SANRAL, Transnet, PRASA, and ACSA to South Africa's national economic development and future economic growth.

- **Road Infrastructure Overview (MCO - SANRAL)**

South African roads are divided into three spheres of government: national, provincial, and municipal. The total proclaimed roads in South Africa are approximately 538,000 kilometres long, with 36,6872 kilometres of non-urban and 168,000 kilometres of urban roads. SANRAL manages approximately 31,340 kilometres of national roads (NRA, n.d.). SANRAL was founded in 1988 by a South African Act of Parliament, and its primary mission is to develop and maintain the country's road networks. Figure 3.9 below shows a reflection of the SANRAL road network maps. For continuous asset management, SANRAL has an extensive road network maps. For continuous asset management, SANRAL has an extensive road management system that provides key data such as traffic and road conditions (South Africa. Department of Transport, 2016). The national road network economic arteries, providing safely engineered and well-maintained roads, improving journey experiences and transformation by taking responsibility for proclaimed national roads, maintaining, funding, operating, and rehabilitating roads, levying tolls to service tolls management, and advising the minister on problems relating to roads and creating value are all responsibilities of SANRAL (NRA, 2022).

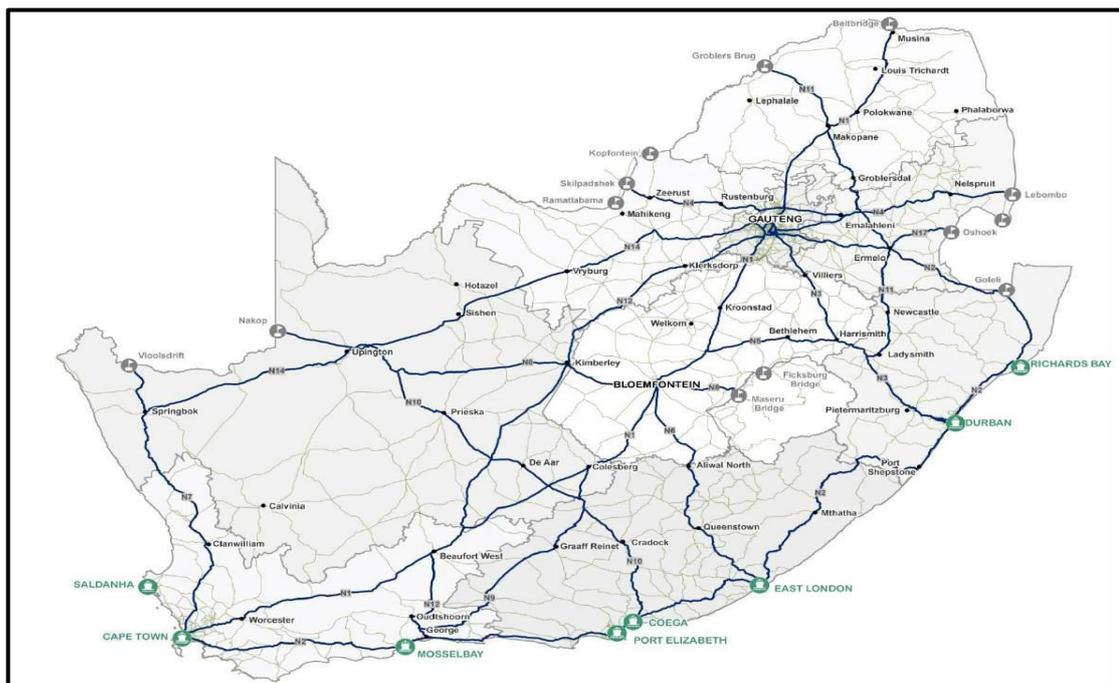


Figure 3.9 – Overview of Major Road Network (South Africa. Department of Transport, 2016)

- **Rail Infrastructure Overview** (MCO -PRASA & Transnet)

Rail is a long-term component of the freight and passenger networks, with Transnet through TFR owning the national freight network and PRASA owning the national passenger rail network, with a mutual usage agreement to operate freight or passenger trains on one another's lines. PRASA operates 471 passenger rail services across 3,180 kilometres of rail lines (PRASA, n.d.), while Transnet's freight rail network has 31,000 track kilometres and 22,000 route kilometres (South Africa. Department of Transport, 2016). The TFR network consists of 1,500 kilometres of heavy haul lines and 3,928 kilometres of feeder lines to main lines (Transnet Freight Rail (TFR), n.d.). Figure 3.10 below is the overview of Transnet Rail network is described above.

Transnet's freight rail objectives include providing capacity ahead of schedule, ensuring the sustainability of development plans, integrating port, rail, and pipeline planning, aligning the network with national roads and electricity supply, providing capacity through efficient operations prior to infrastructure provision, and ensuring proper environmental and social integration (South Africa. Department of Transport, 2016).). TFR Networks' main goal is to increase network availability by reducing maintenance and capital expenditure costs, while also ensuring the safety and security of TFR assets and employees (TFR, n.d.). Civil engineering and track are two divisions within Transnet or PRASA that help the organisations attain their goals. Civil engineering projects and/or works includes everything from storm water drainage to pipelines, tunnels, geotechnical, roads, buildings, bridges, and culverts, as well as specialised railway work on coal and ore lines. Routine maintenance of the railway superstructure, which includes track, sleepers, fastenings, and other components, is included in track engineering (TFR, n.d.).

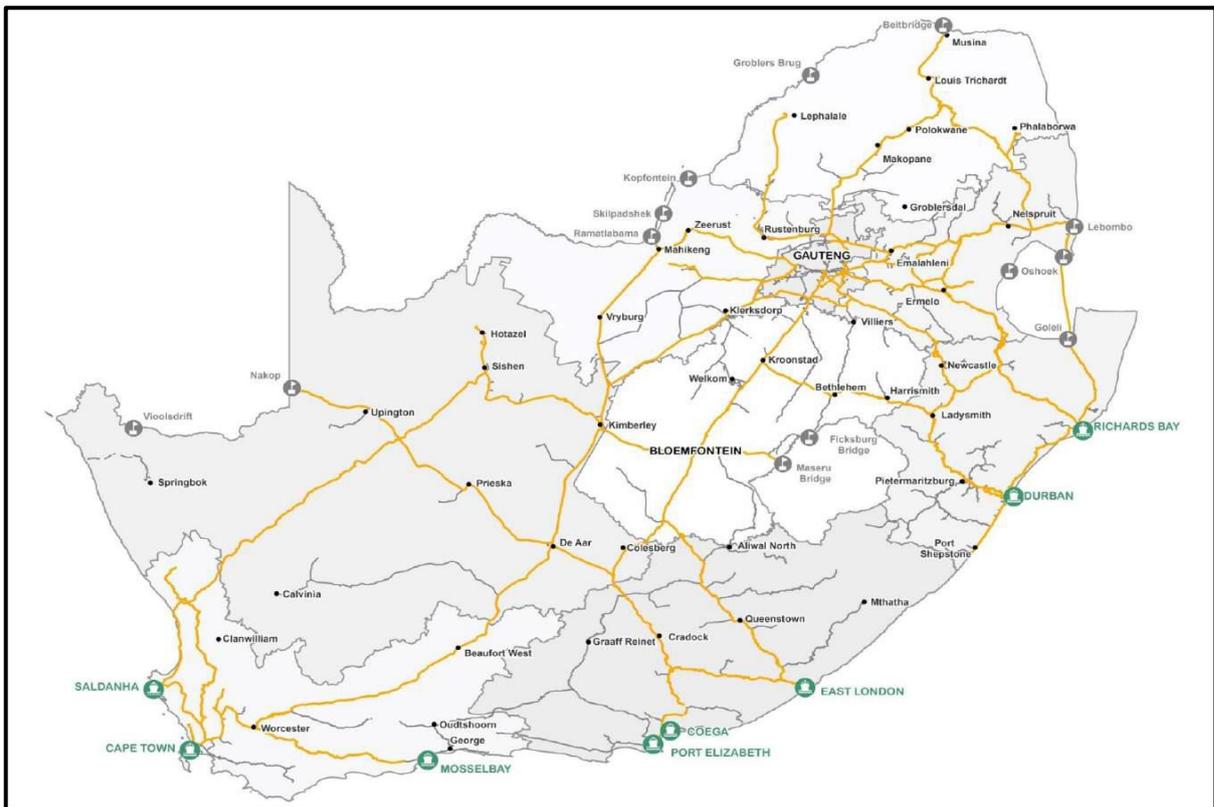


Figure 3.10 – Transnet Freight Rail Network (South Africa Department of Transport, 2016).

- **Air Infrastructure Overview (MCO - ACSA)**

Airports in South Africa are available in a variety of sizes and configurations, which are often determined by the airport's function and the population it serves. International, domestic, military, local, and heliports are the most common functional classifications (South Africa. Department of Transport, 2016). South Africa has 224 airports as of March 2015, as shown in Figure 3.11 below, of which 135 are licensed airports, 10 are international airports, 56 are voluntarily registered airports, and 33 are military airports, with the remainder of the airports and airfields not yet registered (South Africa. Department of Transport, 2015). ACSA owns 9 airports, the provincial government owns 9, the military owns 33, municipalities own 100, and the rest are privately owned. South African airports are generally well-developed in comparison to international standards, and ACSA has won numerous international awards. ACSA is in charge of the procurement, advancement, upkeep, strategic planning, operation, control, and a variety of other functions of any airport they own, as well as any facility or service related to airport functions, such as infrastructure construction, maintenance, and management (ACSA, n.d.).

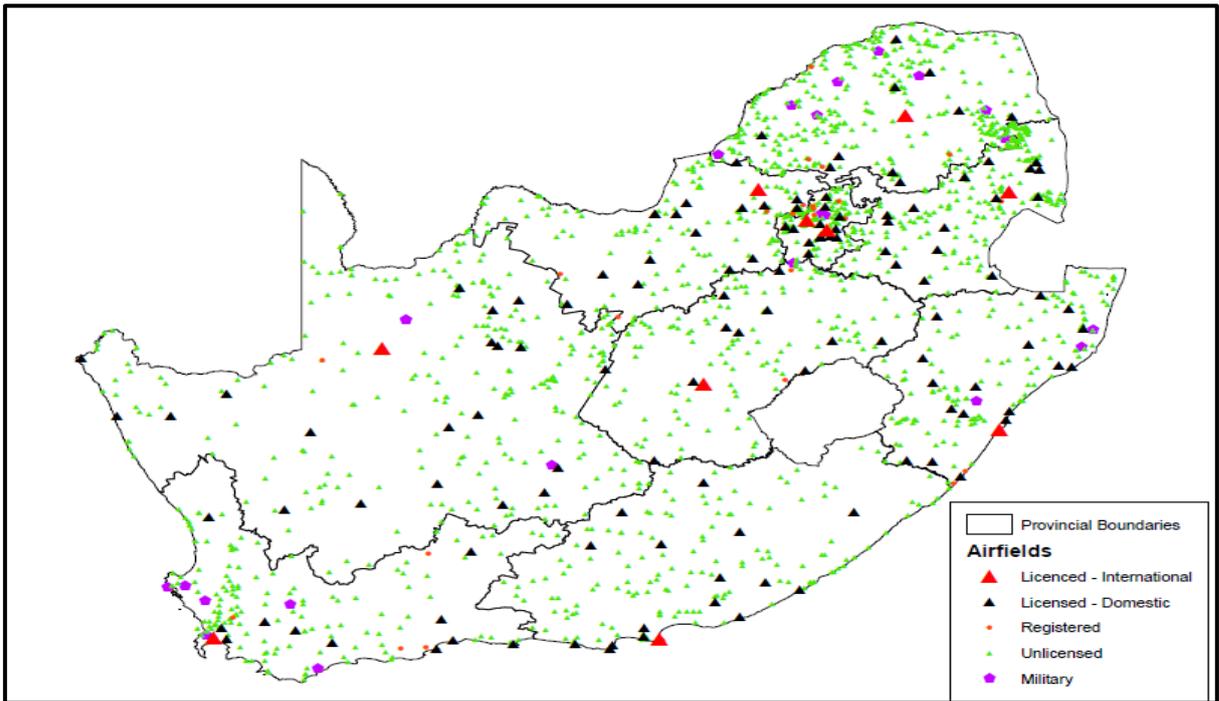


Figure 3.11 – Airports in South Africa (South Africa. Department of Transport, 2015:9)

- **Other Infrastructures Overview (Maritime)**

South Africa is also in charge of managing the ocean space (water engineering in the civil spectrum), which is much larger than its land space, using its maritime infrastructure. Transnet National Port Authority (TNPA), a division of Transnet, manages eight commercial seaports (South Africa. Department of Transport, 2016). The map of South African ports whose infrastructure is managed and maintained by TNPA is shown in Figure 3.12 below.

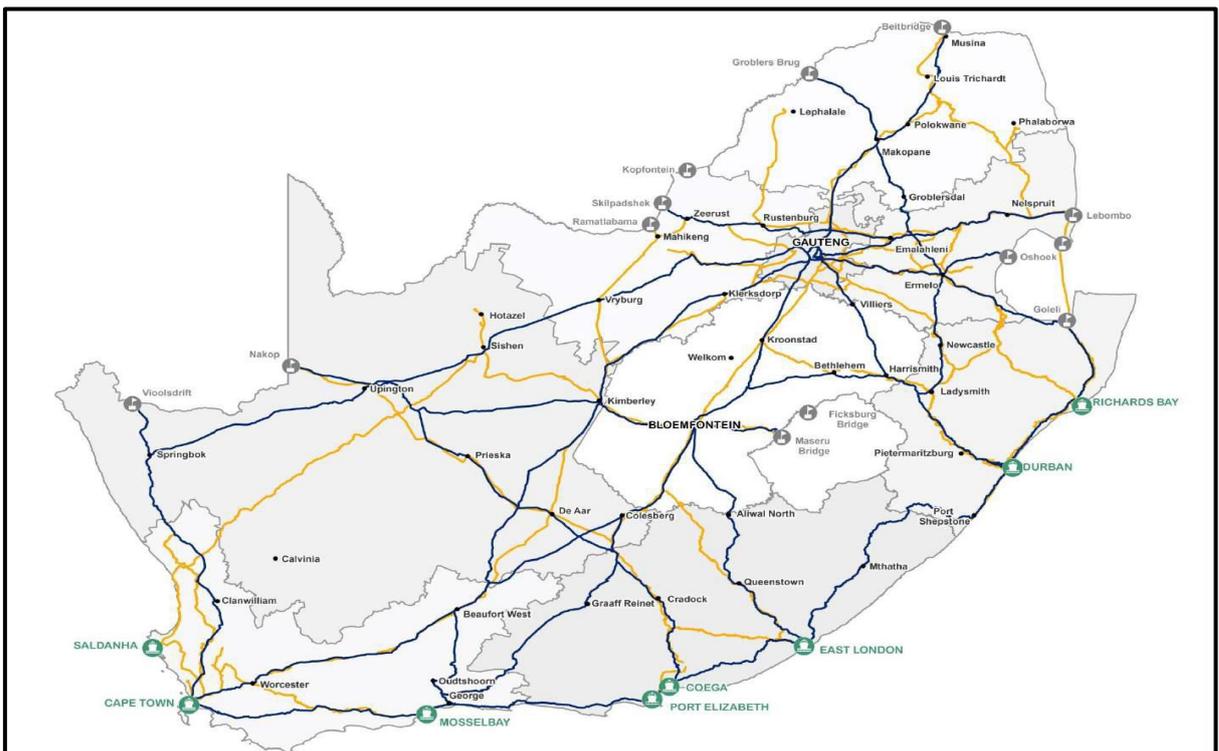


Figure 3.12 – Ports of South Africa (Department of Transport, 2016)

Mega projects are summarised in Table 3.1 below using the sectoral breakdown published in the Infrastructure Chapter 7 of the 2012 Budget Review, where an estimated R3.2 trillion in large-scale projects are currently under consideration or in progress. It provides a clear picture of the industries that manage major capital projects. Table 3.2 depicts major projects, including the value of capital investments and the MCOs and other organisations in charge of their management and execution. These capital projects are worth billions of rands, with MCOs such as Eskom with projects feasibility worth up to 300 billion rands, PRASA with projects worth up to 80 billion rands, SANRAL with projects worth up to 45 billion rands, and Transnet with projects worth up to 37 billion rands, among many others.

R billion	Project stage								Total
	Concept	Pre-feasibility	Feasibility	Financing	Detailed design	Tender	Construction	Ongoing programmes <sup>1</sup>	
Water	20	–	–	32	–	5	18	–	74
Transport	310	–	78	17	12	88	8	71	583
Electricity	720	268	314	–	95	103	345	101	1 945
Liquid fuels	–	–	211	–	2	–	–	–	213
Education	20	–	–	40	–	–	–	125	185
Health	–	–	50	29	–	–	–	31	110
Telecommunication	12	–	–	–	–	–	3	–	15
Human settlement	–	–	–	78	–	–	–	–	78
<b>Total</b>	<b>1 082</b>	<b>268</b>	<b>653</b>	<b>195</b>	<b>109</b>	<b>195</b>	<b>374</b>	<b>328</b>	<b>3 204</b>
<i>% total expenditure</i>	<i>33.8%</i>	<i>8.4%</i>	<i>20.4%</i>	<i>6.1%</i>	<i>3.4%</i>	<i>6.1%</i>	<i>11.7%</i>	<i>10.2%</i>	<i>100.0%</i>

Table 3.1 – Examples of Mega Projects per Sector (South Africa. National Treasury, 2012)

Project name/ Implementing agent	Total project cost R billion	Project objective and completion target date	Status
<b>Energy</b>			
Kusile power station (Eskom)	121.0	Build 4 800MW coal-fired power station, first unit commissioned by 2014	Under construction
Medupi power station (Eskom)	99.0	Build 4 788MW coal-fired power station, first unit commissioned by 2013	Under construction
Grootvlei (Eskom)	7.8	Return to service of 1 180MW power station, scheduled completion in 2012	Civil works complete, commissioning in progress
Komati (Eskom)	12.9	Return to service of 1 000MW power station, scheduled for completion in 2012	Civil works complete, commissioning in progress
Ingula pump-storage scheme (Eskom)	21.4	Build 1 332MW hydroelectric power station to begin operating in 2014	Dam constructed, pipe installation in progress
Renewable energy (independent power producers)	120.0	3 725MW of renewable energy procured into national grid by 2016	Tender process under way, 1 415MW of bids in first procurement round confirmed
Open-cycle gas turbine (independent power producers)	15.4	Build 1 000MW power plant, scheduled completion in 2021	Tendering process undertaken
Distribution backlog (Eskom and municipalities)	27.5	Refurbishment and new distribution network	Ongoing programme
New transmission lines (Eskom)	95.0	Upgrade and new transmission lines over 5 years	Work in progress
<b>Transport</b>			
Passenger railways (PRASA)	80.0	Acquire a new fleet of rolling stock over 20 years	Procurement has commenced
National road improvements (SANRAL)	45.4	Maintenance improvements, refurbishment and new roads	Ongoing programme
Rolling stock and locomotives for freight rail (Transnet)	7.7	Acquire rolling stock and locomotives for general freight rail	Procurement under way
Provincial road improvements (Provincial Department of Roads)	25.5	Maintenance, refurbishment and new roads over next 3 years	Work in progress
Ngqura container terminal (Transnet)	7.9	Improve port capacity by 800 000 units, first phase completed in 2012	Port complete, dredging of 2 berths and construction of port rail line in progress

Project name/ Implementing agent	Total project cost R billion	Project objective and completion target date	Status
<b>Energy</b>			
Nuclear fleet build (Eskom)	300.0	Generation of 9 600MW scheduled for completion by 2029	Final stages of consideration before financial proposal can be determined
Grand Inga (Government of the Democratic Republic of Congo)	200.0	First phases of hydroelectricity project of 40 000MW	South Africa assessing support options
Imported hydroelectricity options (Eskom)	52.2	Hydroelectric, gas and coal projects in Southern African countries	Options of off-take agreements and financial support for projects being considered
Solar park (Central Energy Fund)	200.0	Build 5GW scale solar park in the Northern Cape	Feasibility study to be completed in 2012
Closed cycle gas turbine (Independent Power Producers)	13.6	Construction of 2 450MW of additional gas turbines by 2029	Option under the Integrated Resource Plan
Coal Three (Eskom)	111.0	Build third coal-fired power plant	Feasibility aspects being considered
<b>Transport</b>			
Moloto rail (Transnet)	10.0	Construction of 140km line from Pretoria to Siyabuswa	Feasibility study under way
Manganese rail and terminal (Transnet)	18.0	Upgrade rail, port and terminal capacity for manganese export	Feasibility study under way
Iron-ore line (Transnet)	13.0	Expand Sishen-Saldanha iron ore railway line	Feasibility studies completed
Coal line (Transnet)	37.0	Upgrade of the coal line from Mpumalanga to Richards Bay to 80mt over 10 years	Feasibility studies completed
High speed rail (Department of Transport)	300.0	Build a passenger or freight line between Durban and Johannesburg	Concept
<b>Water</b>			
Mzimvubu water resources development (Department of Water Affairs)	20.0	Build dam for hydroelectricity and agricultural irrigation scheme	Feasibility studies to be undertaken

Table 3.2 – Examples of Major Infrastructure Projects and costs associated with them (South Africa. National Treasury, 2012)

### 3.3.3 Roles and Economic Impact of MCOs

According to the government delivery agreement for outcome 6, which focuses on the efficient, competitive, and responsive economic infrastructure network that was published and signed in 2010, infrastructure investment results in good service provision directly to consumers, such as water and electricity supply, as well as increased productivity in sectors such as rail. Infrastructure that is efficient improves and stimulates job creation and new investments.

MCOs play an important role in urban growth and development, as well as the entire economy. They have a lot of influence over the urban landscape as they own a large amount of land. Transnet, PRASA, Portnet, and Petronet are examples of MCOs that have significant structuring elements that have a significant influence on the development patterns in cities, such as transportation networks, bulk infrastructure, energy, and ICT infrastructure, and more. Transnet and PRASA have an important function of improving urban efficiencies through the provision of mass public transportation (Ovens & Associates, 2013). Figure 3.13 below is an illustration of the impact of SOEs and MCOs' impact on urban and development growth.

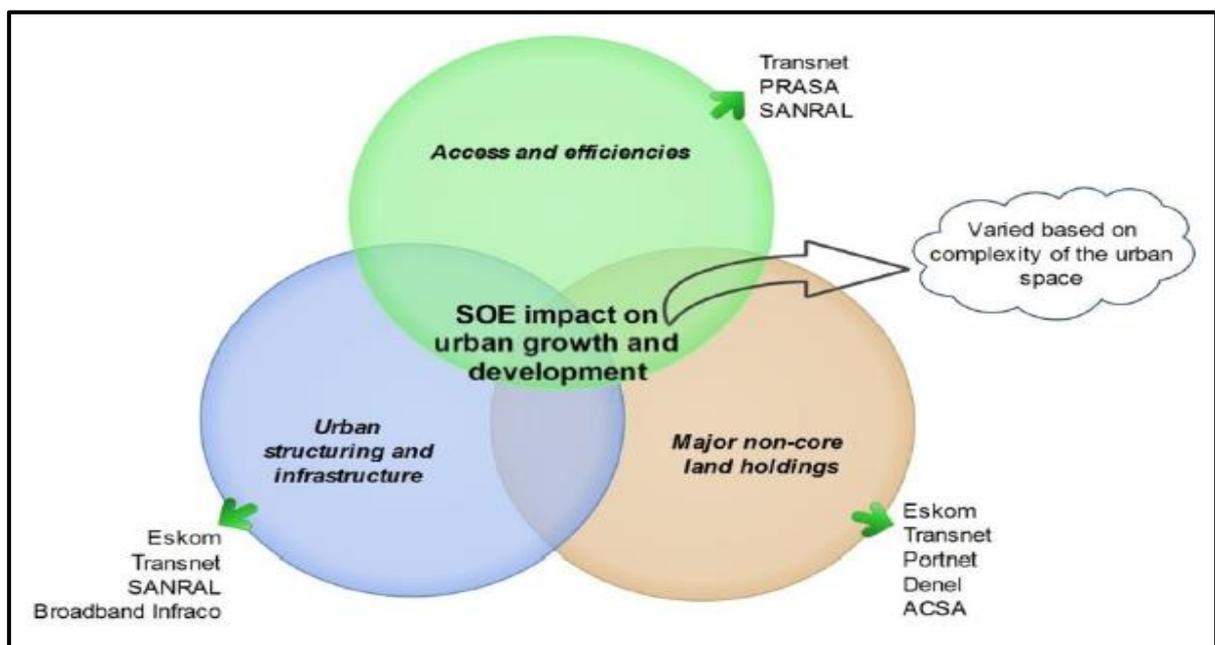


Figure 3.13 – MCOs that impact urban growth and development (Ovens & Associates, 2013:6)

Through links with Southern African Railways, the freight rail network provides strategic connections between terminals, ports, and manufacturing hubs, facilitating regional integration. These connections allow for increased freight delivery volume across value chains. For freight transportation, the TFR unit currently employs an Operating Corridor model, which includes initiatives for improved operating models, geographic expansion, and market and customer development that all contribute to economic growth (TFR, n.d.). Transnet is a world-class employer with a workforce of over 55000 highly motivated employees (Transnet, n.d.).

Airport development benefits the social economy in a variety of ways, including improving geographic accessibility for various activities such as business, tourism, and personal travel, providing time-critical inbound and outbound freight, attracting investors to locations, including knowledge-intensive industries such as biotechnology, universities, and financial services, and increasing infrastructure and property development around airports, among others (South African. Department of Transport, 2015).

ACSA provides a major contribution to the socio-economic development of the country through initiatives that improve people's quality of life and provide long-term social and economic opportunities. They make these contributions by providing education programs such as maths and science initiatives, computer donations, teacher and learner development, and school construction. They also focus on youth and women development, persons with disabilities, employee volunteerism programs, environmental sustainability, and philanthropic donations. They have previously spent over 41 million on various projects that are in line with the country's National Development Plan, Broad-Based Economic Empowerment, and skills development (ACSA, 2022).

SANRAL contributes to community development in South Africa by providing a national road network that contributes to safety, security, social and economic growth, and development. It uses its procurement process to empower people because it believes that achieving the Millennium Development Goals requires economic empowerment. It is dedicated to eradicating poverty by creating jobs, training people to become economically active, improving the status of women by bringing them into the mainstream of business, creating wealth through infrastructure by providing safe roads and better access, and promoting small, medium, and micro enterprises (SMME) (NRA, 2022).

### **3.3.4 Section Conclusion**

MCOs are self-contained entities that are partially or entirely owned by the government, according to the reviews done on this section. They are also known as SOEs or Parastatals. They also have a significant direct and indirect contribution to the country's various economic sectors, such as urban development and social economic development. There are plenty of them, but only a few of them cover the scope of the civil engineering industry. Those that do, however, do so across a broad spectrum.

### 3.4 Chapter Summary

The purpose of this chapter was to look into the study's dependent variable, project function, which is also defined as the knowledge and research area as well as exploring the mother body of this research area which is MCOs. It looked at how project functions are structured within different MCOs, as well as their roles and responsibilities. It also distinguished each organisation's structural and organisational structure, while establishing a link in order to provide a foundation for project function success analysis. Furthermore, the factors that influence the success of project functions were investigated and verified through a variety of articles, books, and publications, all of which were used in the study's relationship evaluation process.

The information gathered in this section is vital to achieving the study's main aim which is *"to evaluate the impact of project management certification and qualification on the success of project function within MCOs."* The aim of the study cannot be achieved without the background knowledge of the dependent variables provided in this chapter, as the benchmark for the entire mixed-method approach is found in the literature. Furthermore, the research design and methods were based on the findings of the literature review.

The following chapter will provide theory on the study's research design, methods and methodology adopted in the study, as well as how these methods were applied.

## CHAPTER 4: RESEARCH DESIGN, METHODS AND METHODOLOGY

The thesis navigation map shown in Figure 4.1 below shows that the first three chapters of the study which covered introduction and literature review have been completed. This chapter will focus on the research design, methods, and methodology. It further shows the path through to the end of the study.

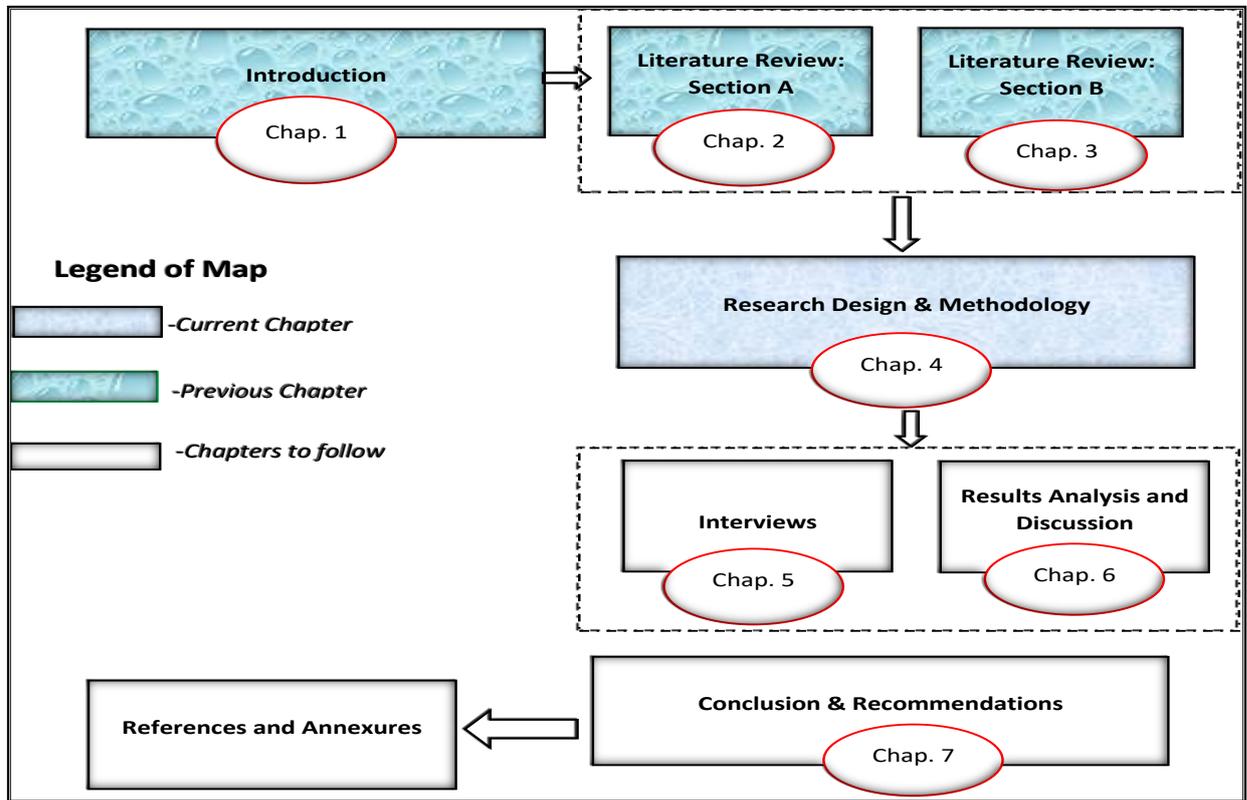


Figure 4.1 – Thesis Chapters Layout Map – Chapter 4

### 4.1 Introduction

The study's objectives 1 and 2 described the various project management qualifications and certifications a student or candidate can pursue, their significant role within the project function, and went on to explore the factors that determine the success of project functions within an organisation. Chapters 2 and 3 intensively reviewed and interrogated the literature that relates to the research knowledge and application areas, thereby addressing objectives 1 and 2 of the study. To best describe the research design and methodology applicable to this study while considering the research problem, the research question, and the research aim described in Chapter 2, while linking it to the theories and findings of Chapter 2 and 3, various research methodologies and approaches are explored in this chapter. Research designs, approaches, and methods are three fundamental terms that describe how data can be presented sequentially.

This chapter provides an overview of the research design, methods, and methodology, as well as the rationale for their use. It aligns these methods, designs, and approaches with the study's aim and objectives. It is divided into sections that describe different types of research design and approaches, such as qualitative, quantitative, and mixed methods, as well as the reasons for using mixed methods in this study. It also explain the data collection and analysis methods used, as well as how the results are analysed and presented to best meet the study's aims and objectives.

## **4.2 Research Design and Methodology**

In various fields and industries, various basic types of research are conducted, including descriptive and analytical research, applied research, qualitative, quantitative, conceptual and empirical research. A combination of both qualitative and quantitative approaches is often used (Kothari, 2004). Research is often referred to as the search for knowledge. It is a scientific and systematic search for information on a specific topic. The aim of conducting research is to find answers to questions using scientific procedures to discover hidden and unknown truths. It further expands research fields academically when students or researchers conduct research to gain familiarity with certain phenomena, gain insights into new phenomena, or test a hypothesis about a causal relationship between variables (Kothari, 2004). The nature of the research problem or issue being addressed, the researchers' personal experiences, and the study's target audiences all play a role in the researcher's decision to choose a particular research approach (Creswell & Creswell, 2018).

The researcher then describes the nature of qualitative, quantitative, or mixed methods research approaches and provides insight into why it is the most applicable and appropriate design for this study.

### **4.2.1 Research Methodology/Approach Theory**

The term "research methodology" refers to a method for solving a problem in a systematic manner. Thus every researcher devises a research methodology to solve a unique problem. Unlike research methods, research methodology has a much broader scope. The logic behind the methods and techniques used in a study are defined by the chosen research methodology, which includes not only the research methods but also explains the logic behind the methods and techniques used (Kothari, 2004)

Research methodology approaches are research plans and procedures that provide the next step from broad assumptions to detailed methods for collecting, analysing, and interpreting data. It is based on the philosophical assumptions of the researcher (Creswell & Creswell, 2018). Quantitative, qualitative, and mixed methodologies are the three most common types

of academic research approaches. Qualitative and quantitative are not rigid or distinct categories; rather, they represent two distinct ends of a spectrum. The most obvious distinction between the two is that qualitative methodology employs words, whereas quantitative methodology employs numbers (Creswell & Creswell, 2018). Quantitative research is based on quantifying phenomena, whereas qualitative research is based on qualitative phenomena (Kothari, 2004). Each methodology involves philosophical assumptions and distinct methods or procedures, whereas a broad research approach involves the intersection of philosophy, research designs, and specific methods, as shown in Figure 4.2 below. The researcher must consider the philosophical worldview assumptions that are brought into the study, and then decide on the most appropriate research design; and the specific research techniques that are practical and most suitable for his/her study (Creswell & Creswell, 2018).

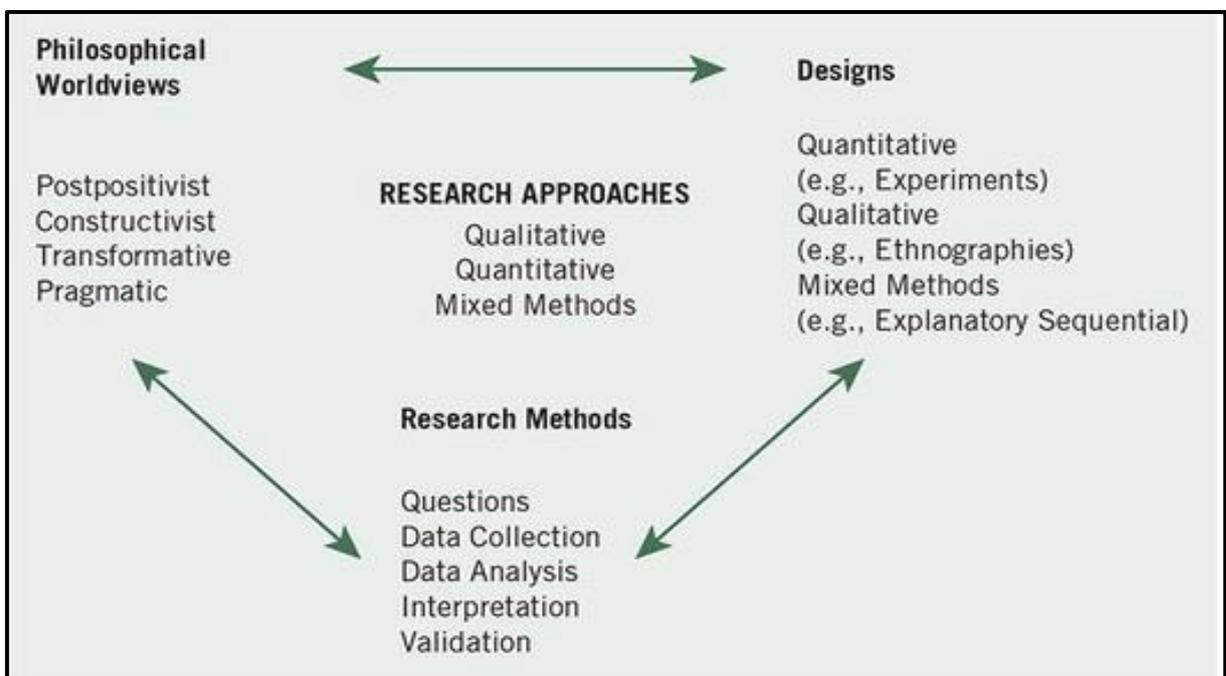


Figure 4.2 – Framework for Research (Creswell & Creswell, 2018)

#### 4.2.1.1. Qualitative Research

A qualitative research strategy seeks to explore and comprehend how individuals or groups perceive a social or human issue (Creswell & Creswell, 2018). It is often referred to as "motivation research" as it is used to reveal the underlying motives and desires of human behaviour. It uses projective techniques such as association tests, sentence completion tests, and story completion tests, among others (Kothari, 2004). This study places a premium on in-depth meaning and people's subjective experiences, relying on inductive design principles to generate meaning, while producing rich and descriptive data, as are commonly used in exploratory and descriptive research (Leavy, 2017). This approach follows the process of asking the participants questions in order to compile data, then converting answers and sorting

it into themes. then the researcher draws interpretations from the data. The final report has no set standard but follows a flexible structure (Creswell & Creswell, 2018).

#### **4.2.1.2 Quantitative Research**

Quantitative research focuses on assessing objective theories by examining the relationship between variables that can be measured using instruments, thereafter, employing statistical procedures to analyse the data (Creswell & Creswell, 2018). To achieve objectivity and precise measurement, the researcher emphasises breadth, statistical descriptions, and generalisability, then makes deductions in order to build evidence that supports a specific hypothesis or theory. It is frequently used in explanatory studies to investigate causal relationships, associations, and correlations (Leavy, 2017). It is applicable to phenomena that can be quantified (Kothari, 2004) Introduction, literature, methods, results, and discussion make up the overall structure of the final report on the phenomena under review (Creswell & Creswell, 2018).

#### **4.2.1.3 Mixed-Methods Research**

The mixed methods approach combines quantitative and qualitative methods by integrating data collected using both methods, while employing a distinct design. This method uses integrated data to provide additional insight beyond what qualitative or quantitative data can provide. Quantitative research methods are more closed ended, whereas qualitative research methods are more open-ended, with no predetermined answers. A mixed methods approach combines the two (Creswell & Creswell, 2018). This method is a problem-centred approach in which methods and theories are applied incrementally based on the study's needs and uses deductive and inductive designs to generate both qualitative and quantitative data (Leavy, 2017). There are three types of methods used in research; convergent, explanatory, and exploratory. To provide a comprehensive analysis of the research problem, the researcher must merge quantitative and qualitative data using the convergence method. The exploratory method requires the researcher to first collect and analyse quantitative data before explaining it in greater depth using qualitative data. The exploratory method requires the researcher to first collect and analyse qualitative data before using the information to build into the quantitative phase (Creswell & Creswell, 2018).

Table 4.1 below summarises the above definitions of the three research methods in a concise manner.

Table 1.3 Quantitative, Mixed, and Qualitative Methods		
Quantitative Methods	Mixed Methods	Qualitative Methods
Pre-determined	Both predetermined and emerging methods	Emerging methods
Instrument based questions	Both open- and closed-ended questions	Open-ended questions
Performance data, attitude data, observational data, and census data	Multiple forms of data drawing on all possibilities	Interview data, observation data, document data, and audiovisual data
Statistical analysis	Statistical and text analysis	Text and image analysis
Statistical interpretation	Across databases interpretation	Themes, patterns interpretation

Table 4.1 – Research Methods (Creswell & Creswell, 2018:53)

#### 4.2.2 Research Design

Definition of the research problem is the first step in creating a research design. Such decisions come from questioning what, where, when how much and by what means the research will be pursued. Research design is the conceptual framework within which the research will be conducted. The researcher considers what the study is about, why it's being done, where it will be done, what data is needed, what techniques will be used to collect that data and where it will be collected, how long the study will last, what the sample design will look like, and what style of report will be used to present the results and findings (Kothari, 2004). The three types of design used are; experimental, quasi-experimental, and non-experimental, If the design involves random assignment to different conditions, it is considered to be randomised or experimental research. It's considered quasi-experimental if it's not randomised but instead uses multiple groups or waves of measurement, and it's considered non-experimental if it's neither of these (Marczyk, DeMatteo & Festinger, 2005).

- **This Study's Research Design**

This research is categorised as non-experimental. Non-experimental studies are also classified according to the nature of the research and the most commonly known are case studies, which entail an in-depth assessment of a single person or a group of people, in order to provide an accurate and complete description of the case in question;

Naturalistic research entails observing organisms in their natural habitat. Surveys entail asking a large number of people questions about their behaviours, attitudes, and opinions; and focus groups entail the formal structuring of a group of people who are brought together to discuss a topic or series of topics over a set period of time (Marczyk et al., 2005). The researcher decided to use the **survey method** to address the aim of the study which is to discover the relationship between the independent variable - 'Project management qualification and certification' and the dependent variable - 'project function'. Thus the study method chosen is a **correlation study**. The research design for this study is shown in Figure 4.2 below, which demonstrates how the mixed methods research approach was used for this study, and how the qualitative method fed into the study's goal and objectives by providing data, while justifying the use of the quantitative method, which will address the study's aims. It also depicts the research design process up to the analysis of results, using the linear regression method.

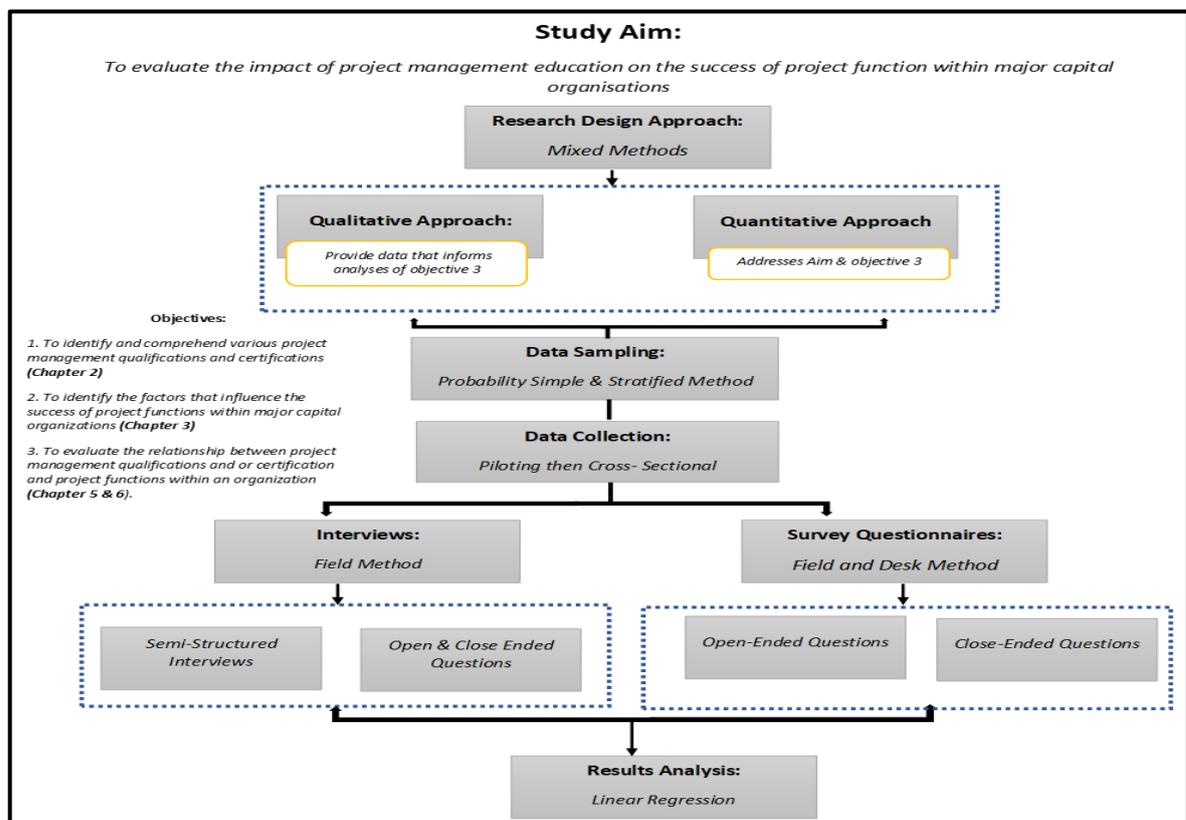


Figure 4.3 – This Study's Research Methodology Design

#### 4.2.3 Research Methodology for this Study

This study uses a mixed method research approach, in which qualitative and quantitative data is collected through semi structured interviews and closed and open-ended questionnaires survey. The convergence mixed method is used, in which qualitative and quantitative data are collected simultaneously, merged, and analysed to reach a conclusion and then produce recommendations. Descriptions of how this method was used to address each objective and research the study's goal are provided below.

#### **4.2.3.1 Addressing Objective 1 – Qualitative Approach**

A qualitative study was conducted to address the study's first objective, which was to *"identify and comprehend various project management qualifications and certifications available on a global scale."* An extensive literature review was conducted on the subject of project management education. Various bodies and institutions' course websites, manuals, and books were also studied, while collaborating with national regulations and acts within the space of higher learning. Considering the absence of individual respondents, the data gathered through the literature review was efficient and sufficient to meet this objective.

#### **4.2.3.2 Addressing Objective 2 – Qualitative Approach**

To address the study's second objective, which is to *"identify the factors that influence the success of project functions within MCOs,"* qualitative data was gathered via a review of various articles and books that published the factors that determine the success of project functions, which have been tried and tested in various fields and industries. These findings are backed up by semi-structured interviews that provide relevant information and results that were very similar to those gathered through the literature review.

#### **4.2.3.3 Addressing Objective 3 – Quantitative approach**

To address the third objective which is, *'to evaluate the relationship between project management qualifications and or certification and project functions success within an organisation,'* a quantitative approach method is used, in which statistical procedures are used to analyse data gathered through survey open and closed ended questionnaires.

#### **4.3.4.4 Addressing the Aim of the study – Mixed Method**

To achieve the study's aim of *evaluating the impact of project management education on the success of project functions within MCOs,* a mixed method approach was used, in which quantitative and qualitative data collected were combined. The data gathered to meet the study objectives was then combined to establish, firstly, a baseline of the factors that influence project function success, and secondly, the various competencies of staff members who had earned various project management qualifications and certifications. The factors were then sorted into four groups, based on the findings: personal, organisational, structural, and strategic factors; and within each of these groups, some of the factors could only be assessed using a qualitative approach, in which specific elements of the project function were interpreted and sorted into various specific categories.

### 4.3 Research Methods

The methods used in conducting research operations include data collection methods, statistical techniques for establishing relationships between variables, and methods for evaluating the validity of research findings (Kothari, 2004). The main distinction between research methodology and research methods is that research methodology is more concerned with the research process, whereas research methods are concerned with finding answers to research questions. The term "research methods" refers to all the approaches, methods, techniques, and processes that a researcher employs during the research process. Surveys, interviews, and questionnaires are examples of methods that can be used during the creation, collection, and processing of data sets (Bairagi & Munot, 2019).

#### 4.3.1 Data Sampling

The term population or universe refers to the entire group of participants that a researcher is interested in (Bairagi & Munot, 2019). The researcher is not able to study the entire population, thus, instead, he or she studies a subset of the population that is called a "sample" (Marczyk et al., 2005). It is not only impossible, but also impractical due to practical constraints such as cost and time (Singh, 2006). By citing Cochran, Singh (2006) defines sampling as a joint procedure of selection and estimation with the least potential estimation error.

In a nutshell, sampling is the process whereby a researcher selects a group of individuals from a larger population by first determining the elements that are of interest to him or her. These elements can include the type of person, the group he/she comes from or other inanimate objects that come from the population or sampling frame from which the study data will be drawn. (Leavy, 2017). Figure 4.4 below shows how a sample relates to the population it is drawn from.

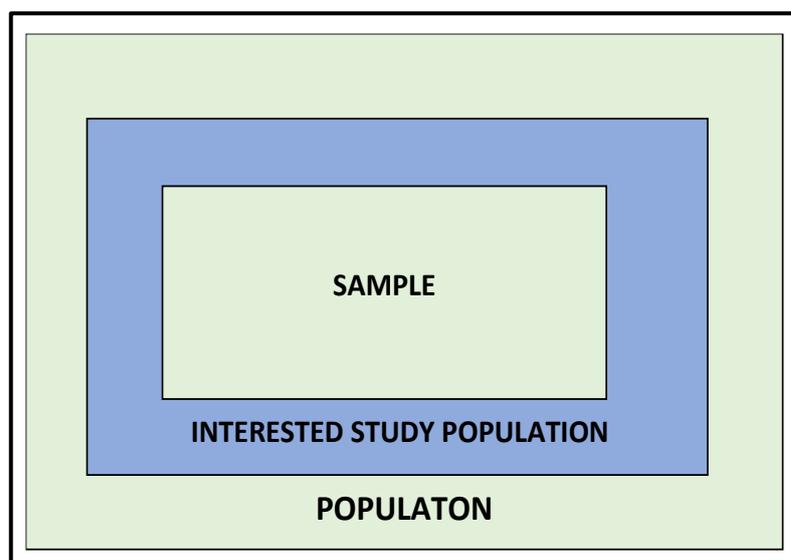


Figure 4.4 – Sample and Population Relationship (Bairagi & Munot, 2019:89)

### 4.3.1.1 Various Methods of Data Sampling

The sampling techniques were developed to make the research process as cost-effective and precise as possible. All statistical techniques and analyses rely on sampling in some way. Statistics are known as the measurement of a sample and include observations such as Mean Standard Deviation, and Coefficient of Correlation, while parameters are known as population measures such as Mean Standard Deviation, and Coefficient of Correlation. The sample statistics determine the accuracy of the parameters (Singh, 2006).

Figure 4.5 below demonstrates the sampling method used to obtain data about the population, while showing the difference between the sample, and the population, as well as the various types of sampling methods that can be used, which will be discussed further in the next section.

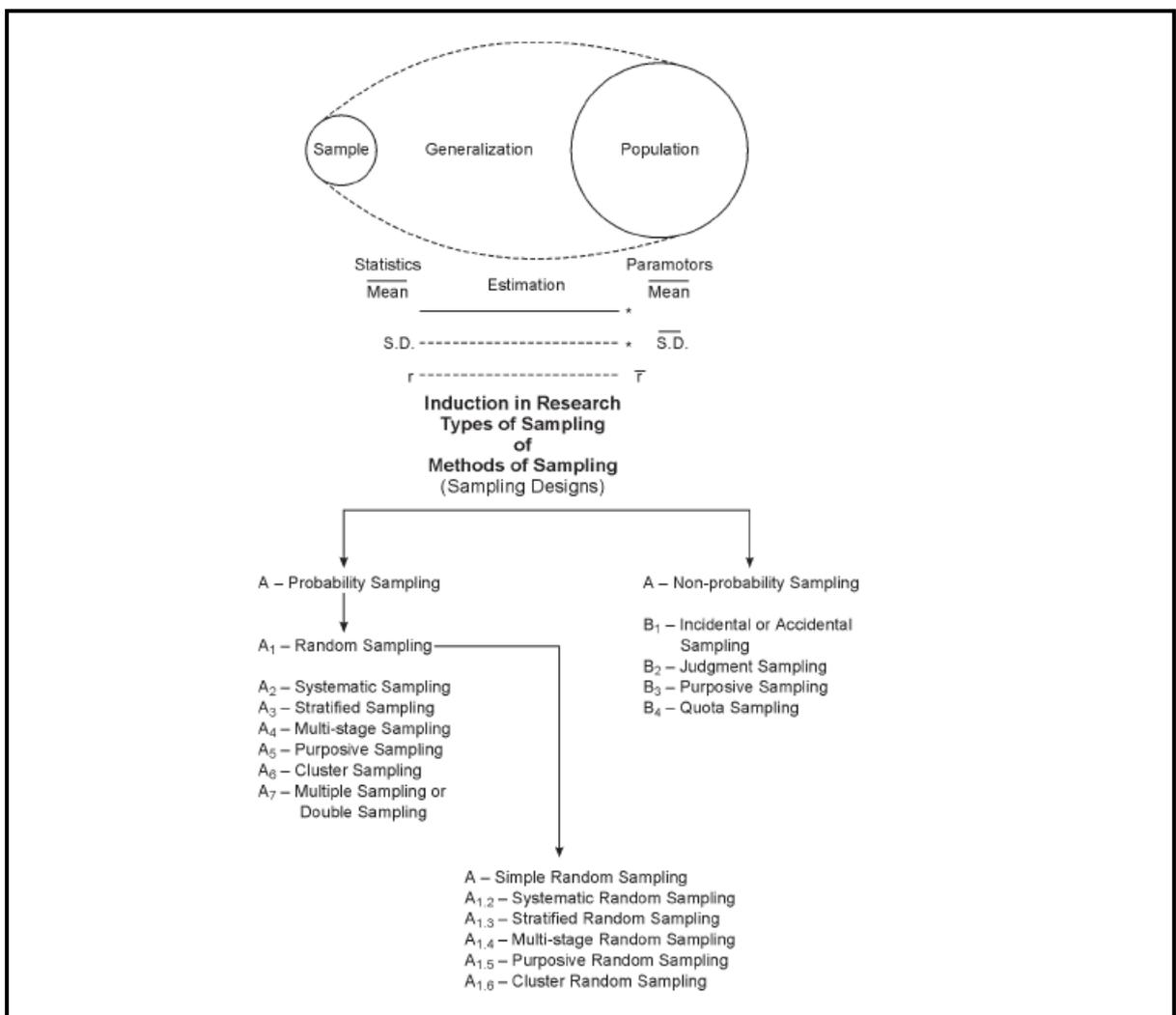


Figure 4.5 – Sampling Design (Singh, 2006)

#### a) Probability Sampling Methods

Probability Sampling also known as random sampling is a sampling method in which every unit of the population must have an equal and independent chance of selection. Equal signifies

that each element's chance of being chosen from a population is the same (Kumar, 2011). The sample selection arises from using probability sampling, and this method is also known as an Equal Probability of Selection Design (Bairagi & Munot, 2019). It expresses the likelihood that a sample is representative of the entire population. The Law of Statistical Regularity, which includes the probability principle, where a small sample is taken to be a good representative of the population, and the Law of Inertia of the Large Sample, which is the polar opposite of the first law, whereby a large sample is a good representative of the population, are the two laws of probability sampling (Singh, 2006). The following are the various types of probability sampling, as well as their definitions.

- **Simple Random Sampling Method**

Simple random sampling is a method in which each element has an equal and fair chance of being chosen by the method of randomisation. It employs a variety of methods, including coin tossing, dice throwing, the lottery method, blindfolds, and so on. (Singh, 2006)

- **Systematic Sampling Method**

The systematic sampling method considers that the target population, which is a large spread, has a method of selection by means of order or numbering, and it selects the sample using element intervals. For example, every tenth element, for example, could be included in the sample (Bairagi & Munot, 2019).

- **Stratified Sampling Method**

When a population is not representative of a homogeneous group, stratified sampling is used. In this method, a population is divided into several sub-populations to make them homogeneous in their selection, and then a sample is chosen from the sub-populations using a proportional allocations process (Kothari, 2004)

- **Cluster Sampling Method**

When the population is large enough to form a relatively small population, the clustering sampling method is typically used, in which the entire population is divided into equal groups and random sampling performed on each group to obtain a sample (Bairagi & Munot, 2019).

- **Multi-stage Sampling Method**

This sampling method is similar to the cluster method, but with the addition of levels of sampling from clusters. It comprises primary and secondary samples where the primary sample units are inclusive groups, while the secondary sample units are sub-groups within the total sample units (Singh, 2006).

- **Multiple or Double Sampling Method**

After the first sample has been completed and some of the selected sample has not responded, a second sample, also known as double, multiple, or repetitive sampling, will be completed on non-respondents and questionnaires will be sent out again. (Singh, 2006)

**b) Non-Probability Sampling Methods**

Non-Probability Sampling is a sampling method in which the researcher deliberately selects study elements from a population, whereby the researcher's selection of a sample reigns supreme (Kothari, 2004). Contradictory to probability sampling, where elements have an equal and fair chance of being chosen, samples drawn using non-probability do not have a fair and equal chance of being chosen because the researcher decides which sample to choose. Thus it is most used in action research, where a group of people is studied without any attempt at generalisation (Singh, 2006). The following are the various types of non- probability sampling, as well as their definitions, as defined by Singh (2006).

- **Incidental or Accidental Sampling Method**

This is the method of sampling that draws on elements of the population that are frequently and readily available because the researcher is unable to use other sampling methods.

- **Judgement Sampling Method**

This is a method for selecting a sample from a population based on available data, thoughts, or intuition on self-evident grounds.

- **Purposive Sampling Method**

This is a sampling technique in which a sample is chosen using an arbitrary method that is known to produce well-matched groups.

- **Quota Sampling Method**

This is a hybrid of the judgment and probability sampling methods, in which the sample is selected based on available information and then a quota is sampled.

**4.3.1.2 Sampling Method for this Study**

The probability sampling method was used in this study, which ensured that every individual in the population had a fair and equal chance of being nominated, while reducing the risk of systematic bias. The results were also validated using margins of error and confidence intervals. This method was chosen because not only is it cost-effective, but it is also time-

effective, given the amount of time available for the research. The types of probability sampling used in this study are listed below, along with an explanation of where and how they were used. Figure 4.6 provides a clear picture of this study's sampling methods.

**a) Probability: Simple Random Sampling**

The MCOs that will be researched were selected using a simple random sampling method. TFR, SANRAL, PRASA, ESKOM, and ACSA are MCOs that deal with major capital civil infrastructure in South Africa, according to the research conducted in the literature review. TFR, SANRAL, ACSA, and ESKOM were randomly sampled using a simple random sampling method, that used a ballot paper technique. However, ESKOM turned down the researcher's request.

This, unfortunately does not leave a large margin of error, as Kumar (2011) explained by saying that if the number of refusals to participate in the study is relatively small, the concept of independent chance of selection is not eliminated, and the sample is still representative of the population. The study area for both qualitative and quantitative methodology then remains a simple randomly sampled group of organisations.

The qualitative part of the study, which required interviews with the leaders of the project functions within the sampled MCOs to assess certain factors of the project functions they lead and provide a better understanding of the functions and roles of their organisations, also adopted to use a simple random sampling method. There were usually multiple project functions and more than one leader serving similar and/or different functions in these organisations; hence the adoption of this method to minimise the number of functions, while saving on time and cost.

**b) Probability: Stratified Sampling Method:**

The quantitative research participants were chosen using a stratified sampling method that using proportionate technique to ensure that all levels of project functions were represented, which ensured that the views and ratings of project function success were not biased. It is well known that when employees are on different levels of employment and have different levels of authority, their experiences of their work environment can differ, resulting in biased opinions. stratified sampling ensures that all levels are included equally and fairly. Figure 4.6 shows the various strata in detail on the third level of the structure.

**c) Probability: Double/Multiple Sampling Method**

When the sampled participants did not respond to the request to take part in the research, request the method of double or multiple sampling was used. The non-respondent sampling

was then repeated, and questionnaires were sent out until a sample size with a small margin of error was reached.

The sampling methods used in this study are demonstrated in Figure 4.6 below. It incorporates the research's mixed methods approach, as well as explaining how and where each sampling method was used.

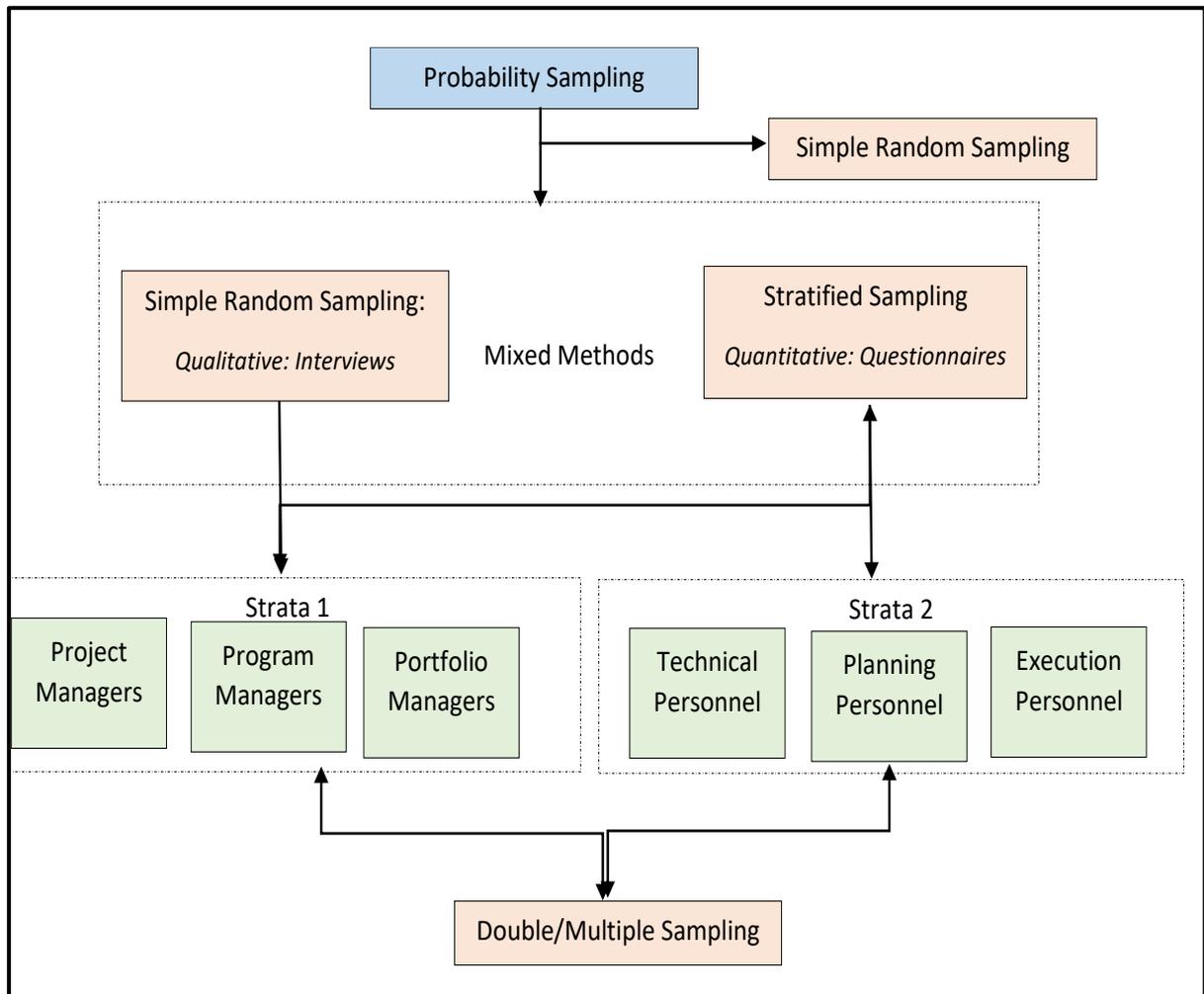


Figure 4.6 – Sampling Methods adopted for this study

#### d) Sample Size Calculations

The number of respondents chosen from a population to make up a study sample is referred to as the sample size. The size of the sample should not be excessively large or small, but should meet the requirements for efficiency, representativeness, reliability, and flexibility (Kothari, 2004).

It is critical that the researcher should determine the acceptable confidence level and level of precision when determining the sample size. The confidence level is the probability of obtaining the confidence interval that truly represents the population being studied and precision refers to the sampling errors that can occur during the sampling process. The following sample size

formula from Cochran's study is used to calculate sample sizes for both simple random and stratified sampling in a finite population; while ensuring that each individual or organisation has the same probability of being selected

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Where: n = Sample size

N = Population Size

n<sub>0</sub> = Cochran's sample size recommendation

The n<sub>0</sub> is calculated using the below equation:

$$n_0 = \frac{Z^2 p q}{e^2}$$

Where Z is a z-score from z-table, p is the estimated proportion of the attribute present in the population at a maximum of 0,5 when unknown, and q is (1- p) and e is the precision level which is 5 percent.

#### **4.3.2 The Data Collection Process**

Data collection is one of the most important aspects of any research study, and without it, there would be no research. Depending on the type of research conducted, data collected for the purpose of the research can be either primary or secondary. Primary data is data that are collected from scratch, whereas secondary data has already been collected and passed through a statistical process by someone other than the researcher (Kothari, 2004). The data collection strategy is usually driven by the research questions and both independent and dependent variables of the study under investigation, both independent and dependent. There are numerous data collection techniques available, and it is impossible to list them all. Formal testing, interviewing, global ratings or surveys, observation, and biological measures are some of the most common (Marczyk et al., 2005).

As shown in Figure 4.7 below, this study collects primary data through interviews for the qualitative part of the study and survey questionnaires for the quantitative part of the study. The desk and field exercises are used to collect both qualitative and quantitative data. Respondents in qualitative studies were interviewed had the option of having face-to-face interviews at their preferred location or online visual or telephonic interviews. For the quantitative study, a survey link was created with questionnaires for participants to complete, and those who wanted the opportunity to meet the researcher and complete the link together, particularly those who wanted more information on the questionnaires, were given that opportunity.

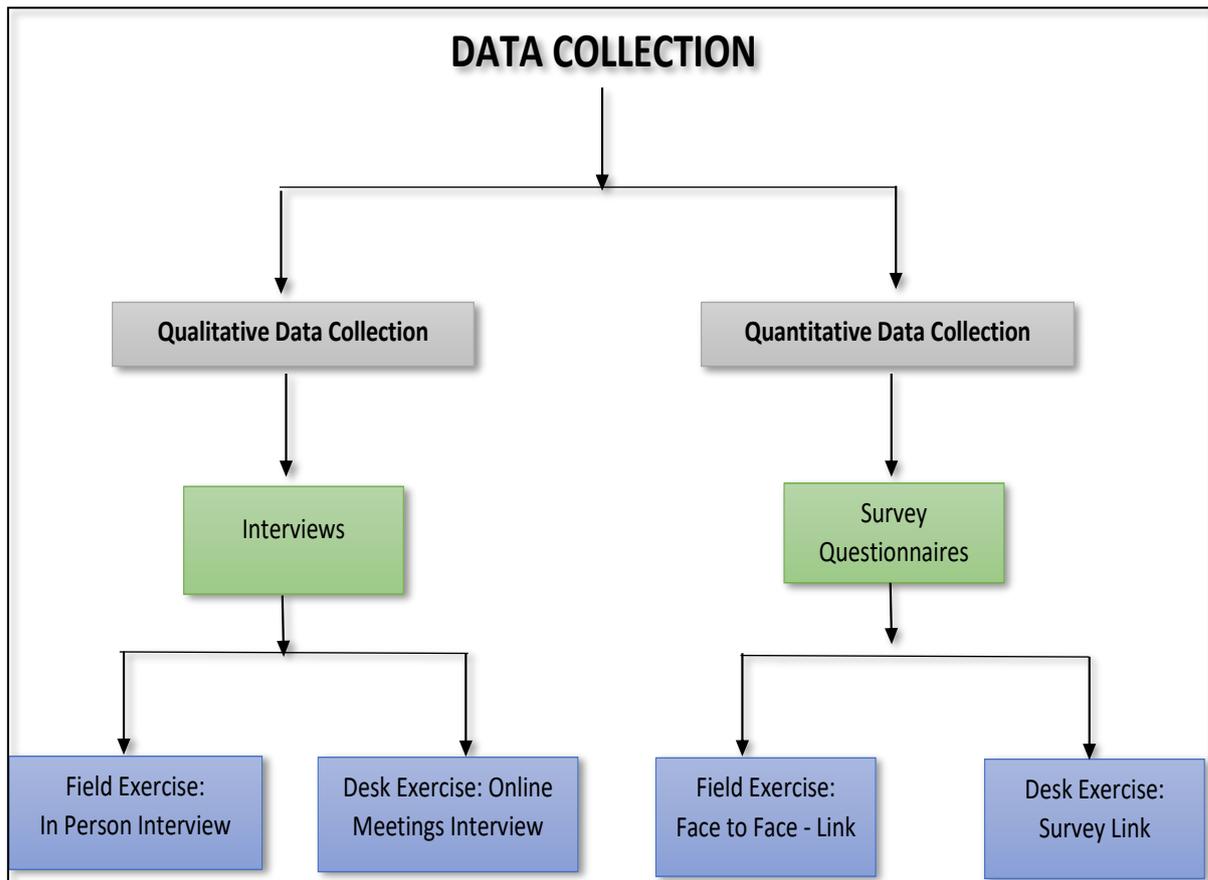


Figure 4.7 – Data Collection Method for this Study

### 4.3.3 Data Collection by Interviews

Personal or telephonic interviews can be used to collect data in interviews (Kothari, 2004), and this study mostly used personal interviews, subject to the respondents' availability, with only a few participants requesting online interviews on Microsoft Teams, which also allowed for a visual interaction meeting.

#### 4.3.3.1 Step-by-Step Process for Data Collection by Interviews

Data collection by interview is a type of self-report that is simple, efficient, and less costly but can yield a great deal of information (Marczyk et al., 2005). Figure 4.8 below shows a step-by-step method used for this study to gather information through personal interviews. The purpose of the interviews was to address the qualitative goal of the study, which was to gain a better understanding of the various project management qualifications and certifications, as well as to discover how those in the project management functions viewed them, as well as to discuss various other factors that impact the success of project functions, that were not discovered during the literature review. The following steps (Figure 4.8) are discussed in greater depth below, in order to establish the validity and accuracy of the data gathered; by providing insight into how the data was gathered, without jeopardising the respondents' privacy and comfort.

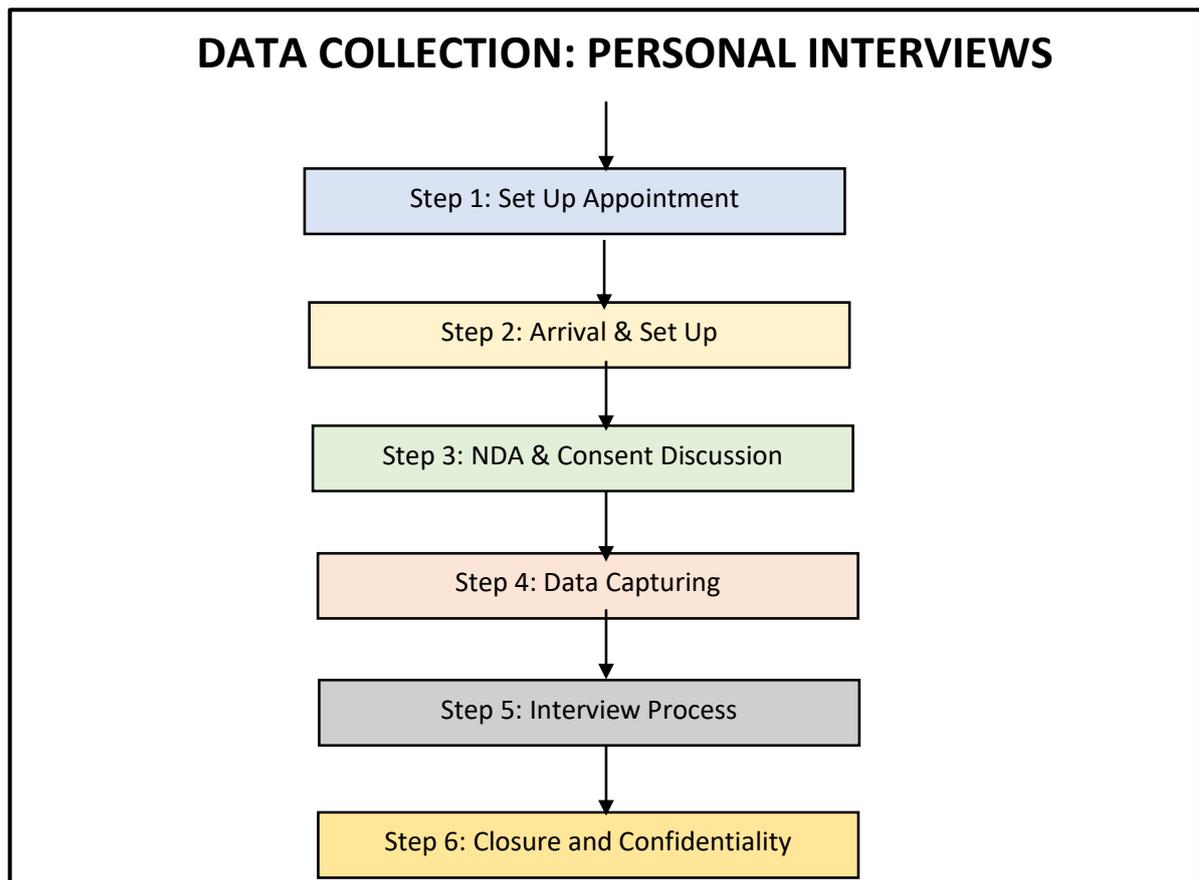


Figure 4.8 – Steps Followed for Data Collection by interviews

- **Step 1: Set Up Appointment**

As soon as the researcher reached the data collection phase, all the organisations that had given consent for the study were contacted with the sampled numbers of participants required for both qualitative and quantitative analysis, considering the extra 20 percent safety factor. An appointment was then made, starting with the highest level of authority, and working down to the second level. This was done to ensure that correspondence from both portfolio, program, and project management levels were consistent and therefore the data received would be accurate. The appointment was set for an hour per interview session, even though it took on average 45 minutes, with an extra 15 minutes set aside as a safety factor.

- **Step 2: Arrival and Set Up**

The interview was scheduled to take place at a location chosen by each respondent, which was usually their office or workplace. The respondent would then select a safe space within their workplace where the interview would take place, which was typically their office or designated boardrooms. The researcher made sure that she would arrive at the agreed time to allow enough time for setting-up and personal comfort, as well as to familiarise herself with the environment in case of an emergency, without wasting the respondent's time.

- **Step 3: NDA and Consent Discussion**

Before an interview could begin, the respondents were presented with a Non-Disclosure Agreement (NDA) to assure them that all information discussed during the interviews would remain confidential, and that their identity would be protected by all means possible even if the article produced after the study was published, the respondents would remain unidentifiable. During this discussion, the respondents were also asked for their consent to record the interview for the purposes of scribbling notes and fact alignment at a later time, and thankfully, all of them consented to that.

- **Step 4: Data Capturing**

To ensure that everything said during the interview was accurately and comprehensively recorded, two methods were used. The first method was to scribble notes in a notebook, highlighting all of the factual responses, and the second method was to audio record the interview so that it could be reviewed later for factual alignment or used as a reference or checkpoint if anything critical was left out during the interview. The audio was also used to compare other correspondence of all the other interviews and as a reference during the analysis phase.

- **Step 5: Interview Process**

The interview began with an introduction phase in which the researcher briefly introduced themselves and their study, as well as the goals the researchers hoped to achieve via the interview and the overall study. The respondent was also given the opportunity to introduce themselves in the best way they knew how, as well as being guided regarding the answering of administrative closed-ended questions for the study's purposes. The interview then progressed to more open-ended questions (Section 4.3.2.3), with the researcher's role being to ask the questions and offer guidance and clarification when needed.

- **Step 6: Closure and Confidentiality Assurance**

The respondents were given the opportunity to ask questions, make suggestions, and offer advice at the end of the interview. The respondents were also reassured of the confidentiality of the interview they had just completed, as well as of the binding terms of the NDA the researcher signed with their employers.

This was done because some of the respondents inquired during the interview process if the interview would be kept private between the interviewer and the respondents and asked whether they would be safe, especially in respect of their being required to give negative feedback about the organisation they belonged to.

#### **4.3.3.2 Interview Questions: Semi -Structured**

Semi-structured interviews are one of the most common interview structures used in qualitative research. Such interviews are used when the researcher wants to understand specific information that can afterwards be compared to other data gathered during the interviews (Dawson, 2009). Semi-structured interviews are commonly used when a researcher needs to know the independent thoughts of participants via the use of open-ended questions. when the research needs to ask questions that the participants would not feel comfortable about answering in front of other people or a group of other people, or when the researcher is examining uncharted territory where there may be issues that require extreme caution and consideration in order to gather useful data.

The goal of this study is to provide the participants with a free space where they could express themselves without fear of anything, by using semi-structured interview questions. The researcher's objective was to generate a safe environment where respondents could answer open-ended questions about the relationship between the variable 'project management qualification and or certification' and the other variable - being various project functions that occurred in the participant's workspace. Participants were assured that they could speak freely without any negative repercussions occurring thereafter (Adams, 2018).

Adams (2018) stated that semi-structured interviews are used as an adjunct to supplement and add depth to the quantitative approach of the study; and that is one of the reasons why that approach was adopted for this study. Complicated questionnaires are still used during semi-structured interviews, but only as guidelines to channel participants' thoughts, and not to limit their responses in any way. These interviews, it goes without saying, provided extremely useful information to supplement the quantitative data, while also channelling the respondents' thoughts.

#### **4.3.4 Data Collection by Survey Questionnaires**

Singh (2006) divides survey methods into the following categories; descriptive, analytical, school, and genetic in his 2006 book '*Fundamentals of Research Methodology and Statistics.*' He stated that the use of various survey methods is dependent on the study's assumptions, and that they are typically used to investigate the cause-effect relationship between two or more variables.

The methods of data collection used in this study, interviews, and questionnaires, are some of the survey methods that fall under the descriptive category. The most common type of descriptive survey method is questionnaires. Even though developing questionnaires, receiving adequate responses, and receiving reliable and easy to analyse data can be difficult,

questionnaires allow for broad coverage with less effort and cost; as well as greater validity of results due to having a larger or more representative sample to work with.

#### 4.3.4.1 Step-by-Step Process for Data Collection by Survey Questionnaires

The step-by-step process for collecting data through questionnaires for this study is depicted in Figure 4.9 below. These steps will be described in more detail below the illustration. The quantitative section of the study used a questionnaire survey method to gather data for the investigation of the cause-effect relationship between project management education (certification and qualification) and project functions. The motive for illustrating and elaborating on the steps below is to provide a better understanding of the critical strategy that had to be implemented, to ensure that enough data that is accurate or close enough, was received in a timely manner.

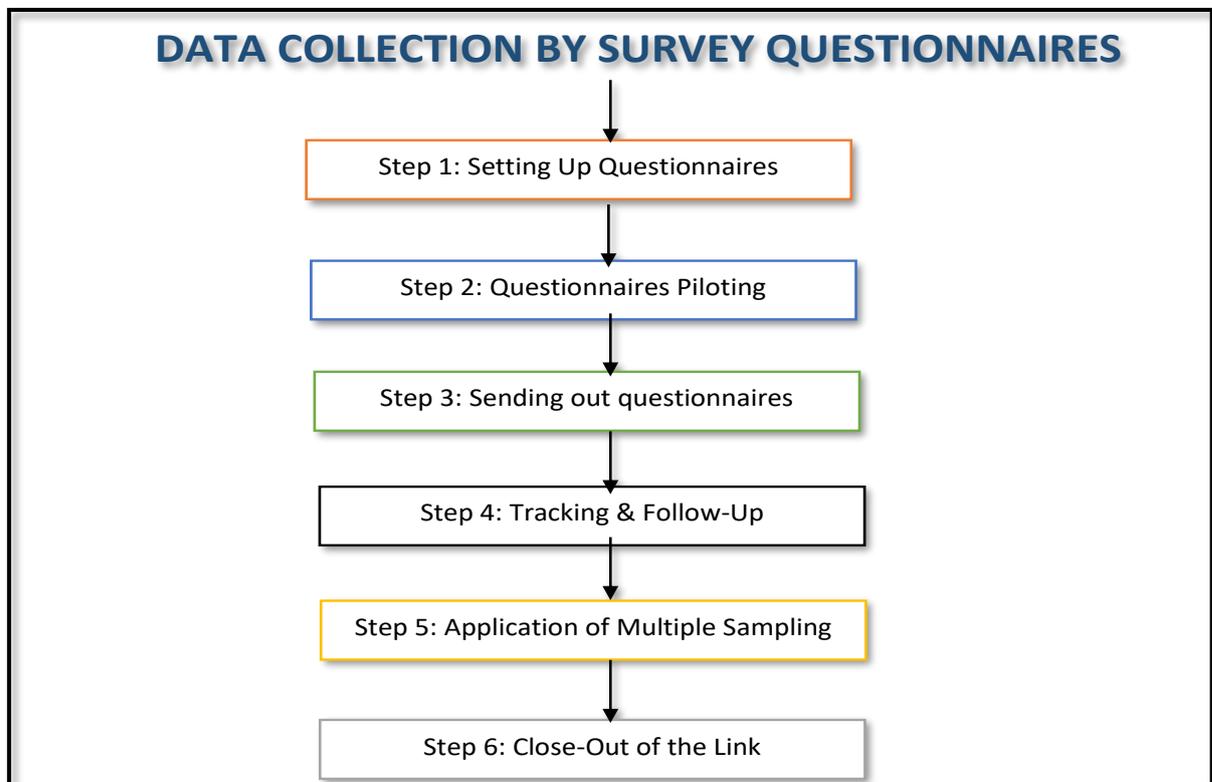


Figure 4.9 – Steps Followed for Data Collection by Survey Questionnaires

- **Step 1: Setting up Questionnaires**

Various success factors that contribute to the success of project functions were identified during the literature review study (Chapter 3 Section 3.2). Various scholars' and authors' findings of success factors of project function were compared and contrasted. More of these factors were continually established during the qualitative study. Valle and Soares (2012) summed up all of these factors into brief in-depth categories, hence the study was then centred on their classification to ensure that each factor was considered. and evaluated. The

questionnaires were then uploaded to a Google Form and discussed with the study supervisor, who offered suggestions for further improvement before approving the questionnaires for piloting.

- **Step 2: Questionnaires Piloting**

After receiving approval for piloting, questionnaires were sent to ten people, eight of whom responded within four days and one within five days. The feedback from piloting mostly stated that the questions were mostly simple to answer and did not take much time. However, the respondents said that the long description of the study and the terminology used took up unnecessary time, and that if there was a way to reduce it, that would be ideal. After receiving all of the comments, more changes were made, including a short video of the researchers introducing themselves and the study, and the uncommon terminology (less than 2 minutes). The questions were then ready for final approval after all of the necessary changes had been made.

- **Step 3: Sending out Questionnaires**

The questionnaires were loaded into three different Google forms, one for each organisation, and each was linked to its own Google Drive excel spreadsheet for analysis at a later stage. Questionnaires and sampled numbers, which included the safety factor number, were then sent to the representative of the organisations with whom the researcher had been working since the beginning, who then forwarded the link to the appropriate participants.

- **Step 4: Tracking and Follow-Up**

Data collection via survey link is not an easy task, especially in corporate settings where participants are already overburdened by their own work obligations. To keep track of the process, one must remain alert and on top of their game. This was why the tracking system was put in place. The google form app was downloaded on the phone to track the progress of the responses, and whenever a new response to the questionnaires was received, the researcher received a notification on the phone. This also allowed the researcher to monitor whether the participants were providing sufficient information, and if a deviation was detected, then a mitigation procedure would immediately be implemented.

- **Step 5: Application of Multiple/Double Sampling Method**

Two of the organisations' responses were extremely positive, and the required number of samples was obtained in less than a week. This was, of course, after some follow-up after three days and assistance from higher management in encouraging their team's participation. One of the organisations, however, presented a problem. There was still no response two

weeks after sending out the link, and even after a follow-up, they had to reassure the organisation that participation was voluntary. Then a mitigation strategy was put in place. The strategy included reaching out to a personal network of people to intervene and plead on behalf of participants, with the organisation's management. To fit the study, the application of a double or multiple sampling method was activated and used. Responses started to emerge, and because there was still insufficient participation, another network was established until the sampled target was met.

- **Step 6: Close-Out of the Link**

The link was supposed to be closed in three weeks, but it was only closed after 31 days due to delays in responses. This applied to all organisations, regardless of the response rate. The linked excel spreadsheets were extracted from Google Drive at that time for the purpose of results analysis.

#### **4.4 Results Analysis and Presentation**

To determine the relationship between two or more variables, different types of statistical analysis methods can be used. Regression and correlation analysis are the most common. The difference between the two is that correlation assesses the degree of a relationship between two variables, whereas regression examines how one variable influences another (Treiman, 2009). What most authors pointed out was that correlation does not always imply causation; which was taken into account. The motive for utilising both methods for this study was to provide a better understanding of the absence or presence of the independent variable (Project Management Qualification and Certification), allowing for a better prediction of the consequences of changes in the cause, by performing correlation relationship analysis, while providing its association.

##### **4.4.1 Correlation Relationship**

Observed association between the independent and dependent variable is one of the criteria of establishing correlation analysis (Glass & Asher, 2006). In this method, when one variable is going up (or down) then the other variable must also go either up (or down). In this study, the project management certification and qualification are the independent variables and project function is the dependent variable. Consequently, a test is carried out to see if the presence and rise in project qualifications and certifications increases the success of project functions and vice versa; or otherwise does not have any impact at all. This criterion was met in the study.

#### **4.4.2 Results Presentation**

The data is presented in a variety of graph structures, including pie charts, line graphs, and bar graphs. Pie charts are used for administrative data such as age, gender, work experience, and years of service. Bar graphs are used to present an individual organisation's data and factor by factor results; and line graphs are used to demonstrate the causation relationship between independent and dependent variables and to make comparisons of organisations' results. The interpretation is also provided below each graph, to give the results a clear meaning and translation, while providing a clear and broader picture.

#### **4.5 Chapter Summary**

The purpose of this chapter was to provide an overview of the study's research design, methods, and methodology, as well as the motivation behind each. It did so by presenting a line of execution while providing an in-depth theory and application of the methods used. In this chapter it was stated that the best fit research method is a combination of qualitative and quantitative research methods. For the qualitative research, data was gathered through interviews while for the quantitative research, data was gathered through questionnaires. To ensure the study's accuracy and validity, the population was sampled using a random sampling method for quantitative data, stratified for qualitative data, and then double or multiple sampling was used to address any remaining discrepancies.

The interviews were conducted in the field, with appointments made well in advance with the sampled participants, and those who were unable to attend the field interview were scheduled for online interviews (Desk method) at their earliest convenience. Questionnaires, on the other hand, were distributed via google forms, which were linked to an excel spreadsheet to help with the analysis. The causation process was used to determine the variation in these variables before establishing the in-depth relationship between the independent variable (Project management certification and qualification) and the independent variable (Project Function). This process used a criterion of association or correlation, time order, non-spuriousness, mechanism, and context to determine the variation in these variables before confirming the in-depth relationship.

## CHAPTER 5: INTERVIEWS

The thesis navigation map shown in Figure 5.1 below shows that the first four chapters of the study which covered introduction literature review and research design and methodology has been completed. The current chapter will focus on the presentation of the results from the interviews conducted. Thereafter, it shows the path through to the end of the study.

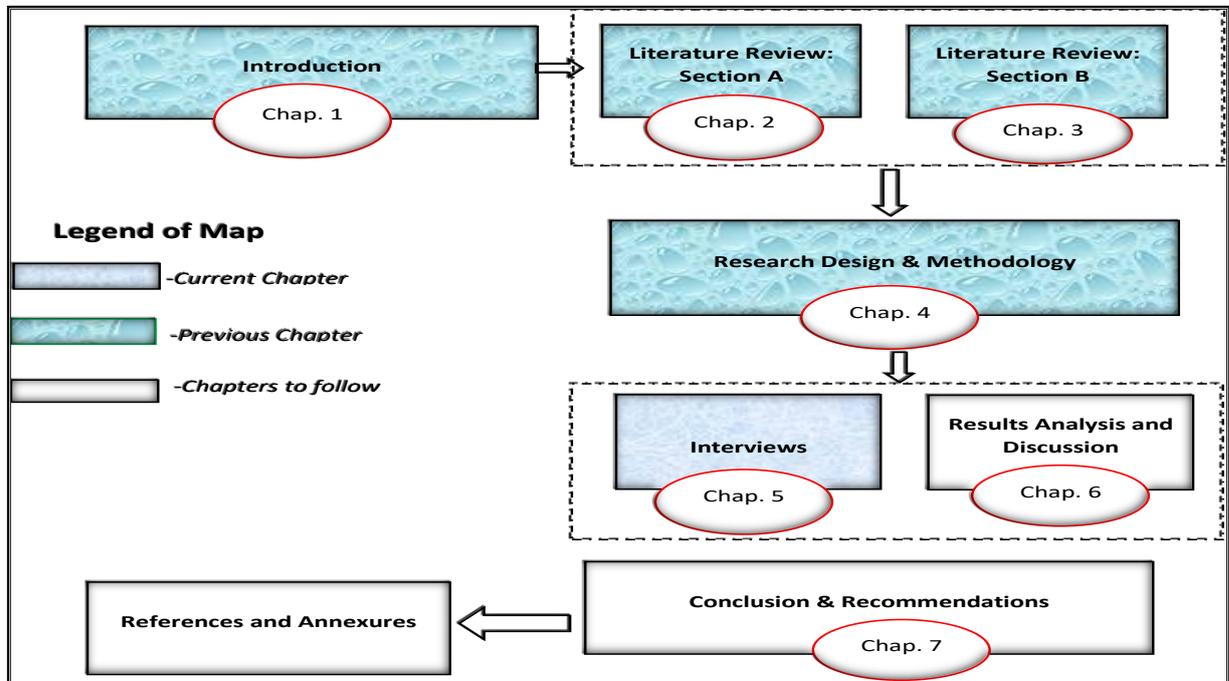


Figure 5.1 – Thesis Chapters Layout Map – Chapter 5

### 5.1 Chapter Introduction

This chapter uses semi-structured interviews to address the qualitative research component of the study. In order to clarify the classification of the project function and its management strategy, open-ended questions, as seen in Figure 5.2 in the next section below, were put together in such a way that they would address the project function factors that could not be ascertained through the use of questionnaires. Semi-structured interviews are crucial because they act as a framework to direct participants' thoughts without placing restrictions on their answers. Naturally, these interviews provided a wealth of information that was very helpful in completing the quantitative data and in directing the participants' thoughts toward the analysis of the results. This chapter presents factual data that was gathered from interviews and documents in the interviews, including data on organisational structures, goals, and strategies that were slightly rearranged to prevent respondents from being identified. However, some information conveyed the respondents' strong opinions and knowledge gained through experience. This is not to say that it should be taken lightly, as the respondents were carefully chosen, based on their position, rank and the level of competency necessary for the roles they held. Each question was expanded on each section, to present the reason for its structure and

what decision it informed, followed by the table of responses. Additional analyses of these interviews was done at the end of each table of response to provide a comparison and reveal the relationship between the three sampled organisations.

## 5.2 Introducing Respondents and Questions

Although the organisations under study are MCOs that carry out mega capital projects, it was discovered during the research that their organisational structures and job titles frequently differed. The respondents were, however, given project management titles such as program manager or project manager for the purposes of this study; after understanding the roles and responsibilities they carry. This was done to enable respondent alignment and, efficient analysis, contrast, if any, and correlation between organisations. To help people understand the scope of the work, the respondents are accountable for as well as the kind of responsibility and accountability they bear, project management terminology was also used for titles. The questions were also left open-ended to stimulate the flow of any new data that might be beneficial to the research. Three respondents were sampled for each organisation and each representing the different level of authority as follows

- Senior Program Manager
- Senior Project Manager
- Project Manager

This was done to provide a glimpse of understanding from various level of authority within an organisation. Section 5.2.1 below provide an in-depth details of each respondents.

### 5.2.1 Respondents: Organisation A

- **Respondent 1** – The respondent is a Senior Program Manager, who has been in her position for just over 4 years but has been exposed to project management within the organisation for almost 10 years. Her highest qualification is Master of Engineering, and she has had her PMP certificate from PMI for just over six months. She has overseen projects and programs ranging between R200 million and R300 million, either in the form of a single program or several programs.
- **Respondent 2** – The respondent is a Program Manager with a Bachelor of Engineering degree who has been with the company for more than ten years but has only held the position for a little over five years. The highest value project he has worked on is an R12 million project, but he has managed programs with a value ranging from R100 to R250 million on an annual budget basis. He also holds a PMP certificate from PMI, which he has had for about 5 years.
- **Respondent 3** – The respondent is a Project Manager who has six years of experience and a Bachelor's Degree in Engineering. Almost two years of acting preceded his formal

tenure in the position, which has lasted for around three years now. Within the scope of his current position, he has managed a number of engineering projects with budgets ranging from R36 million to R135 million annually.

### 5.2.2 Respondents: Organisation B

- **Respondent 1** – The respondent is a Senior Program Manager in charge of a capital investment project. He has been in that position for three years now after holding the position of a senior project manager. He has overseen programs with annual budgets ranging from R220 million to R1.5 billion, with the exception of one project he worked on that had an R1.7 billion budget all to itself. His highest degree is Master of Architecture, and he also holds a post graduate diploma in project management. Due to the positions he has held within his current organisation and other organisations, he has a variety of project management and architectural experience.
- **Respondent 2** – The respondent has been working as a Senior Project Manager for 13 years and has a technical degree in engineering. She completed a brief project management course as part of her studies, and she has had PMP certification from the PMI for the past two years and has managed projects in her current position with values ranging from R2 million to R330 million.
- **Respondent 3** – The respondent is a Project Manager who has a Bachelor of Technology in Project Management and a national diploma in engineering. She has been in her current position for 5 years and she has been managing projects with values ranging from R2,5 million to R280 million within her current role. She also holds PMP certification which she obtained two years ago.

### 5.2.3 Respondents: Organisation C

- **Respondent 1** – The respondent is a Senior Program Manager with 25 years' experience in project management with his highest qualification being Master of Engineering. He manages project managers and engineers among other supporting teams. He has managed programs worth billions of rands with one program ranging within the value of R3.5 billion rands.
- **Respondent 2** – The respondent is a Senior Project Manager and Engineer and has been working in this position for over 16 years. He holds an engineering degree and a Master of Business Administration degree and has vast experience in project management. He has served in various engineering institutions as a board member and has managed projects that range from R750 million to R2.4 billion within the civil engineering spectrum.
- **Respondent 3** – The respondent is a Project Manager with 12 years' experience in project management. He holds a Master of Engineering Management degree and has done courses in project management. He has managed projects ranging from a value of R10

million to R2 billion and has extensive experience in managing civil engineering construction projects.

### 5.2.4 Open-Ended Questions

The interviewing template is shown in Figure 5.2 below. It included both open-ended and administrative questions, which yielded insightful, in-depth details about the respondents' and their level of knowledge and experience. The purpose of the open-ended questions was to gather in-depth viewpoints from PMPs who hold various ranks in connection with various factors that contribute to the success of project functions, as well as to obtain factual information about their organisation that is required to support the study analyses and provide support for the quantitative data obtained through survey questionnaires (Chapter 6). The questions presented to the respondents worked as a guideline whereby respondents were afforded the opportunity to add any valuable information, they saw fit to add.

<b>Interviewee's Names: (Optional)</b>		<b>Age:</b>	
<b>Department:</b>		<b>Gender:</b>	
<b>Position</b>		<b>Years of Service:</b>	
<b>Job Description</b>			
<b>Highest Qualification</b>			
<b>SECTION A: ADMINISTRATIVE</b>			
1. Do you have a project management qualification? If yes, which one and how long have you had it?			
2. Do you have a project management certificate? If yes, which one and how long have you had it?			
<b>STRUCTURAL FACTORS:</b>			
1. May you please take me through the structure of your organisation highlighting where your Project function fits on that structure.			
2. According to you what is the important of project management qualification and or certification?			
<b>PMO SUCCESS FACTORS</b>			
3. What do you think is the key factors that makes a Project Management Office/Team a success? List as many as you possibly can.			
<b>ORGANISATIONAL FACTORS</b>			
4. Do the PMO leaders have the authority to utilize the organization's resources without the need for high-level approval and the authority to make decisions that can affect the entire organisations? How are decision taken			
5. How well do PMO members apply their knowledge and achieve objectives and how often is their competency measured?			
<b>STRATEGIC FACTORS</b>			
6. What is the usual vision, role, and benefits of your PMO projects			
7. What are your key business metrics and how are they measured? How is productivity and Performance measured?			

Figure 5.2 – Interview Questions Template

## 5.3 Interviews Responses and Analysis

### 5.3.1 Question 1: Structural Factor: Size and Structure of PMO

One of the most important and significant factors that contribute to project function success is its structural composition. The success of a project function depends on the hierarchy, positioning, size, and its appropriate placement within an organisation. The following question was posed to determine how each project function of the sampled organisations fitted within the organisational structure and whether its positioning, and size were appropriate for the functions it performed. This strategy also established the operational method adopted by its structure as demonstrated in Chapter 3, Figure 3.5. Even though the final method cannot be established by the structure only, it does provide substantiate data when the final results are summarised in chapter 6.

*Question: Please explain the structure of your organisation and where PMO/Project function fits into that structure and its functions.*

- **Organisation A**

The organisational structure of Organisation A is shown in Figure 5.3. It demonstrates that the organisation is made up of different areas and divisions within the structure. The project management department uses a linear reporting structure, with senior program managers and program managers reporting to the same level of authority, and being on the same level, respectively. The fact that their roles and responsibilities differ, even though they report to the same authority and affect each other's advancement, was discovered as a matter of interest. Even though the term used in the structure is related to the concept of project management, the actual organisations use different terms for different positions, which might cause some confusion regarding the roles and responsibilities within the project management spectrum. However, since both parties were included in the interview sample, this will be further explored in the questions that follow.

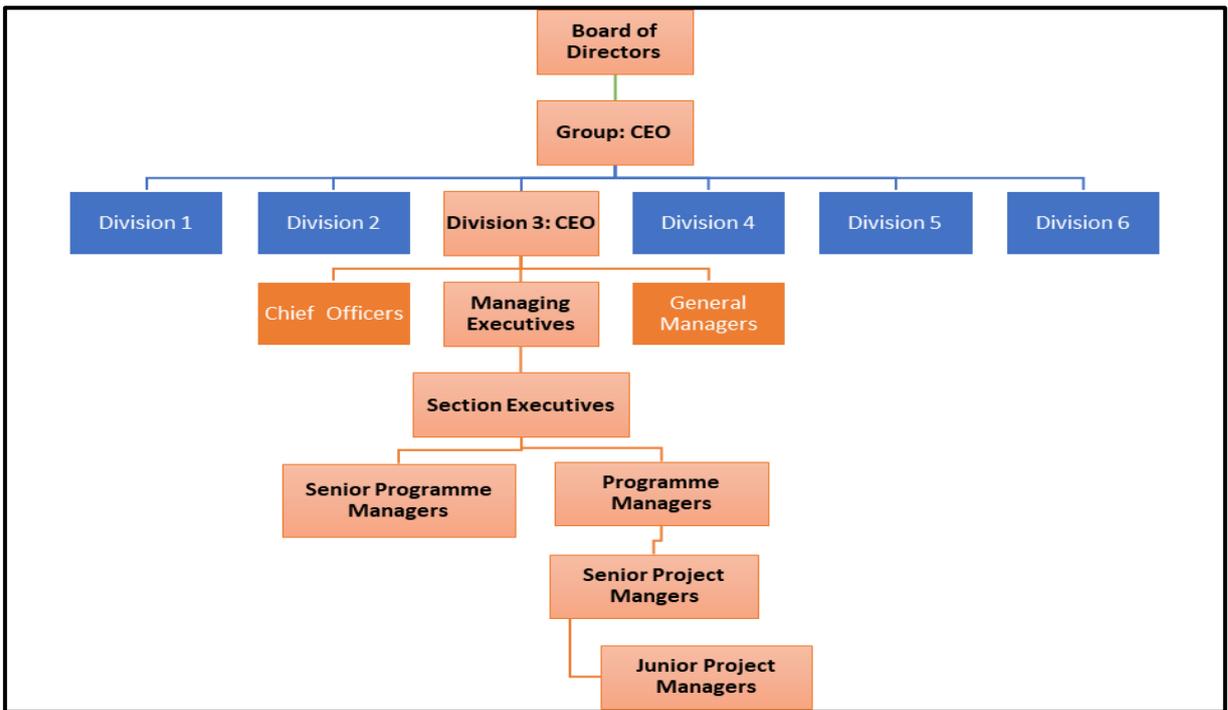


Figure 5.3 – Organisational Structure for Organisation A

- **Organisation B**

Organisation B's organisational structure is depicted in Figure 6.2 below. It was discovered that even though Organisation B uses a linear reporting mechanism in the same way as Organisation A, there is no reporting diversion within the structure of the project function, and both the project department and the various project positions are named using the project management concept. A single program manager acts as a liaison between the various project stakeholders and facilitates communication with supporting functions and other departments. The program manager of this organisation's project function and the other two employees who report to him were all interviewed, but everyone who reports to him was included in the study's sample population.

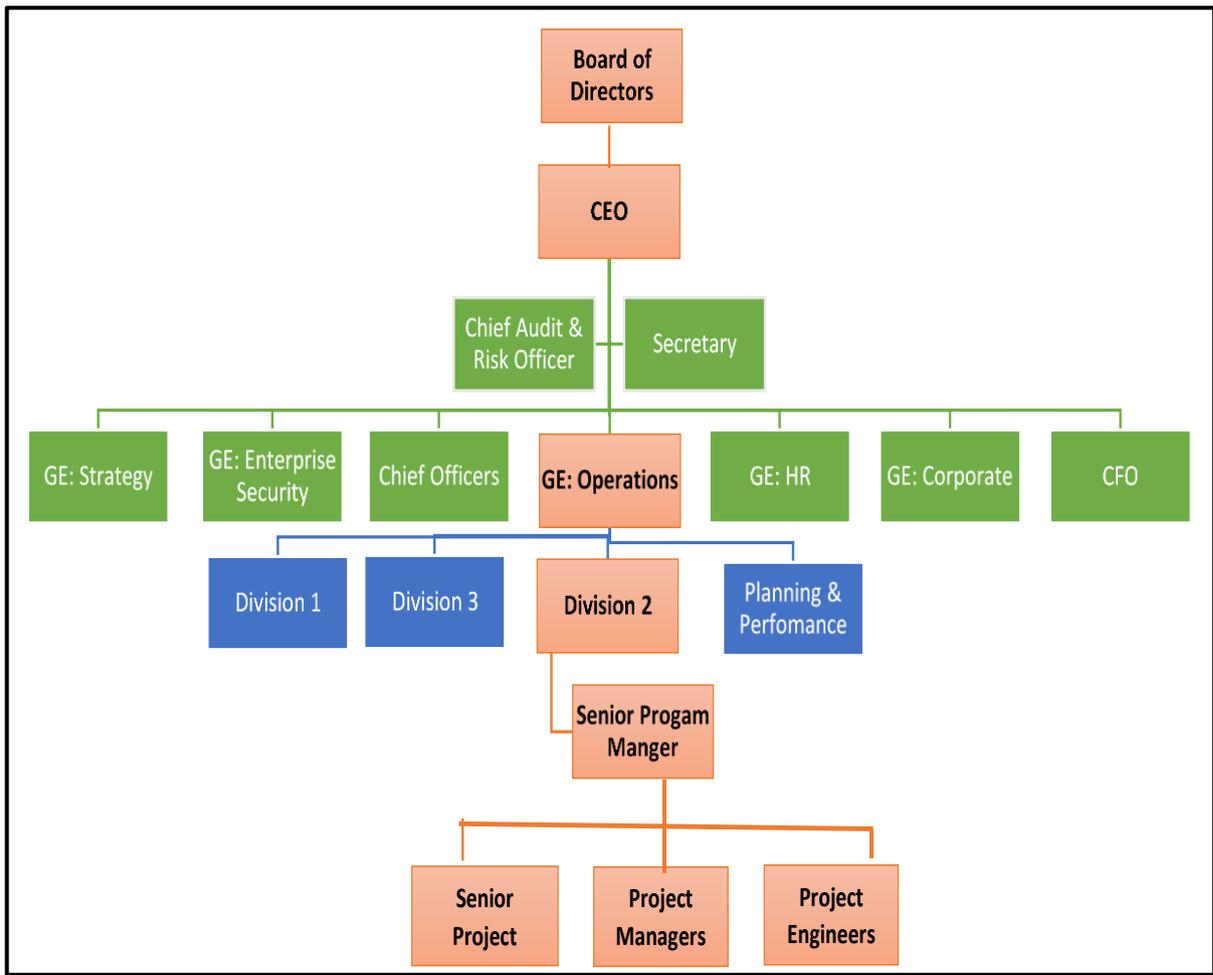


Figure 5.4 – Organisational Structure for Organisation B

- **Organisation C**

The structure of Organisation C differs significantly from that of the preceding organisation, as shown in Figure 5.5 below. The role of the program manager extends beyond project or program management; as he is also responsible for overseeing other departments that may be directly or indirectly related to the project management department. Even though there may be some interaction between project managers and project engineers, some project managers also double as project engineers, managing the expectations of both roles for their own projects, as well as those of others. It was discovered that this organisation does not strictly adhere to the linear reporting mechanisms because most divisions converge before reaching the highest level of authority.

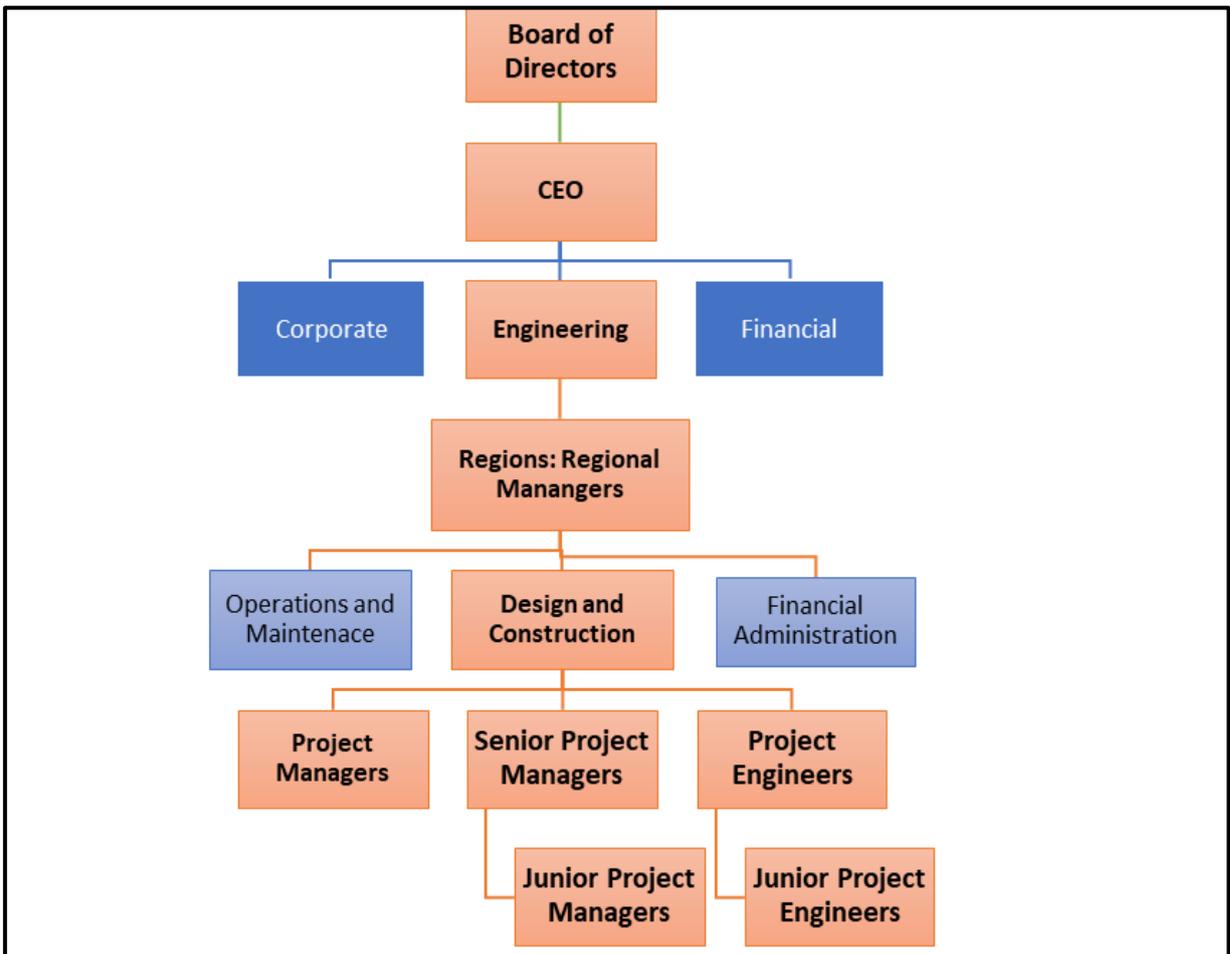


Figure 5.5 – Organisational Structure for Organisation C

### 5.3.2 Question 2: Project Management Certification and Qualification

It was discovered during the literature review that there is growing interest in acquiring project management qualifications and certifications and there are many different reasons why people pursue these qualifications and/or certificates. Therefore, it was essential that the project functions various leaders share their perspectives on the value of project management qualifications and certifications, if any value exists at all. This inquiry is also consistent with the survey link, which the remainder of the sampled population completed. This is done to determine whether a mutual value has been placed on these qualifications and certifications and to identify any deviations and causes derived from that value.

*Question: According to you, what is the importance of Project Management Certifications and or Qualifications?*

	Respondent 1 (Senior Program Manager)	Respondent 2 (Program Manager)	Respondent 3 (Project Manager)
<b>ORGANISATION A</b>	I think it is to understand what best practice says about projects and how that can influence how you do projects. The idea is to be competitive and follow methods that have been researched.	It is important for personal growth and development. Having a Project Management Certification makes one more competitive, especially in the private sector	It is very important as it provides one with the knowledge to manage projects, especially in the engineering industry.
	Respondent 1 (Senior Program Manager)	Respondent 2 (Senior Project Manager)	Respondent 3 (Project Manager)

<b>ORGANISATION B</b>	From a private sector you need project management certifications to be able to tender for work and to be evaluated to make it through to the next step and also for the private sector, it is important to meet functionality criteria when tendering for the public sector. The public sector is also becoming more streamlined with international standards. These certifications also play a crucial role when competing for international works. Also important for international functionality criteria.	Project Management Certification provides more practical experience and even though it is not as highly valued In South Africa as It is internationally. SACPCMP is more recognised in South African organisations than other forms of certifications. However, the experience of project management education becomes more valuable and highly expected within the project management environment. I decided to do my PMP more for personal development rather than for recognition by my institutions.	It is important to be able to be flexible on a national and international scale. It provides one with a competitive advantage in the project management industry. It changes your mindset on how project management is conducted.
	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Program Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION C</b>	Project Management qualifications are important, however it is a two-way street, because on its own it is not sufficient. A person can manage projects without project management qualifications but an engineering degree in the engineering field however with just project management only, the results can go south. It is good to learn best practice, but it must be substantiated.	I think it gives some direction in terms of the definition and clarity in terms of the stages of the project. It provide a good understanding of how to manage project in extensive deep details. Providing the understanding of every phase of project management for the successful execution of projects but there are other factors to a success project department.	Project Management is very important to solve project challenges organisations are faced with, and in turn achieve their strategic objectives. It provides an Alignment between the organisational strategy and project strategy.

Table 5.1 – Responses to Question 2 from Project Leaders of all Organisations

As can be seen from the answers given above, every interview respondent believes in the value of project management credentials for a variety of reasons. Best practice for the management of engineering projects is valued by all, despite differences on the extent of its value. The majority of the respondents emphasised the well-known significance for individual development and industry market competitiveness in projects. Some respondents also noted that while the public sector, including MCOs, has not yet established a standard of requirements for itself, the private sector places a higher value on project management certifications and qualifications. The fact that international organisations value project management more than our national organisations was also highlighted by some respondents with one saying *‘Project Management Certification provides more practical experience and best practice, even though it is not as highly valued In South Africa as it is internationally. SACPCMP is more recognised in South African organisations than other forms of certifications’*. It's also crucial to note that, despite the fact that respondents from Organisation C acknowledged the value of project management credentials, they consistently doubt whether they are as valuable as the other organisations suggest.

### 5.3.3 Question 3: PMO/Project Function Success Factors

The project function success factors referred to in this study came from a variety of articles and journals, and were largely based on interviews conducted by various authors with eminent reputations in the project management field. Primarily, those authors first developed the idea of project management and carried it forward as it evolved, conducting reassessments as and

when necessary. Based on that, it became necessary to also determine what the project leaders who are mostly perceived as industry experts on these various project functions believe contributes to a project function's success. This information both enhanced the evaluation of the qualitative data and contributed new knowledge and expertise to the field.

*Question: What do you think are the key factors that makes a project function a success? List as many as you possibly can.*

	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Program Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION A</b>	Addressing maintenance requirements. Improve processes. Top-Down management support. Accountability. Integrated Planning and Processes. Standardised documentations. Time-Factor appreciation. Planning alignment.	Standard processes and procedures. Integrated Planning and Management. Accountability. Training and Competency. Team work and communication.	Understanding job outputs and job description. Having qualified and competent team individuals who are well trained. Internal Processes and structure in place on the output's methods. Stakeholder Involvement and alignment.
	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Senior Project Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION B</b>	Inherit knowledge on the topic. Industry experience preferably private and public but not delimited. Accredited from different bodies of project management so they can develop policies and procedures based that accreditation. Be registered to statutory bodies that will align to the business they are in. Adaption of teams to best practise and maintenance of team accreditation. Effective systems like IT systems, Internal policies, and procedures. Standards documentations: Templates (Doing the same thing in a same manner with room for amendment). Stable deposition of information like SharePoint. Ergonomics and digital adaption.	Teamwork Reward and recognition Performance. acknowledgement and motivation. Better Team dynamic. In the broader organisation, build a team culture.	Policies and Procedures well established. Training on these policies as and when there are new developments. Targets and timing are crucial but members must stay informed. Provide team members with support and provide them with training that will develop them while also accumulating the CPD Points they require. Incentives, rewards, and recognitions.
	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Program Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION C</b>	Engineering skills are one of the most key factors. A good project plan needs good engineering skills to see it through. Teamwork, people need to be able to work sufficiently together. Dedication people with relevant skills. Good communication within the team and across various stakeholders. Honesty and Integrity.	I think from the engineering perspective. Clear understanding of the mandate and what it entails. The interface between the different professionals. If I am a structural engineer, I need to deal well with a guy that deals with geotechnical engineering. - Committed team members.	I think good alignment between the organisational strategy and project strategy. Competent team members and skills integration.

Table 5.2 – Responses to Question 3 from Project Leaders of all Organisations

The project function success factors, according to the literature review, are very diverse, but Valle and Soares (2012)'s classification put the majority of these factors into a group category. Organisational, structural, strategic, and personal factors were separated out, to make up the overall success factors. The interview responses showed that the project function leaders are aware of what contributes to a successful project function. The respondents' list is consistent

with the findings in Chapter 4 and also helped to provide a clear direction for future quantitative data collection. Despite the fact that some respondents gave very concise responses, the details matched what was discovered in the literature study. However, it is important to note that some respondents conflate project function success factors with people's management and leadership skills. This was taken into account when analysing the results.

### 5.3.4 Question 4: Organisational Factors- Part 1

Organisational factors that affect project function success include the level of project function power, the maturity of project management, and the competency of all project function members. This question aims to comprehend and evaluate the project function's level of authority as well as the operation of the authority levels and decision matrix. This is essential to support the quantitative data analyses for the variable correlation analysis.

*Question: Do the project function leaders have the authority to utilise an organisation's resources without the need for high-level approval and the authority to make decisions that can affect the entire organisation? How are decision taken?*

	Respondent 1 (Senior Program Manager)	Respondent 2 (Program Manager)	Respondent 3 (Project Manager)
<b>ORGANISATION A</b>	The authority differs with accordance to the scope of work and the extent of the resource utilisation. Our organisation utilises something called Delegation of Authority where leaders or managers are afforded authority to a certain extent but for low level management it is very limited.	No and yes to some extent. There is a DOA for higher level management that project leaders needs to follow to acquire funds or utilise certain resources but at the same time there are low level resources that require DOA that I also have. And with regard to the decision, it is also to some extent but very minimal.	No, project managers like me do not have any authority. Every approval comes through the DOA.
	Respondent 1 (Senior Program Manager)	Respondent 2 (Senior Project Manager)	Respondent 3 (Project Manager)
<b>ORGANISATION B</b>	Yes, to the resource utilisation authority. I have the mandate to direct all project management resources in line with the performance contract. Yes and no to making decisions that affects the business. Yes, in an essence that in my role an SPM I have the mandate to sign contracts with consultants and contractors and if I do that unwisely I could get my organisation into a scenario where it loses money and that affects the entire organisation. The larger the project the higher the risks and the larger the impact. And if done well then, the benefit impact is just the same. No, the executive currently holds the mandate with the new contracts since the structure. To measure performance and productivity we use balanced scorecards.	It depends on the position you hold but, in my position, I do not have any authority to utilise certain resources without approval as I hold no mandate, but I can recommend for approval. In the project management environment if it is a decision that has to be taken in the project and it is within the ambit of the project, I can make the decision and if it is outside then I need to escalate it as I do not have the mandate.	Yes and no, I can utilise resources within my disposal and make project decisions that are within by capability for the administration of the project. I think part of our roles and responsibilities as project managers and executors is knowing what decisions are within your ability to make and not and those that are out of my control and could have business risks then the authority changes. It is normally not my decision but our decision and when there is impact then it is our responsibility rather than one person.
	Respondent 1 (Senior Program Manager)	Respondent 2 (Program Manager)	Respondent 3 (Project Manager)
	It all depends on the level of leadership a person in question is in.	<ul style="list-style-type: none"> <li><b>Resources</b></li> </ul>	In my level I need to obtain authority before the use of resources and even if it is at

<b>ORGANISATION C</b>	<p>The approval however is required by a certain level to some extent however it just depend on what resources.</p> <p>When it comes to decisions everyone has the authority to take decision to a certain extent but more often if they will affect the organisation then a certain level of authority is required to sign it off.</p>	<p>This is out of the question in our organisation. Every payment, every progress requires authority. This authority must be controlled; it is very important to separate roles and there is always an oversight in place.</p> <p>there is a system in place to check the utilisation.</p> <ul style="list-style-type: none"> <li>• <b>Decision</b></li> </ul> <p>I am accountable to the family of engineers in south Africa. The reason I qualify is because I can make decisions. And yes, I do have the authority to make decisions and if I have to stop everything based on quality then I can make decisions. You have to have the technical capability to make decisions.</p>	<p>project planning phase, but the authority is required. However, I do make some decision especially around my project but if it is a risk then I run it past my seniors.</p>
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Table 5.3 – Responses to Question 4 from Project Leaders of all Organisations

This interview revealed that all of these organisations are controlled by the National Treasury, so there is always a mandate that needs to be complied with. All of these organisations operate through the delegation of authority, with a focus on the use of organisational resources like finances; and resources that have an impact on the organisation's financial health.

The respondents emphasised that they have a certain amount of authority based on the level of their positions for this compliance. The same holds true for decision-making; while some decisions can be made by an individual without the need for high-level approval, that others have. The level of authorisation increases as the risk increases.

### 5.3.5 Question 5: Organisational Factors- Part 2

One of the most important organisational factors that contributes to the success of a project function is the competency of its members, which is demonstrated not only by their level of knowledge but also by the results they produce and their capacity to use that knowledge to accomplish objectives.

Therefore, the purpose of this question is to determine how effectively different project function members apply themselves, in accordance with the individuals they report to or who have an impact on the performance of the project functions they are a part of.

*Question: How well do PMO members apply their knowledge and achieve objectives and how often is their competency measured?*

	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Program Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION A</b>	<p>It is important to emphasise that our organisation has a lot of skills and competency. However there is lack of interest from employees in applying themselves and delivering on their objectives. There is a lack of responsibility and accountability.</p>	<p>We do not assess competency in our organisation and while some of our members apply themselves fully, there is still room of improvement for most of our members.</p>	<p>The human Factor is a real challenge in our organisation. Most team members fail to apply themselves.</p>

	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Senior Project Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION B</b>	<p>My team members apply themselves extremely well and the gauge is the number of challenges we have had in the last well. We do not get into fights with contractors because the contracts are so well put together that everybody understands what is needed and that is exactly where my team's competency is felt. They understand the contract, have input in compiling it and when they administer it, they know exactly what is needed.</p> <p>There is frequency meeting where time, cost, quality, and scope are consistently measured.</p>	<p>I do not know of anyone within my department who do not meet their set target. The team has an amazing level of experience, qualifications, and competency. It is with no doubt through the results there is a vast amount of knowledge that is applied to meet all set targets.</p>	<p>The members of our department are highly competent people who always take decisions to develop themselves. and deliver on the goal set with passion.</p> <p>The competency is measured regularly through the tracking of projects progress and deliverables.</p>
	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Program Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION C</b>	<p>Yes, my team members perform within expected standards and deliver on their set goals and deliverables. Even though there are challenges every now and then, we are able to overcome them as a team.</p> <p>With regard to measuring competency, we have a performance scorecard where each person's performance is reviewed every 6 months.</p>	<p>I think we do well. We are stressed with regard to the number of people and the amount of work. My colleagues are highly dedicated people, regardless of age. We are a very connected and committed team.</p> <p>Yes, competency is measured. Every 6 months there is an internal appraisal with clearly defined objectives and deliverables. For my style I measure it every week.</p>	<p>Most of the team members do. Everyone has their set of projects or roles to play within their project and they are expected to report on a frequency basis.</p>

Table 5.4 – Responses to Question 5 from Project Leaders of all Organisations

When it comes to how effectively the project function members apply themselves to meet set objectives, Organisation A calls for concern. Even though the respondents believe that the people working on their projects are competent and skilled enough, they fail to apply themselves. One respondent was quoted as saying, "Our organisation has a lot of skills and competency, however there is lack of interest from employees to apply themselves and deliver on their objectives. There is a lack of responsibility and accountability". Even more troubling was the discovery that there was no reliable method for evaluating the team members' competency, despite the fact that the project outcomes demonstrate that set goals were not being met as per the set standard.

Organisations B and C, on the other hand, showed that members of their project functions were highly competent and met the goals they had been given and mostly within the set time. They also all used some form of tracking and measurement techniques to consistently assess competency.

### 5.3.6 Question 6: Strategic Factors- Part 1

The management of portfolios and programs, which are collections of projects, is one of the duties of an organisation's strategic planning, which is a component of successful project functions. The way in which knowledge is managed, including rewards and recognition for

members, benchmarking, and performance metric, is what enables project functions to fulfil their obligations. The roles, benefits, and clearly defined vision of the project function projects are all a part of strategic planning and knowledge management. If members do not feel empowered and don't clearly understand the benefits of the work they are investing themselves in, they are usually not able to meet expectations in an effective manner. The purpose of this question was to determine the goals, roles, and benefits of each organisation's projects. It was also used to determine whether or not the project's participants fully comprehended the company's objectives during the quantitative data analysis.

*Question: What is the usual vision, role, and benefits of your PMO projects?*

	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Program Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION A</b>	To have better availability of the network. The end goal is being reliable, affordable, and providing safe network. We are spending time and money on the network, so its availability is crucial for the clients and economical support.	Maintaining current network capacity while renewing its life. Protect the market share through expansions of network and the safe operations of the mode of our transport.	For the safe movement of our transport mode and not deviate from the project's outputs
	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Senior Project Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION B</b>	<ul style="list-style-type: none"> <li>• <b>Vision:</b> to be a world leading business of our category as well as to make a partner in our category.</li> <li>• <b>Benefits</b> we are a development organisation. The more money is invested the better the return Build, develop and improve our assets for the benefit of the stakeholders and also for our own organisation the owner and operator.</li> <li>• <b>Role</b> To promote the use of our mode of transport through the improvement and development of our assets.</li> </ul>	The vision is clearly defined as being the world's best, and our role is to provide well developed assets and the benefits of the projects we do is something we are working on at the moment and we do acknowledge there is something not right with the brief hence the work for improvement. At the moment the benefits expand from the organisations benefits to economical contributions.	When we get a project, and it comes in a form of a brief. In that brief you are told what you are going to do and how much it will cost and instructed to investigate. Stakeholders then have a meeting and put together a charter that will clearly define the vision, role, and benefits. It is usually to provide and develop the best assets that is of high level meeting the various standards and within my scope to deliver the projects targets within the specified time, cost and quality.
	<b>Respondent 1 (Senior Program Manager)</b>	<b>Respondent 2 (Program Manager)</b>	<b>Respondent 3 (Project Manager)</b>
<b>ORGANISATION C</b>	<ul style="list-style-type: none"> <li>• <b>The vision</b> To be the world leader in the provision of the superior network in our business category</li> <li>• <b>Role</b> Strategically plan, design, construct, operate, rehabilitate, and maintain South Africa's national roads in order to mobilise our economy.</li> <li>• <b>Benefits</b> Creation of economic value for the nation, through the provision of our network infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• <b>The vision</b> The vision is driven by the organisation mandates. Development of national road network. South African better roads</li> <li>• <b>Role</b> ensure that I deliver on the vision of the organisation.</li> <li>• <b>Benefits</b> Community development.</li> </ul>	The vision is to provide well maintained roads for the benefit of the community while remaining the best. Our role amongst many others include finance, plan, construct, provide, operate, and maintain roads to an exceptional standard for the benefit of the community.

Table 5.5 – Responses to Question 6 from Project Leaders of all Organisations

From the interview responses above, the vision and roles of project functions for each organisation is quite clear across the various respondents. The terminology used might differ, but the meaning remains consistent. However, the benefits are sometimes not understood in the same manner or not well explained at all; as one respondent from Organisation B was

quoted as saying “*The benefits of the projects we do is something we are working on at the moment and we do acknowledge there is something not right with the brief, hence the work for improvement*”. However, it is not a call for concern as the organisations has already realised a gap and are working on addressing it.

### 5.3.7 Question 7: Strategic Factors- Part 2

According to the example from the previous question, it is crucial that every member of the project function understands the organisation's and the project function's key business metrics and how and when they are measured. Along with that, regular productivity and performance monitoring of project function participants and resources is also included. Therefore, this question was used to comprehend the business metrics of each sampled organisation and how they are measured. It was also used to determine whether productivity and performance are regularly, effectively, measured and how that is done.

*Question: What are your key business metrics and how are they measured? How is productivity and Performance measured?*

	Respondent 1 ( <i>Senior Program Manager</i> )	Respondent 2 ( <i>Program Manager</i> )	Respondent 3 ( <i>Project Manager</i> )
<b>ORGANISATION A</b>	They include finance, processes and customer and there are standard processes of measuring these even though it is not consistent and mostly just for compliance purposes.	The key business metrics are financial perspective, customer, internal processes and learning and development. These and productivity are normally measured through scorecards, MSP, Tracking processes as well as presentations.	They are measured through audits. <b>Low:</b> Internal processes <b>Medium:</b> Project Manager measures subordinates by progress reports. <b>High:</b> Process Owner measures everyone internally <b>Higher Level:</b> External auditors
	Respondent 1 ( <i>Senior Program Manager</i> )	Respondent 2 ( <i>Senior Project Manager</i> )	Respondent 3 ( <i>Project Manager</i> )
<b>ORGANISATION B</b>	- The most important one is the ASQ. It is about service quality. It is an international measurement across all organisations in our category of the same capacity. Standards must always be in place and in compliance to independent assessors' requirements including people management, convenient, security management, culture responsibility amongst others. Profitability metrics is one of the major business metrics. Best Practice, which is the standard in terms of governance, safety, and security must be up there with the best practice in the world to keep the operating licence as part of regulatory compliance. Provision of our modes of transport for low-income communities.	We have Key Performance indicators (KPIs) that are developed on senior level management. We enter into performance contracts every year. For example, one of the KPIs will include budget expenditure, stakeholder expectations met. There is also a business score that is kicked out and aligned with our score.	They are determined by the performance scorecards where the KPIs are set out and results are tracked regularly as per each indicator. Our key business metrics are based on project management best practice and outputs.
	Respondent 1 ( <i>Senior Program Manager</i> )	Respondent 2 ( <i>Program Manager</i> )	Respondent 3 ( <i>Project Manager</i> )

<b>ORGANISATION C</b>	<p>Our business metrics include a motivated and professional team. Consideration for community needs. State-of-the-art technology. Proficient service providers and The user-pays principle.</p> <p>The delivery of our projects and year by year review is how we keep track of progress and performance.</p>	<p>Our business at the moment due the fact that we are a government institution, empowerment, training, job creation. There are a couple of engineering parameters that are measure but we also include social parameters.</p>	<p>Our business metrics include best value for money, efficient business practice, maintaining market confidence and achieving international best practice. All of these are in alignment with the team's scorecards, and this was just to name a few among many others</p>
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Table 5.6 – Responses to Question 7 from Project Leaders of Organisation A

The interview revealed that the project function members within these various organisations are familiar with their organisations' business metrics. Finances, customers, internal processes, and learning and development are the different categories for Organisation A's business metrics. Organisation B's business metrics are focused on customer satisfaction, profitability, best practices, and service quality. The business metrics for Organisation C include business practices, community needs, expert service, market confidence, and customer satisfaction comes last. The respondent mainly responded according within the parameters of their individual portfolio scope.

#### 5.4 Chapter Summary

Results from the qualitative portion of the study, which used semi-structured interviews to collect data, were presented in this chapter. This information was necessary to establish some of the project function success factors within the organisations being studied, including organisational structures, goals, and visions, as well as business metrics and many other aspects. These interviews were conducted with the goal of gathering factual information that couldn't be discovered and verified by the use of questionnaires. For the purpose of evaluating the effectiveness of project functions within the organisations being studied, the information gathered in this chapter will be combined with the information gathered through the use of questionnaires before findings are discussed and presented. The results of each question will be considered in light of the project success factors in the next chapter. Each class of project success factors will then be collated to present the results. Additionally, the chapter that concludes the study will include the findings from this chapter.

The next chapter will contain quantitative findings while reflecting on the qualitative findings and present the overall findings of the study as well as an analysis and discussion of the results.

## CHAPTER 6: RESULTS ANALYSIS AND DISCUSSION

The thesis navigation map shown in Figure 6.1 shows that five chapters of the study have been completed and only one chapter; namely the conclusion and recommendations will follow.

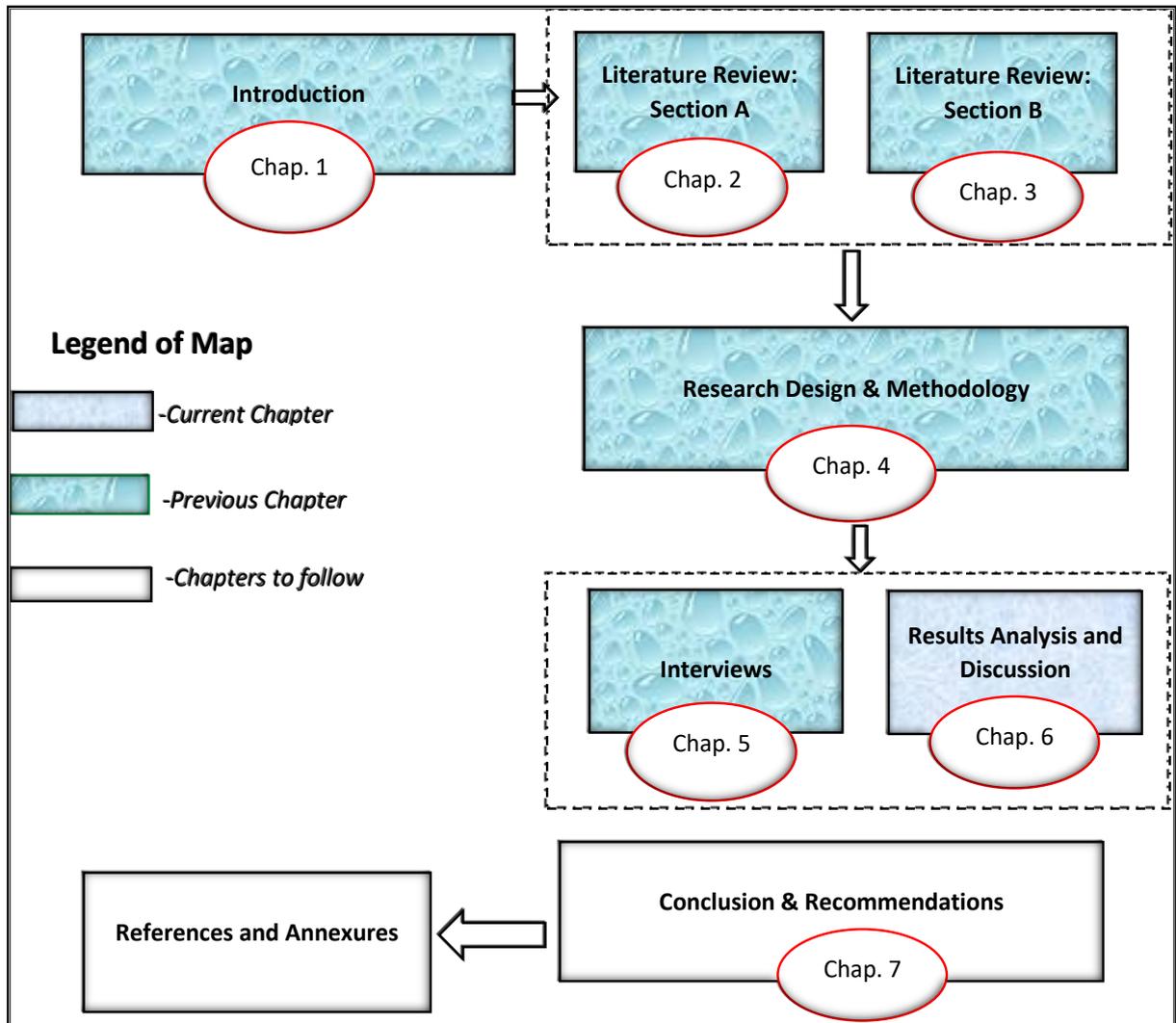


Figure 6.1 – Thesis Chapters Layout Map – Chapter 6

### 6.1 Introduction

This chapter adopted the use of survey questionnaires (See Attached Annexure A) to collect information from participants from various MCOs in South Africa. There was a mix of open-ended and closed-ended questions, with closed-ended questions completing the design. The questionnaires provided enough information for an effective analysis of the project functions that the participants form part of. These questions were developed from the success factors that were previously discussed in Chapter 3 section 3.2.5.

The success factors are classified into four sections, namely, personal, organisational, structural, and strategic factors. The factors were then divided into sub-divisions (See Chapter 3 section 3.2.5). Some of the factors required factual fixed data, whereas others comprised the

opinions, knowledge, and experiences of the participants. In this chapter, the data from the questionnaire were analysed before being sorted into various themes in order to discover the relationships between organisations by measuring correlations and/or causation. Conclusions and recommendations will follow in due course.

### 6.1.1 Sample size per organisation

The quantitative research respondents were chosen using a stratified sampling method that uses a proportionate technique to ensure that all levels of project functions were represented, which ensured that the views and ratings of project function success were not biased. It is well known that when employees are on different levels of employment and have different levels of authority, their experiences of their work environment can differ, resulting in biased opinions. Stratified sampling ensures that all levels are included equally and fairly. The first strata of respondents included programme managers and senior project managers while the other strata included project managers, junior project managers, consultants, technical teams and many other portfolios that reported to the delegated higher leadership within each project function. Table 6.1 below shows the list of respondents and their designation per organisation as well as the responds rate attained.

<b>Positions</b>	<b>Organisation A</b>	<b>Organisation B</b>	<b>Organisation C</b>
<b>Programme Manager</b>	4	3	8
<b>Senior Project Manager</b>	8	4	5
<b>Project Manager</b>	32	2	17
<b>Project Engineer</b>	8	3	12
<b>Support Team/Specialist</b>	Not Applicable	Not Applicable	5
<b>Respondents/Team Strength</b>	<b>86% (52/60)</b>	<b>100% (12/12)</b>	<b>86% (47/78)</b>

Table 6.1 - Organisation by Organisation Respondents Sample

### 6.2 Administrative Observation: Gender, Age, Qualifications and Work Experience

Gender, age, qualifications and work experience are shown in diagrams 6.2 through to 6.5. These characteristics of the participants have a bearing on the results of the study and provide a background to the various organisational practices and cultures that prevail in the organisations being reviewed.

Figure 6.2 below shows that Organisation A has 63 percent of its employees being women and 90 percent of the staff fall into the age group of under 40, 42 percent of the staff has a B.Tech qualification and 89 percent have less than 10 years' experience in their current positions. Organisation B has 83 percent of staff aged between 60 to 63 years of age, 67 percent are male, 67 percent have a master's degree and 50 percent of the staff have less than 5 years of experience. Organisation C has 67 percent male staff, 42 percent are between 60 to 63 years of age 50 percent of staff have a master's degree and 33 percent have less than 5 years of experience.

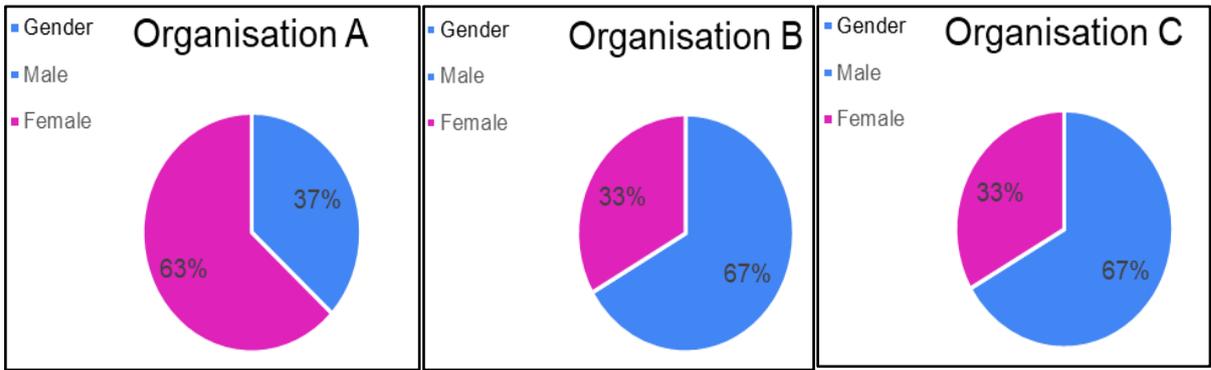


Figure 6.2 – Gender Groups per organisation

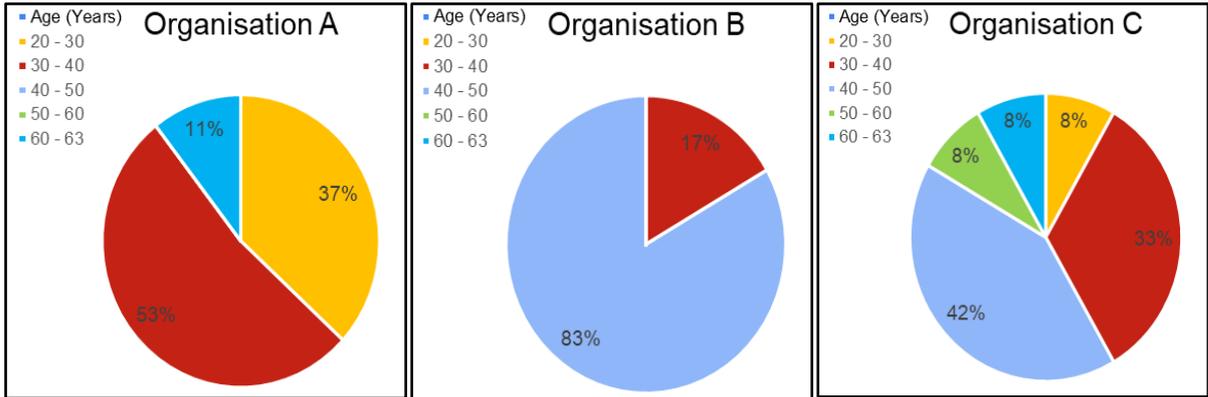


Figure 6.3 – Age Groups per Organisation

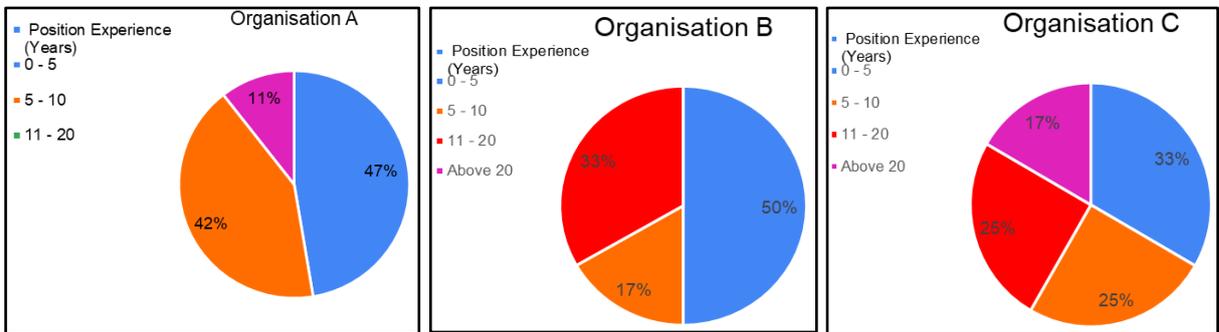


Figure 6.4 – Positions Experience per Organisation

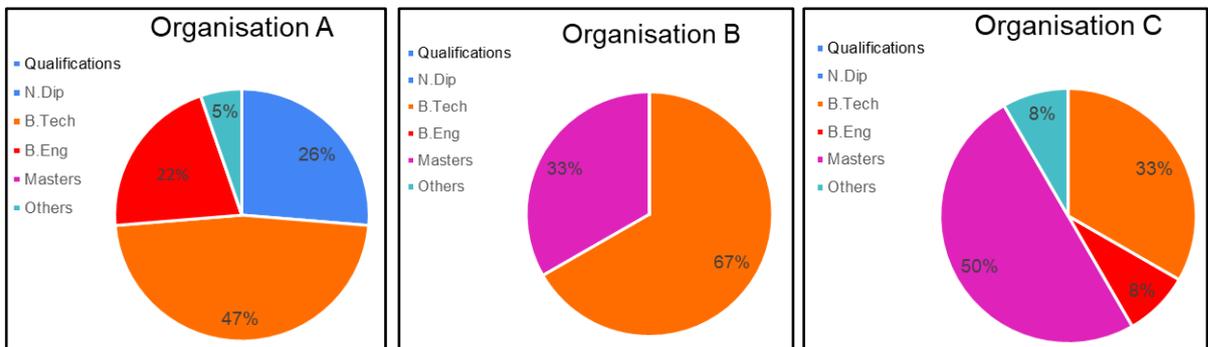


Figure 6.5 – Highest Qualifications Groups per Organisation

Although the data was gathered for administrative purposes, the information provided by the above figures gives a picture of where the data to be analysed in the following sections comes from. It also helps in the analyses and evaluation of some of the project function success factors.

### **6.3 Project Management Qualification and Certification**

Project management qualifications and certifications serve as the study's sole independent variable. The aim of the study is to evaluate the impacts of "*project management certification and qualification*" on the success of project functions within MCOs. Therefore, it was crucial to determine whether there are members who possess project management qualifications and or certifications within the study's project functions and if so, how many there were in each organisation. The percentage of participants who possess a project management certificate, qualification, or both is shown in the pie charts below.

The participants were asked what kind of certifications and qualifications they had. Respondents were also asked what their main reason was for pursuing project management certifications and or qualifications, and their responses were then summarised for each organisation, as seen below. Additionally, they were asked to rank the significance of the project management certifications or qualifications they had which will also be presented and discussed in section 6.3.2.

#### **6.3.1 Organisation A**

- **Project Management Qualification and Certification Holders**

Figure 6.6 below shows the pie chart presentation of the percentage of respondents who possess either project management certification and/or qualifications. It can be observed from these that over 83 percent of Organisation A project function members do not have any project function qualifications and only 5 percent have project management certifications. Those who had qualifications all held post graduate diplomas in project management and those who held certifications had PMP from PMI. The participants who held these certifications and or qualifications were asked what their motive was for acquiring them and one participant said; "*My field of study Civil Engineering revolves around project planning and mostly execution. Depending on the magnitude of the project, a certain level of project management principles would feature. Therefore, personally to be afloat and meet the requirements of the company I felt the need to further develop my understanding of project management as a whole.*" The others mostly stated that it was for the benefit of "*acquiring effective and efficient project management skills.*"



Figure 6.6 – Project Management Certifications and Qualifications within Organisation A

- **The Value of Project Management Certifications and Qualifications Ratings**

The respondents were asked to rate the importance of a project management certification and/or qualification on Project Function on a scale of 1 to 10 with 1 being the least important and 10 being highly important. Figure 6.7 below shows the results obtained from Organisation A. 47 percent of the respondents rated certifications and qualifications as highly important and over 85 percent rated the importance as important or higher than average and only 15 percent rated it below average. In the interview in question 2 (Chapter 5, section 5.3.2) respondents were asked: ‘According to you, what is the importance of Project Management Certifications and or Qualifications?’ The responses highlighted the importance of such certifications; including the provision of project management best practise, and commented on the competitive advantage it provided to people within the industry and also on the personal growth in general it offered. The pie chart below; in comparison to Figure 6.6 above, showed a contradiction, in that more than 85 percent of the respondents did not have any project management qualification or certification. the exact same number of respondents rated these qualifications and certifications as highly valuable.

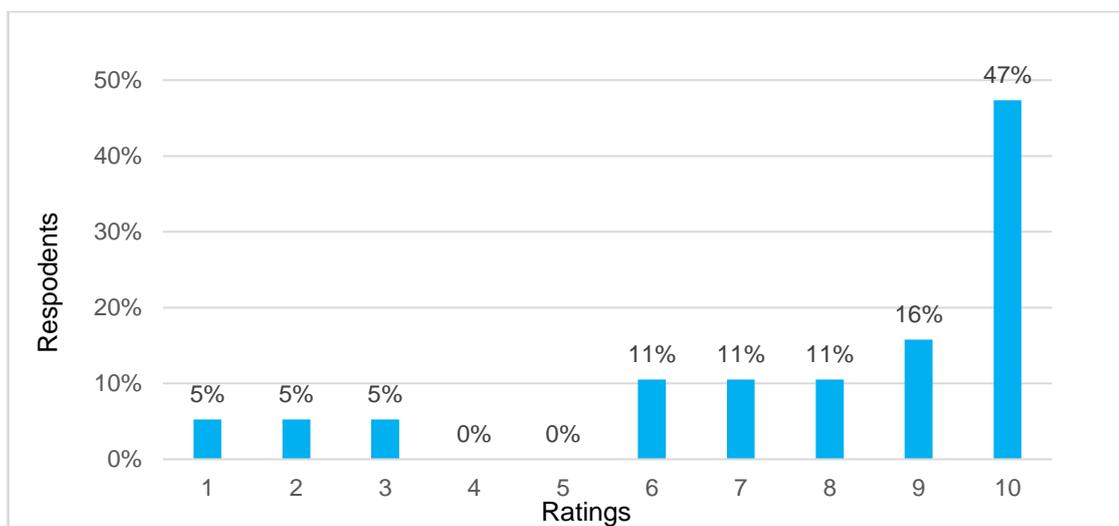


Figure 6.7 – Organisation A Ratings on the Importance of Project Management Certification and Qualifications

### 6.3.2 Organisation B

- **Project Management Qualification and Certification Holders**

Organisation B was shown as the leading organisation when it came to the percentage of project function members who held either project function qualification or certification as can be seen in Figure 6.8 below. Furthermore, most of the members had both qualifications and certifications and interestingly their reasons for pursuing those qualifications differed slightly from those of the Organisation A respondents.

The main reason given for pursuing such qualifications was that it enabled them to be more competitive and marketable in the field of project management. Here are some of the responses, *“I acquired my project management certification from the PMI to further improve my project management skills and be more competitive and marketable and improve my knowledge base.”* Another respondent said, ‘I needed to become professionally recognised while personally developing myself to be more marketable.’

The project management qualifications possessed by respondents from this organisation are post graduate diplomas and advanced diplomas, while the certifications are PMP from PMI and Professional Construction Project Manager (PrCPM) from The South African Council for the Project and Construction Management Professional (SACMCMP).

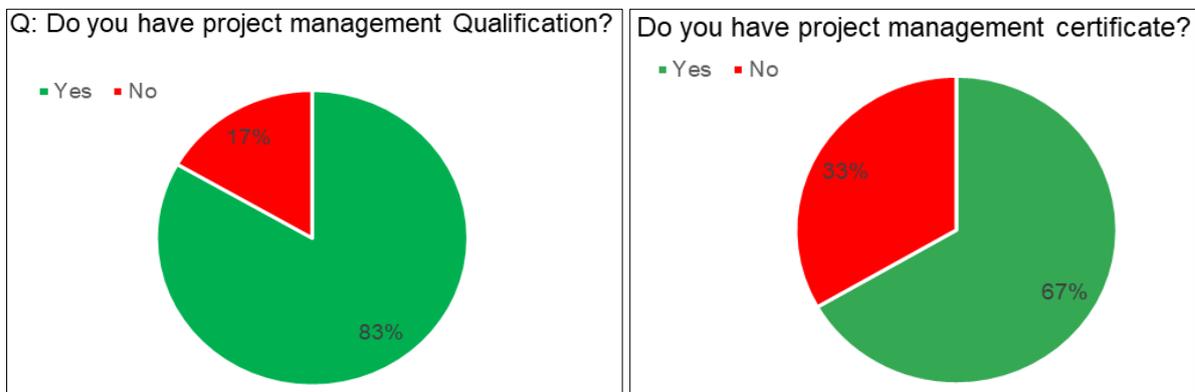


Figure 6.8 – Project Management Certifications and Qualifications within Organisation B

- **The Value of Project Management Certifications and Qualifications Ratings**

All the respondents in Organisation B gave the holding of project management certification and qualification the same high importance rating as the majority of the respondents in Organisation A. The figures in Figure 6.9 below show this clearly. These ratings agree with the number of respondents who have a project management qualification, certification, or even both. One must also remember that those who lack a certification can, at the very least, acquire a qualification. One should reflect on the significance of having project management qualifications and certifications as mentioned in the responses to interview

question 2 as discussed on Chapter 5 above. It was discovered that most respondents placed a strong emphasis on improving their marketability, best practices in personal development, and competitiveness as an individual. Even more respondents placed a strong emphasis on their ability to compete for work as an organisation and meet international functionality standards. The ratings of the importance of project management qualifications and certifications as determined by Organisation B are shown in Figure 6.9 below.

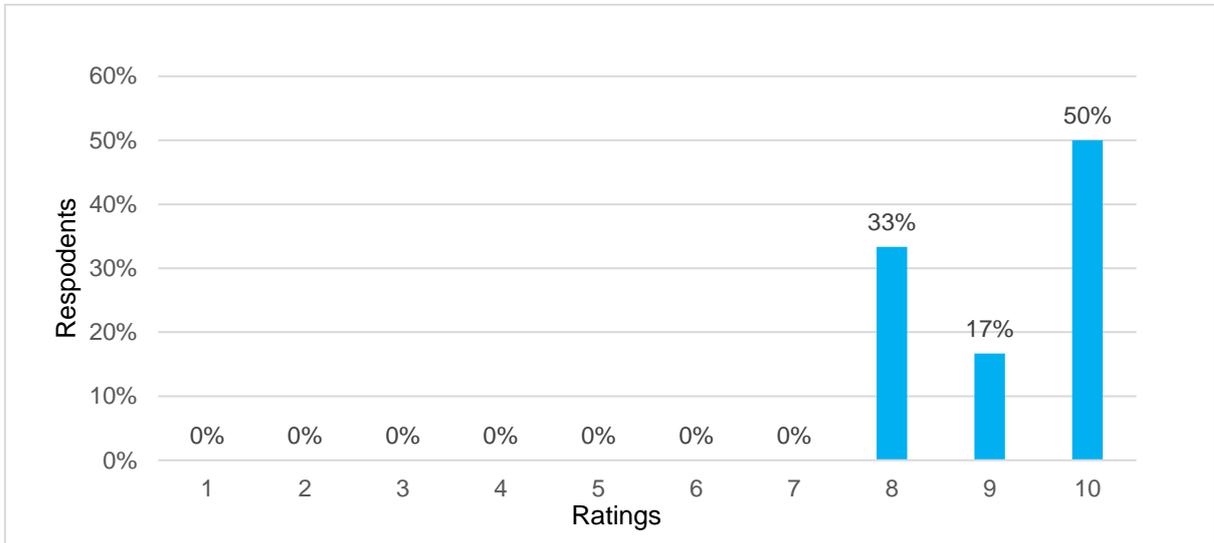


Figure 6.9 – Organisation B Ratings on the Importance of Project Management Certification and Qualifications

### 6.3.3 Organisation C

- **Project Management Qualification and Certification Holders**

Similarly to Organisation A, Organisation C had a small proportion of members in the project functions who are qualified or certified in project management. Only 17 percent of the respondents have project management credentials, as shown in Figure 6.10 below, and the same is true for certifications. Additionally, the majority of those who possess qualifications show similar numbers as the majority of those who possess certifications; meaning that the majority of the 17 percent of people who are certified are also qualified and those who are not certified are also not qualified. Most respondents stated that they wanted to improve their knowledge of project management when asked why they were pursuing these certifications, with one respondent aligning his/her motivation with organisational strategy by stating, *“I acquired my certification and qualification to solve project challenges organisations are faced with; and in turn achieving their strategic objectives.”* The respondents from that organisation have national diplomas, postgraduate diplomas, and master's degrees in project management, as well as certification of PrCPM from SACMCMP.

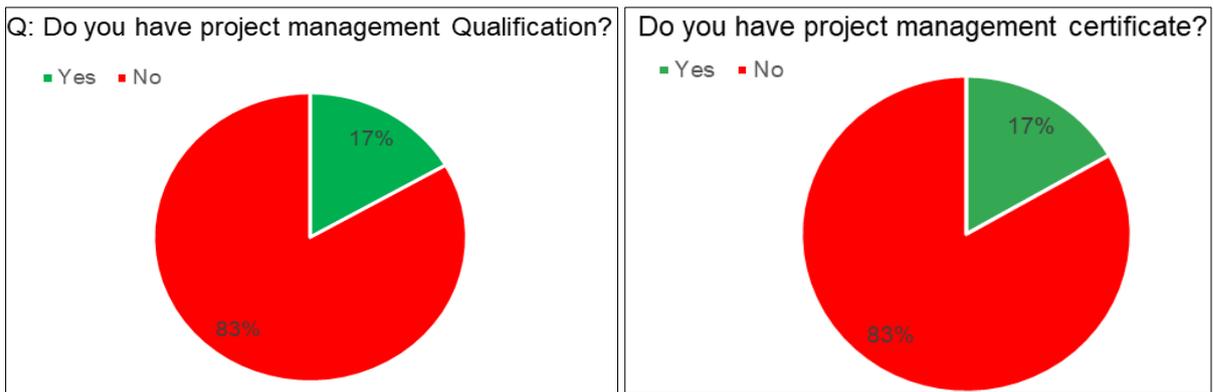


Figure 6.10 – Project Management Certifications and Qualifications within Organisation C

- **6.3.2 The Value of Project Management Qualifications**

Of respondents 33 percent from Organisation C rated project management certifications and qualifications as being extremely important, 41 percent rated it as highly important, 17 percent rated it as averagely important and 8 percent rated it as minimally important. The valuing of these qualifications, shows very disparate ratings, which creates division. Nevertheless, 74 percent of respondents valued it as above average, which still paints a picture of how highly the majority of people within the organisations being studied value these qualifications and certifications. Figure 6.11 below provides a clear picture of all these facts.

A respondent answering question 2 from Chapter 5 said; *“I think it gives some direction in terms of the definition and clarity in terms of the stages of the project. Provide a good understanding of how to manage project in extensive deep details. Providing the understanding of every phase of project management for the successful execution of projects but there are other factors to a successful project department”*.

Another respondent said, *“Project Management qualifications are important, however it is a two-way street, because on its own it is not sufficient. A person who has an engineering degree can manage projects without project management qualifications in the engineering field; however with just project management only, the results can go south. It is good to learn best practice, but it must be substantiated.”* These responses alone shed some light on one of the reasons why Organisation C, had fewer than 80 percent of its members rate the importance of project management certification and qualification lower than the other organisations in the study.

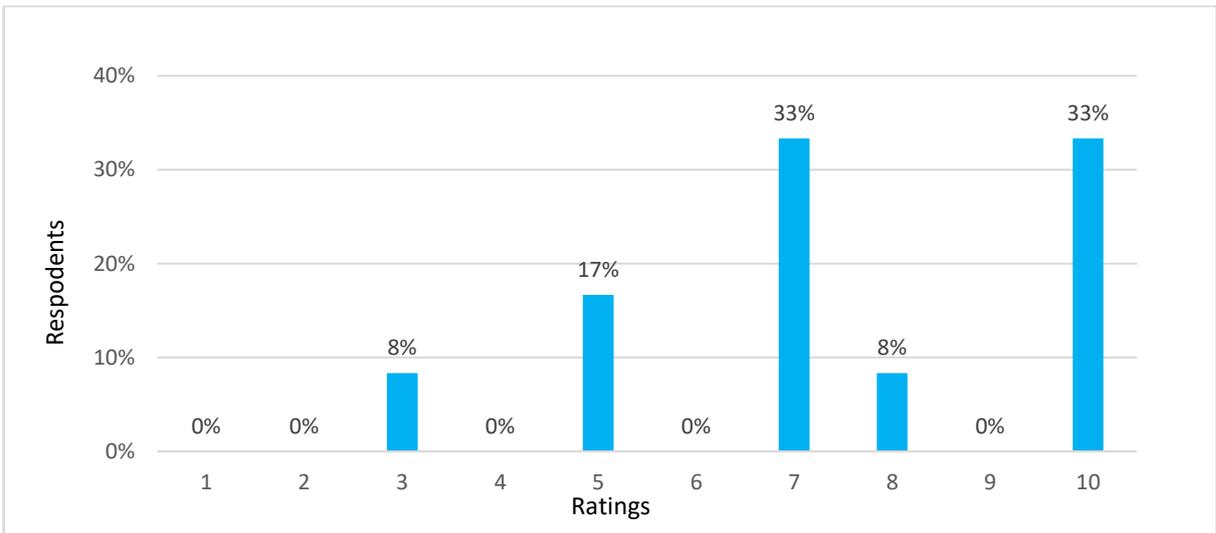


Figure 6.11 – Organisation C Ratings on the Importance of Project Management Certification and Qualifications

## 6.4 Personal Factors

One of the groups of factors that many authors have emphasised as a contributor towards determining the success of project functions is the personal factors group. The implementation of a project function or department as a project, the time factor for this implementation, rewards and recognition, as well as internal integrating of people, are the four factors that fall within the personal factor group. Since the organisations under study have had these project functions in place for a considerable amount of time, it is impossible to establish the effect of the first factor, being time factor implementation on project function.

This section, however, focuses on understanding projects' structure and one has to wonder whether or not all participants comprehend how the time factor can be implemented and how it continues to operate within projects. Equally important, are the effects of the people integration factor and the reward and recognition factor. Various close-ended questions are posed to members regarding each factor, and the responses are then discussed for each organisation in section 6.4.1 and compared across organisations in section 6.8.1.

### 6.4.1 Project Function Implementation

The implementation of project functions as a project was the subject of question 25 on the survey questionnaires about personal factors (See attached Annexure A). On questions pertaining to project function implementation, the respondents were asked to respond with the words yes, no, or maybe with maybe implying that they are unsure. These are the questions:

- There is an existing project function in their organisation.
- I know all the project function stakeholders.
- There are regular project function meetings which I form a part of.

- The results and performance or project function are regularly tracked.

#### **a) Organisation A**

The response outcomes to these statements for Organisation A are shown in Figure 6.12 below. It was discovered that at least 74 percent of the participants affirm that there was a project function within their organisation, while 16 percent suggested that there wasn't a project function, 11 percent were unsure of whether the project function, they were a part of was actually a project function. It is possible that they might not have understood their responsibilities within these organisations or their connection to the outcomes of the project functions they are a part of, which resulted in their uncertainty. This is further supported by the fact that, despite playing an important role in the project, the majority of respondents do not know or are unsure of the identity of the stakeholders, as shown in the results of the stakeholder awareness in the graph below. Which begs the question of how they carry out their duties when they are unaware of the stakeholders who have specific authority over and participation in the work they do.

Furthermore, in accordance with the results shown below, at least 68 percent of the respondents confirmed that they participated in regular project function meetings, which can be correlated with the 74 percent who acknowledged the existence of project functions within their organisation and the additional 63 percent who stated that the results are regularly tracked within their project functions.

According to the overall results of the personal factors study, at least 60 percent of the respondents confirmed that personal factors exist. However, the small number of respondents who were unsure or who were declining is concerning because these are obvious factors that every member of the organisation should know about.

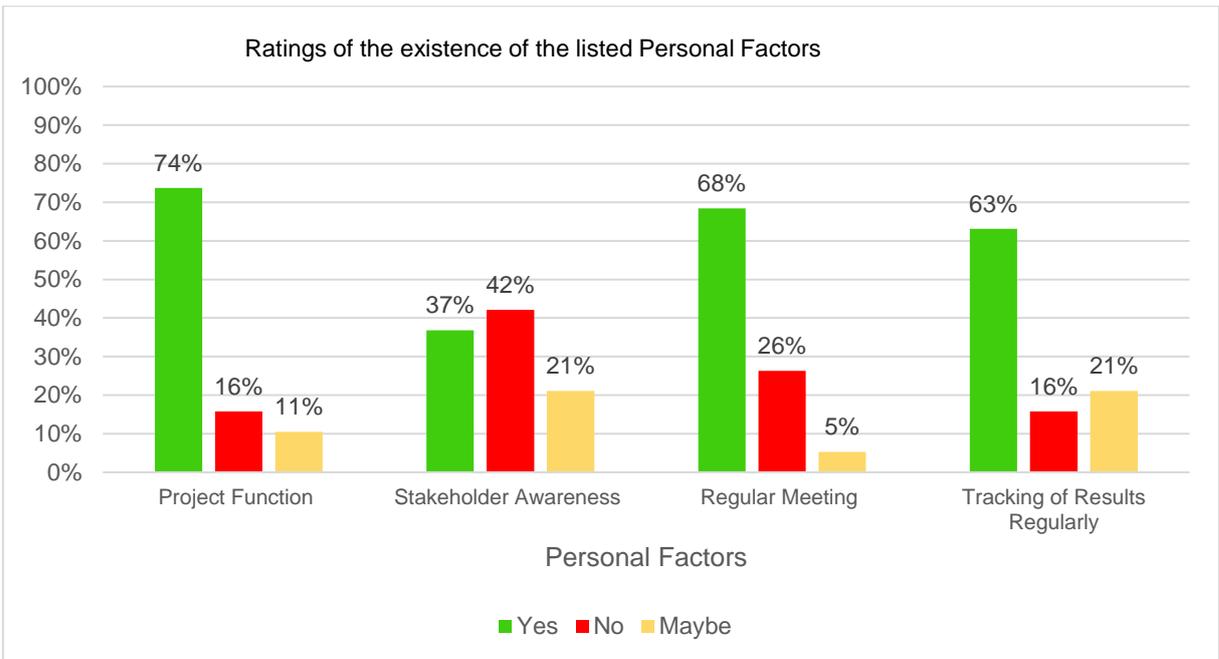


Figure 6.12 – Organisation A Personal Factor Part 1 Results

**b) Organisation B**

The results of Organisation B are shown in Figure 6.13 below. Members of project functions for Organisation B were asked the same questions as members of project functions for Organisation A. The Organisation B members confirmed the existence of each personal factor of project implementation, as posed by the questions mentioned above. In this organisation, every member of the project function was in agreement that they were a part of a project function, and they are all aware of the stakeholders in their respective project functions. They further attested to the existence of regular meetings and the regular tracking of outcomes. The results below show no differences regarding this division of personal factors and there were some participants who were unsure or disagreed with the findings of other members.

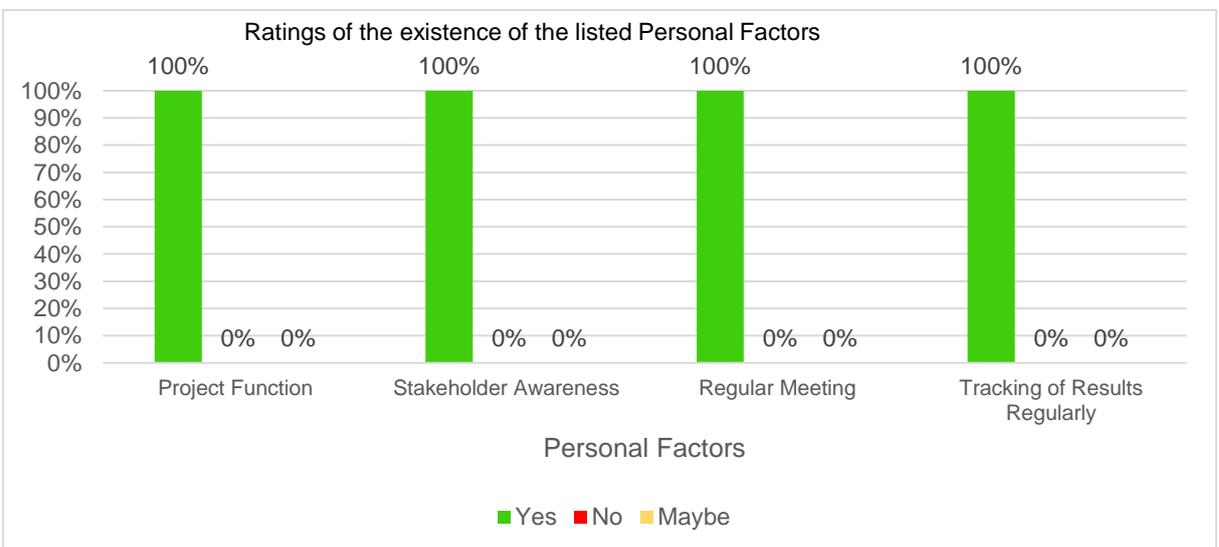


Figure 6.13 – Organisation B Personal Factor Part 1 Results

### c) Organisation C

The results of the personal factors analysis for Organisation C are shown in Figure 6.14 below. Members of Organisation C's project functions were asked the same questions that members of Organisations A and B's project functions were asked. According to the findings on Organisation C, all respondents attested to the existence of a project function within their organisation. In this organisation, 50 percent of the members were familiar with the project's stakeholders, while 25 percent were unsure or did not know them all, and the remaining 25 percent did not know any of them. Around half of the members confirmed that they participated in regular project activities, and that the results are tracked on a regular basis; while the remaining half of the members were split between not at all and not regularly.

The results shown below also showed an intriguing pattern that suggested that, on average, the way these factors performed was a cause for concern, with half of the members giving full acknowledgement and the other half remaining in the dark.

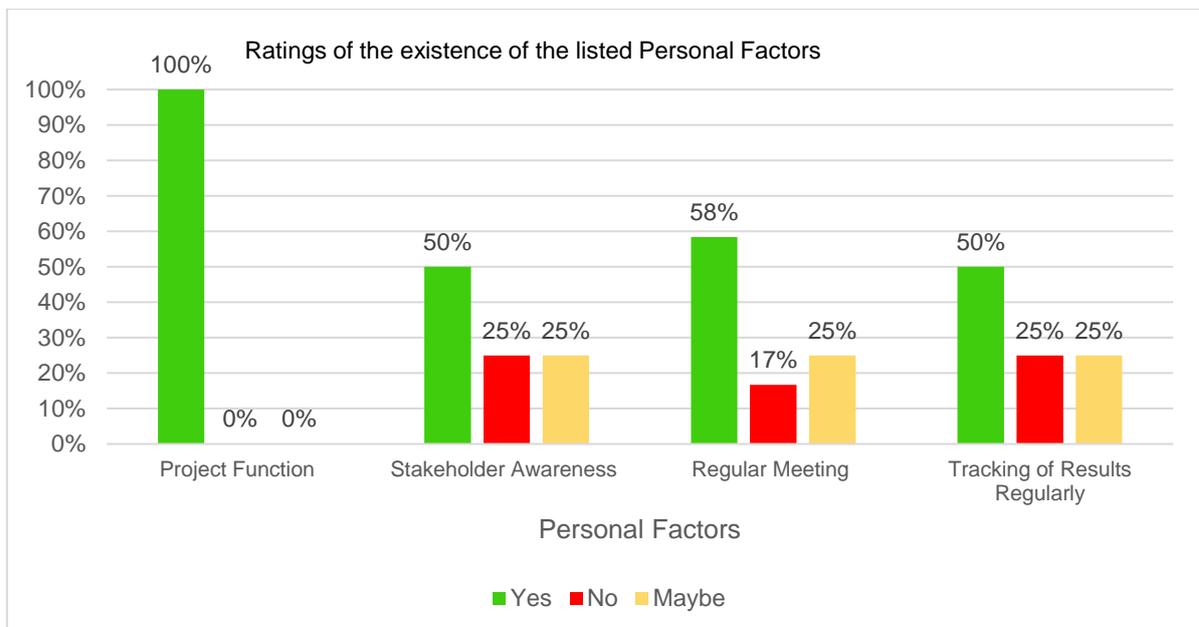


Figure 6.14 – Organisation C Personal Factor Part 1 Results

#### 6.4.2 Reward and Recognition and People Internal Integration

On a scale of 1 to 10, with 1 being the least applicable and 10 being the most applicable, the respondents were asked to rate which of the established personal factors apply in their organisation when it comes to rewards and recognitions, and internal integration of people (See Annexure A, Question 26). Figure 6.15 to 6.17 shows the results of the following questions, with their interpretations:

- Project function members are regularly rewarded and recognised for excellence performance.

- There is internal integration of people within our project function.
- There is an existing efficient relationship between project function members and stakeholders where requirements are collected and results are measured, and then distributed.

In each of the graphs below, which are briefly discussed in detail, the last question has been analysed and grouped into a single category showing the relationships between members and stakeholders. The ratings were all summed up and the mean rating was used as the overall rating for each factor.

### a) Organisation A

The findings below suggest that Organisation A's project function members receive recognition infrequently, with a mean percentage rate of 34 percent. This indicates that at 3.4 on a scale of 1 to 10, members are rarely recognised and rewarded. Along with the existence of stakeholders and members relationships being only average, the effectiveness of people integration is also below average at only 48 percent. The findings below demonstrate that there is still much work to be done to enhance rewards and recognition, internal people integration, and interpersonal relationships within this organisation's project function. One of the elements that can affect team morale and undermine many other organisational success factors is the perception that people are performing their duties without being acknowledged or rewarded for their exceptional performance. At the same time, it was not anticipated that there would be effective people integration when there was no relationship between the stakeholders. The results in this section and the next section can be related to one another, as it was also discovered in section 6.4.1 a) that only 37 percent of the project function members in this organisation are cognizant of all of their stakeholders.

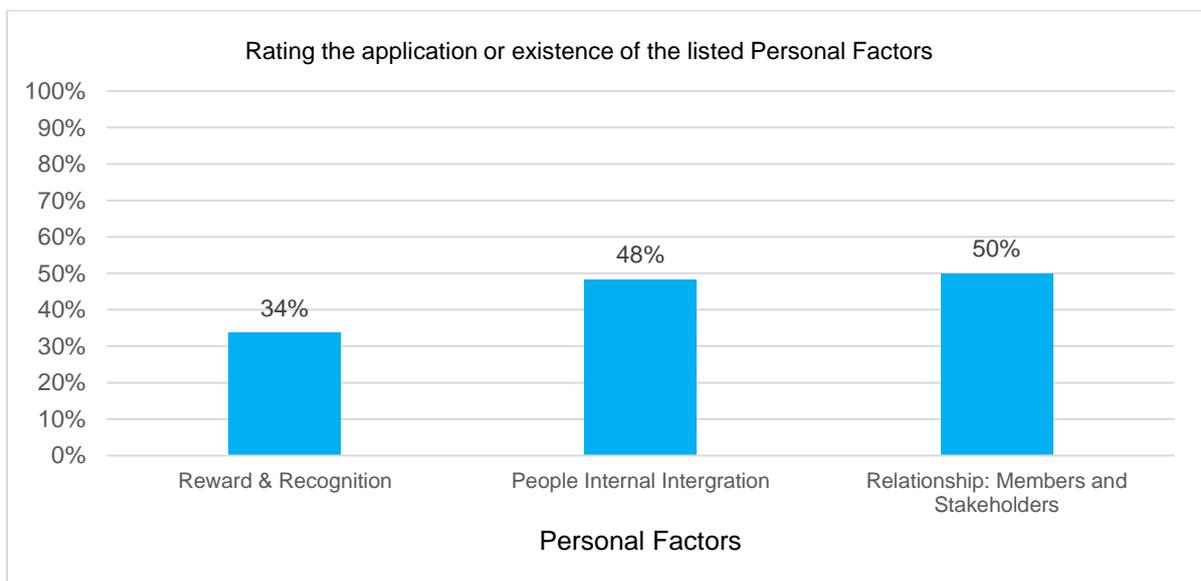


Figure 6.15 – Organisation A Personal Factor Part 2 Results

## b) Organisation B

Members of the project function in Organisation B rarely receive rewards and recognition for excellent performance, with an average mean rating of 25 percent, or 2.5 on a scale of 1 to 10, which is similar to Organisation A but much lower. Figure 6.16, below, shows these outcomes. Contrary to Organisation A, however, internal people integration has a higher rating for efficiency, which also speaks to the relationship between project function stakeholders and members, all of which are rated at or above 80 percent. These once again speak volumes in relation to the outcomes from 6.4.1 b), where all the participants confirmed that they were familiar with the stakeholders in their project function and can thus work together with them and develop some sort of relationship.

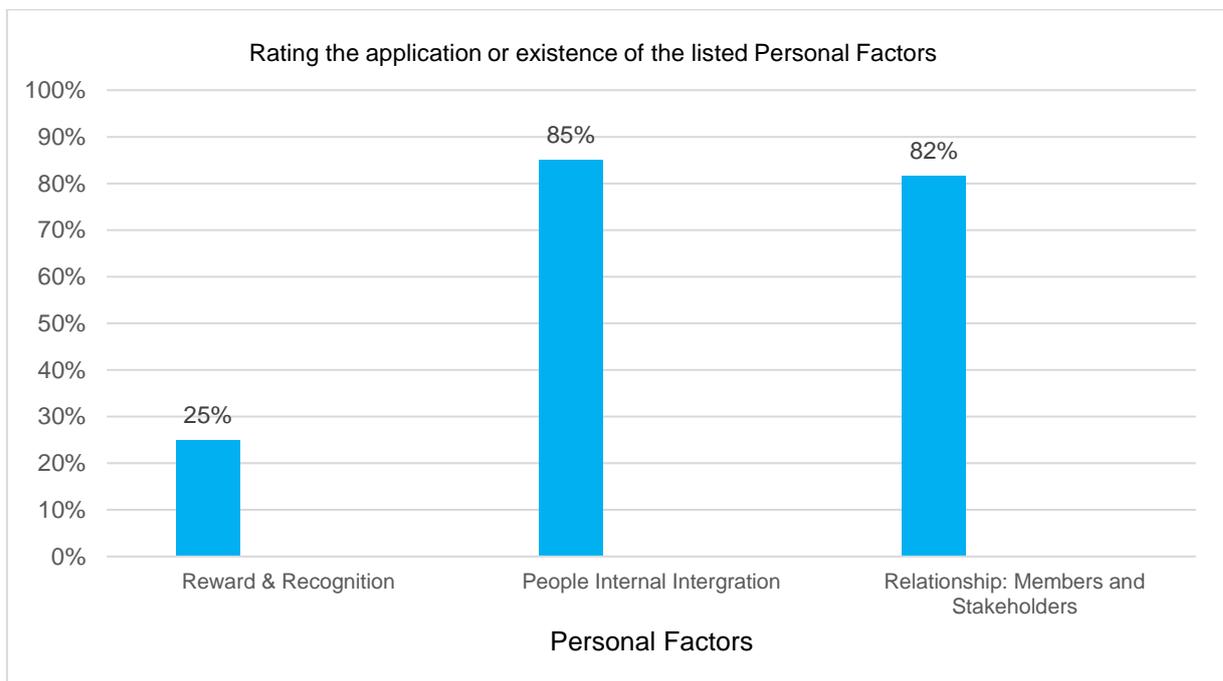


Figure 6.16 – Organisation B Personal Factor Part 2 Results

## c) Organisation C

As shown in Figure 6.17 below, Organisation B's rewards and recognition ratings on the frequency of their occurrence are higher than those of Organisations A and B combined, but are still below average. Members of this organisation's project function also give the efficiency of relationships with stakeholders and members and internal integration of people a slightly below average rating. Additionally, similarly to what was said for Organisations A and B, the average internal stakeholder relationships and people integration somehow relates to the average number of people who are undoubtedly aware of who their stakeholders are, as discussed in section 6.4.1 c). The results are also very disconcerting because they appear to show some sort of split regarding personal factors, which requires some type of investigation and leaves room for improvement.

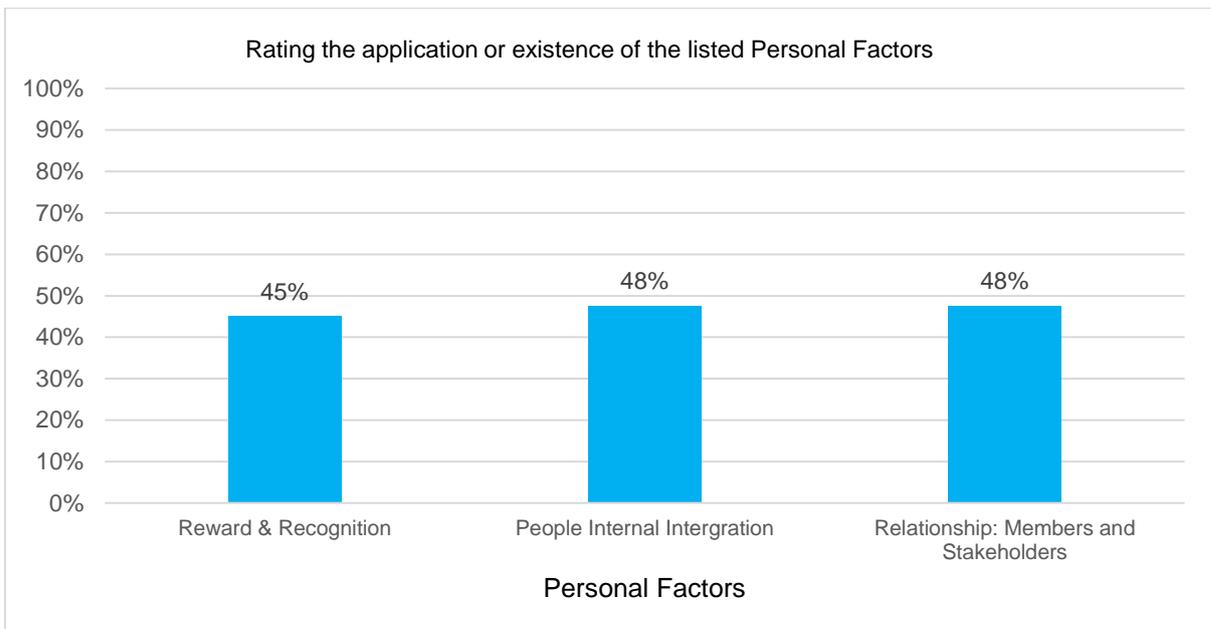


Figure 6.17 – Organisation C Personal Factor Part 2 Results

## 6.5 Organisational Factors

One of the groups of factors that affects the success of project functions is the organisation factor. This category is divided into top-down commitment, in which senior management receives the essential support for the project function's success from executives and top leadership of the organisation (Valle & Soares, 2012). The second factor is the organisation's level of project management maturity, which determines how well data collection, processing, reporting, and decision-making are standardised. The project function's authority over resource utilisations and decision-making is another consideration which falls under project function powers, followed by the project function's members' competency. Top-down commitment was identified by Valle and Soares (2012) as the most crucial factor that affects the success of the project function in an organisation, followed by the competence of the project function members, and finally the project management maturity within the top 5, taking positions 2 and 3, respectively. This proves that, without diminishing the importance of the other factors, organisational factors are the most crucial ones for a project to function successfully. The outcomes of the organisational factors' success within each of the study's organisations are covered in sections 6.5.1 through to 6.5.3

### 6.5.1 Project Management Maturity

Standardisation is the highest level of maturity when it comes to corporate cultures that are managed by the company and connected to project management maturity (Valle & Soares, 2012). The respondents were asked to confirm whether various project management standardisation or process elements were present within their organisation, in order to evaluate the maturity of project management within each organisation. They did this by either

responding with a yes, which indicated that the listed element was present, a no, when it wasn't, or a maybe, which indicated uncertainty or partial existence. The following statements were presented for comment:

- There is a standard data collection system in place that we use.
- There is an existing data processing system in place.
- There is an existing support for systematic decision-making.
- There is standardised documentation of project reports.

The results for each response of the aforementioned questions from each organisation are presented in the graphs from Figures 6.18 to 6.20. They are displayed as percentiles, which represents the proportion of respondents who selected yes, no, or maybe.

**a) Organisation A**

The results presented in Figure 6.18 below show that an average of just over 60 percent of the respondents confirmed that Organisation A possesses the listed components of project management maturity. While the other respondents are unsure, there are still too many respondents who do not know that these elements exist. It is worrisome for an organisation to have an average of 20 percent of employees in the project management function, who are unaware of the processes and standardised documentation they are supposed to use on a daily basis. Therefore, Organisation A has room for improvement to ensure that the project function members are all on the same page, particularly when it comes to project management maturity.

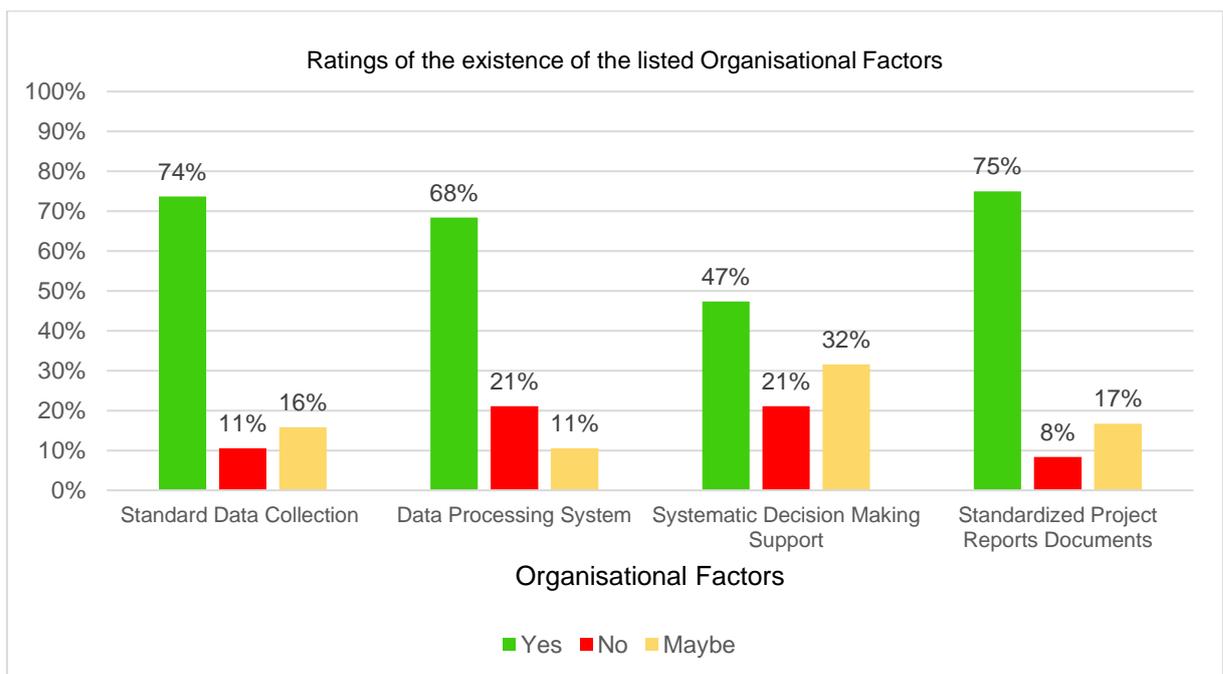


Figure 6.18 – Organisational Factor Part 1 Results for Organisation A

**b) Organisation B**

The outcomes from Organisation B are presented in Figure 6.19 below. The results below show that, even with just 17 percent of the members who are unsure about the existence of data processing or are probably only partially using it, all respondents confirmed that standard data collection, systematic decision-making support, and standardised reports documents exist. Organisation B is without a doubt performing well in terms of project management maturity. The 17 percent data processing deviation can be seen as confirmation of the existence of questionable data processing because it shows uncertainty rather than denial of its existence.

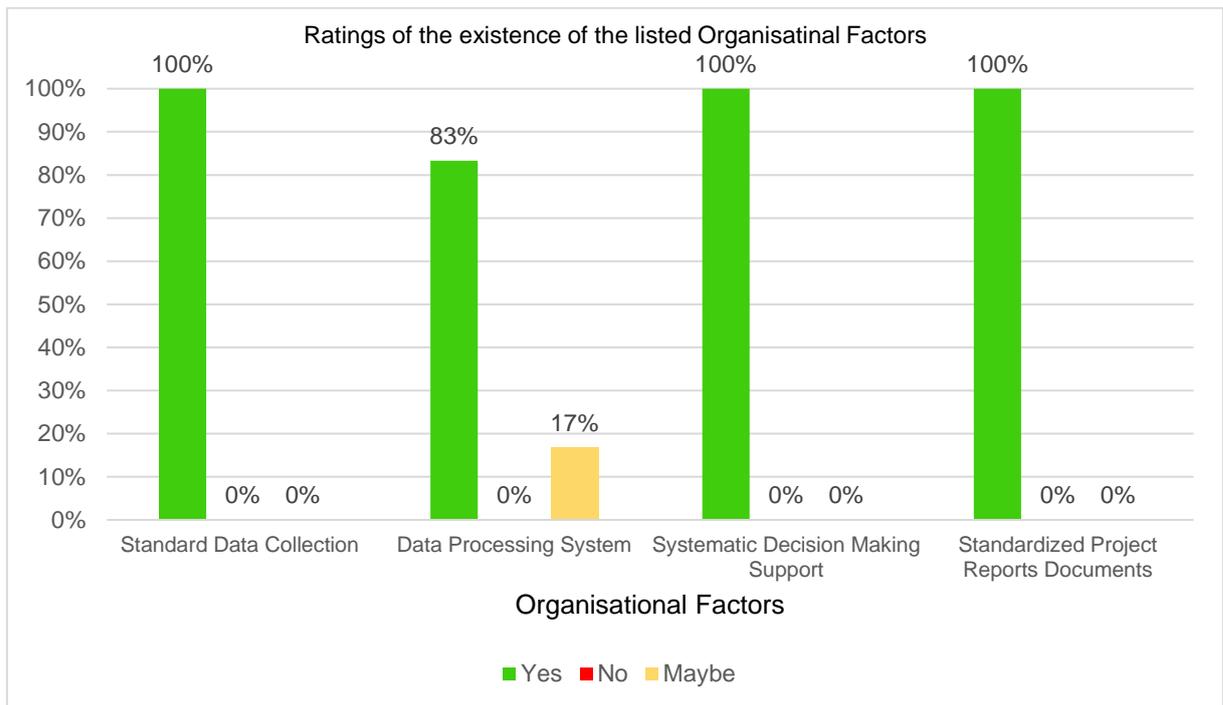


Figure 6.19 – Organisational Factor Part 1 Results for Organisation B

**c) Organisation C**

Figure 6.20 represents the outcomes for Organisation C. Just over 70 percent of the respondents confirmed the existence of the project management maturity listed on the questionnaires, which is slightly higher than that of Organisation A. When interpreted as a ratio, it is clear that these aspects of project management maturity do exist. However, about 17 percent of the respondents do not know they exist, suggesting that they are not using them. However, another 17 percent are unsure whether they exist or even if they are sure, this suggests that they may be using procedures and documentation that they do not know are standards. There is room for improvement within Organisation C, where they need to make sure that every member comprehends and adheres to all aspects of project management maturity, given the no and maybe at an average of 30 percent.

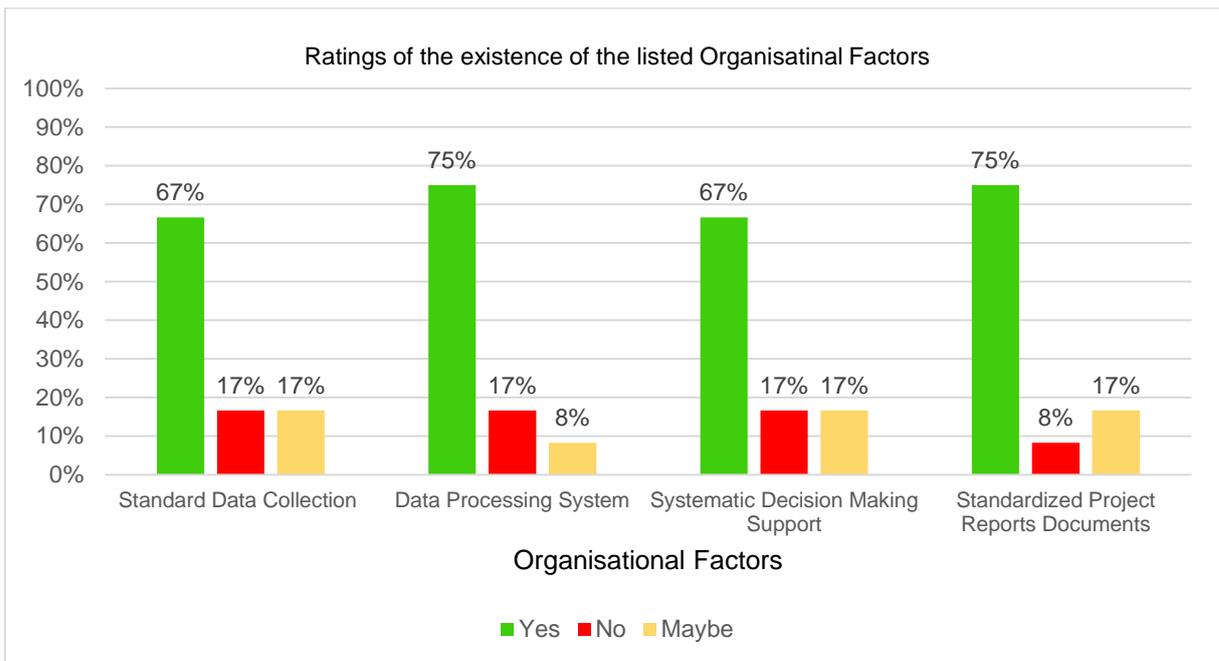


Figure 6.20 – Organisational Factor Part 1 Results for Organisation C

### 6.5.2 Top-Down Commitment

The top-down commitment was ranked as the most important factor in the study by Valle and Soares (2012) concerning the effective implementation of the PMO, which surveyed 20 different project management experts. Top-down commitment entails rewards and incentives as well as the provision of resources, education, skills, and training. Included in this is top management's development of a project management culture. For this study, the respondents were asked to rate the applicability of the following three statements on a scale of 1 to 10, with 1 being the least applicable and 10 being the most applicable, to evaluate the top-down commitment of each organisation:

- Our organisation consistently incentivises and awards staff for outstanding performance within our project functions.
- Our organisation has an effective education, skills development and training program.
- Senior management in the project function and lower level project function sections receives support from the organisation's top management.

The results are shown as graphs in Figures 6.21 to 6.23, which show the percentages of how true each of the statements is. The success rate of each element, as reported by respondents and averaged ratings, is what the results present, but it's not the population percentage.

#### a) Organisation A

The outcomes shown in Figure 6.21 below were obtained from Organisation A, and the employees there gave the applicability of incentives and awards a mean rating of 3.4 out of

10. Although the employees believe that top-down management offers some form of education and training at an average level, it is clear that incentives and awards are rarely given. The same is true of the organisation's top management's support for such rewards as a project function structure. Organisation A performs the worst regarding this factor when compared to Organisations B and C, but that does not imply that the other two organisations are performing well. Challenges related to competency and performance arise when employees are not properly trained, and project functions are not given enough support by top management.

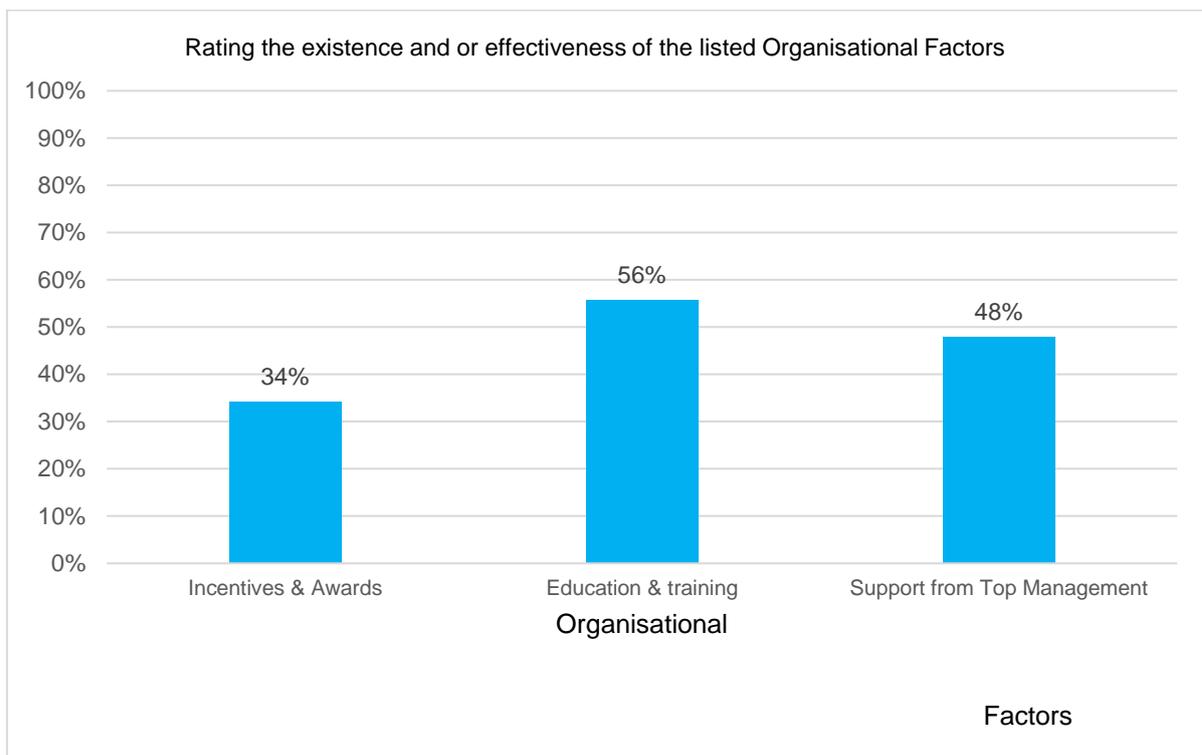


Figure 6.21 – Organisational Factor Part 2 Results for Organisation A

#### b) Organisation B

The results from Organisation B are shown in Figure 6.22 below. Organisation B is performing well in comparison to Organisations A and C, but not well enough to be proud of itself. The respondents gave education and training programs a mean rating of 4.8 out of 10, which is 48 percent applicability, and incentives and gave awards a mean rating of 5.7 out of 10, which is 57 percent applicability.

This indicates that employees only receive average training, incentives, or awards. The respondents do concur, however, that as a project function or project management department, they at least received 75 percent of the top management's support. These results show that there is definitely room for improvement, but that there are issues that this organisation needs to address to ensure a successful project function. This shows that this organisation has problems that need to be resolved in order for the project function to succeed.

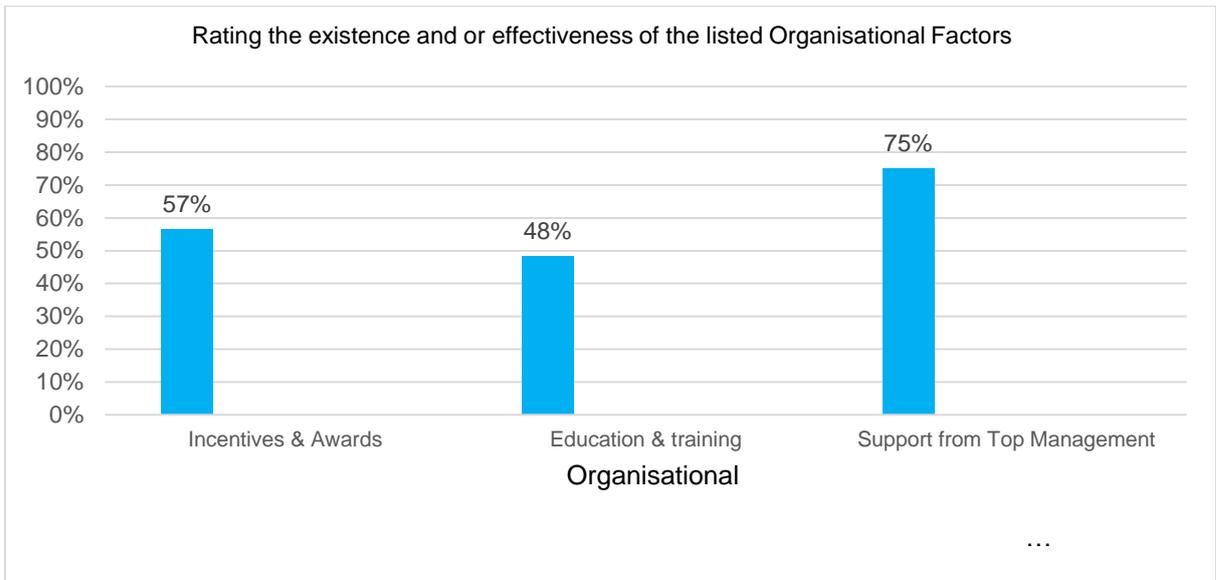


Figure 6.22 – Organisational Factor Part 2 Results for Organisation B

### c) Organisation C

Results from Organisation C's top-down commitment are shown in Figure 6.23. With a mean rating of 6.2 out of 10, the results show that this organisation is performing better in education and training than the other two organisations under review. The support from top management, as well as the incentives and awards, are, also rated as a mean average, which raises some red flags. This implies that employees only receive support from top management about half the time and that they are only partially rewarded for exceptional performance. Therefore, all of the top-down commitment factor's components within the organisational factors that contribute to the success of project functions have room for improvement.

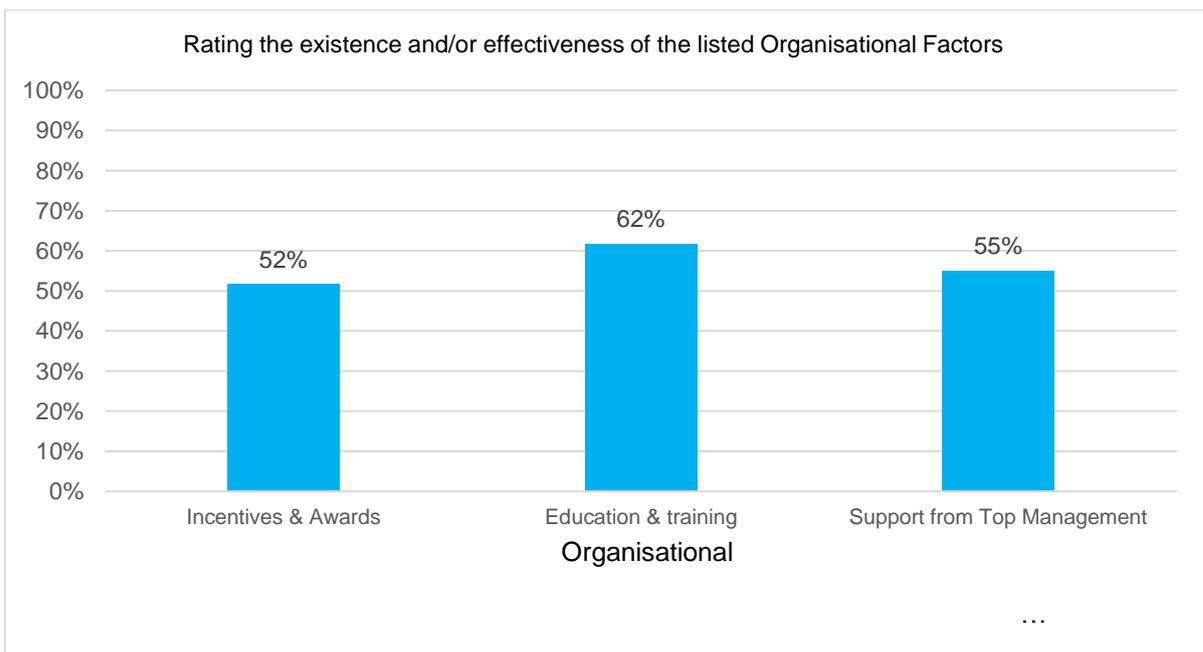


Figure 6.23 – Organisational Factor Part 2 Results for Organisation C

### 6.5.3 Reflecting on Interview Question 4 and 5

This section offers a review of the interview results that were mentioned in Chapter 5 Sections 5.3.4 and 5.3.5. Respondents were asked two questions regarding the top-down commitment factor group, and they provided the answers, which were recorded and will be further examined. The first question in section 5.3.4 was, “*Do the project function leaders have the authority to utilise the organisation's resources without the need for high-level approval and the authority to make decisions that can affect the entire organisations? How are decisions taken?*”. This question was asked to address the success factor ‘*Power given to the Project Function*’. When project managers take over from functional managers, who continue to be in charge of resource pools; in order to develop skills and apply them to projects, the power reflects the prestige of the activity and therefore it can fully utilise the organisation's resources and make decisions that affect the whole organisation’s maturity (Valle & Soares, 2012).

The second question asked on section 5.3.5 was, “*How well do PMO members apply their knowledge and achieve objectives and how often is their competency measured?*” This question addressed the success factor ‘*competence of the project function members*’ and this data could only be obtained from the people who are in leadership positions within these organisations. According to Valle and Soares (2012), competency is not the same as knowledge; rather, it is the outcomes and the capacity to apply knowledge, in order to accomplish predetermined objectives or goals.

Thus, the answers are discussed in this section as the outcomes of the powers given to a project function factor, as well as the competency of project function members factor, for each organisation.

- **Findings for all organisations**

The interviews showed that the power granted to project functions within the three organisations was discovered to be connected. However, there is something called Delegation of Authority (DOA), where the authority to use resources and make decisions differs depending on the severity or impact of the decision to be made and/or the extent of the resources. Various respondents from different organisations, confirmed that they do have the power to use certain resources without top management approval. One respondent from Organisation A said, “*The authority differs in accordance to the scope of work and the extent of the resource utilisation. Our organisation utilises something called Delegation of Authority where leaders or managers are afforded authority to a certain extent but for low level management it is very limited*”.

A respondent from Organisation B stated; “*It depends on the position you hold but, in my position, I do not have any authority to utilise certain resources without the approval as I hold*

*no mandate, but I can recommend for approval. In the project management environment if it is a decision that has to be taken in the project and it is within the ambit of the project, I can make the decision and if it is outside then I need to escalate as I do not have the mandate". A respondent from Organisation C said; "It all depends on the level of leadership a person in question is in. The approval however is required by a certain level to some extent. When it comes to decision everyone has the authority to take decision to a certain extent but more often if they will affect the organisation then certain level of authority is required to sign it off".*

The delegation of authority is the central theme of each response. The interview went on to reveal that all project functions within the organisations were content with their decision-making matrix and their capacity to use resources; but that when it came to competency, the situation was very different. The responses from Organisations B and C emphasised how exceptional and commendable the level of competencies of the members of project functions within their organisations was. Everyone was seen as performing exceptionally well, despite the fact that they were not given training as frequently as they would like.

Organisation A, however, faced a problem because all of the responses criticised the members' competence. A senior program manager said, *"It is important to highlight that our organisation has a lot of skills and competency, however there is lack of interest from employees to apply themselves and deliver on their objectives. There is lack of responsibility and accountability".* Another program manager said, *"We do not assess competency in our organisation and while some of our members applies themselves fully, there is still room for improvement for most of our members".* These findings support the statement made above that "knowledge" does not always equate to "competence". Therefore, that raises eyebrows because one of the top 5 project function success factors an organisation must never overlook is the competency of the project function members. It affects many other factors, and consequently, the whole organisation.

## **6.6 Structural Factors**

The size of the project function, how it is positioned within the organisational structure, how projects are organised, and the structure of the information system are all structural factors (Valle & Soares, 2012). The interview discussions where the respondents provided information about the organisational structures of each organisation, the positioning and size of the project function were all presented in Chapter 5 section 5.3.1. Section 6.6.2 will go into more detail in the analysis of the results and will provide a better understanding of the effectiveness of each organisation's positioning and size without drawing any conclusions about its impact. The results of the organisation's organisational structure by projects and information systems will also briefly be demonstrated and discussed in the next section.

### **6.6.1 Structure of the Organisation by Projects and Structured Information Systems**

Project functions are linked to the organisational culture of project management and, therefore also to projects' proper perceptions of their organisations. The project function offers integrated systems, project controls, project support, and best practices for the whole project management environment. Structured information systems for project management enable senior management to make decisions and project members to share information, while also facilitating good communication between professionals working on projects (Valle & Soares, 2012).

The following statements were posed to respondents, who were then asked to rate the applicability of the listed factors on a scale of 1 to 10, with 1 being the least applicable and 10 being the most applicable within their respective project functions; in order to evaluate the effectiveness of the structured information systems for each organisation and the structures of the organisations by projects:

- There are adequate integrated systems for project management.
- There are adequate and effective project controls.
- There is an existing effective information system for project management.
- There is adequate communication between professionals within projects.
- There is an effective information sharing system.

The results are shown in Figures 6.24 to 6.26, which show the percentages of how true each of the above statements is. The applicability or efficiency rate of each element, as reported by respondents and averaged ratings, is what the results present, but not the population percentage.

#### **a) Organisation A**

According to the findings derived from Figure 6.24, which depicts the effectiveness of structured information systems as well as the organisation's structure by projects, Organisation A is currently performing slightly above average. It still has a lot of work to do to stay relevant and improve competency and performance. Despite the fact that one might anticipate that factors like the effectiveness of communication and information sharing systems would take precedence within the project management environment, this organisation's results say otherwise. A mean score of 6 out of 10 suggests that if something is ignored further, things will only get worse. When compared to the other two organisations under study.

Organisation A is performing better than Organisation C, but worse than Organisation B, specifically on the following factors.

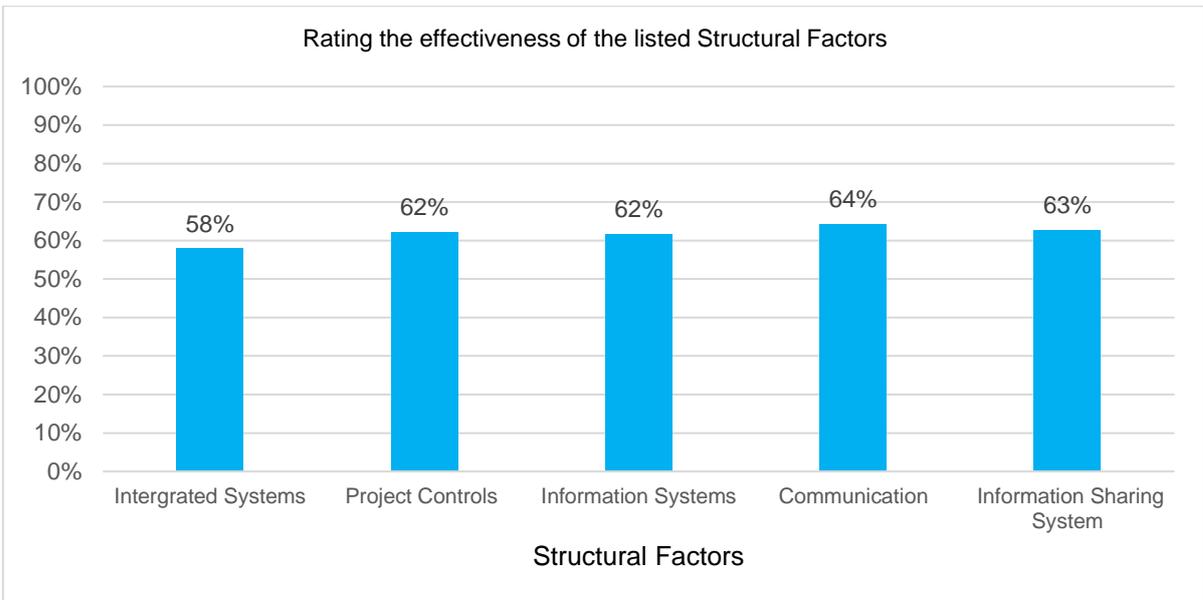


Figure 6.24 – Organisation A Structural Factors Results

**b) Organisation B**

A comparison of Organisation B's performance under the structural factors of organisational structure by projects and structured information systems, is shown in Figure 6.25. With a mean score of 8, it is clear that Organisation B is doing phenomenally well. Although there is always room for improvement when performance is below par, Organisation B's performance deserves applause. While integrated systems and project controls are slightly below 8 with a mean rating of 7.8, communication efficiency, information sharing systems, and information systems are all over 8. The observed deviation is not a great concern, and when it is monitored, it won't cause the results to drop below the average rating.

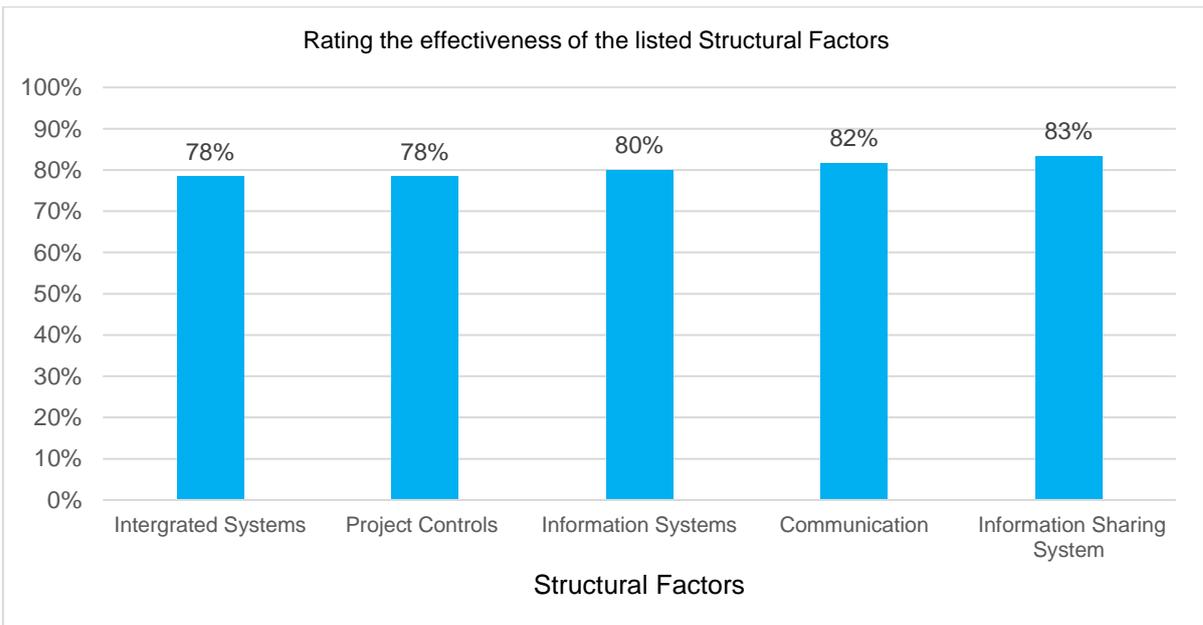


Figure 6.25 – Organisation B Structural Factors Results

### c) Organisation C

Results for Organisation C's structural factors are shown in Figure 6.26 below. Organisation C performed the worst when compared to its counterparts, especially in terms of these structural factors. The listed structural factors, mean rating's applicability and effectiveness are just about average. These ratings serve as a reminder that the organisation still has a lot of work to do if their vision is to see progress on structural factors, which have a negative impact on the general effectiveness of the project function and thus on organisations. With an average rating of 5.6 out of 10, this raises concerns and a requirement to investigate the potential root cause of the poor performance. The success of project functions depends heavily on communication, information sharing, and integrated systems, which can either directly or indirectly affect other success factors.

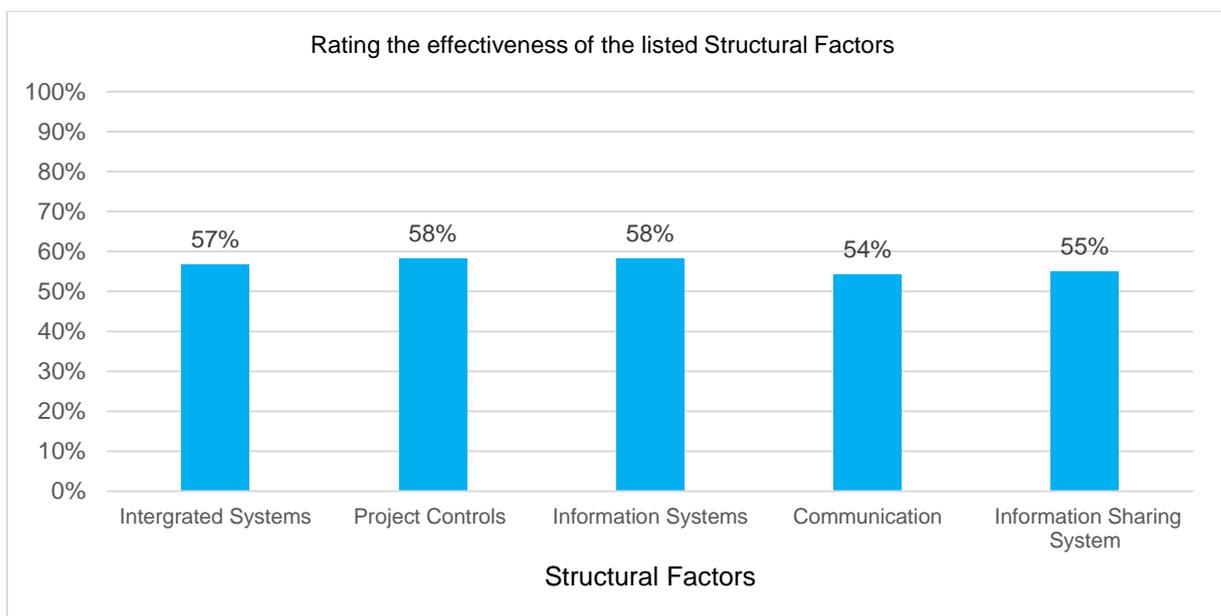


Figure 6.26 – Organisation C Structural Factors Results

#### 6.6.2 Reflecting on Interview Question 1

This section refers to the study's interview section from the previous Chapter 5 section 5.31. It defined two additional project function success factors under structural factors: "Size of the Project Functions" and "Positioning of the Project Function in the Organisation." It was discovered that all of these organisations use functional organisational structures, which are similar to hierarchical structures but different in that they start with positions with the highest level of responsibility and then move down; primarily with employees organised according to their specialities and corresponding organisational functions.

Figures 5.2 to 5.4 illustrate that. These organisations benefit greatly from this type of structure because it encourages specialisation while allowing employees to focus solely on their assigned roles. However, if poorly managed, this structure could lead to the formation of

organisational silos, making integration extremely difficult. However, project functions appear to be properly positioned within the organisational structure of all the organisations under investigation, with the right number of members allocated to each project function role.

Over 90 percent of respondents across all organisations said yes to questions 19 and 20 regarding the project function team members having clearly defined roles. They also said there is flexibility in roles within their project functions, which emphasises the fact that even though these organisations operate under functional structures, there is still flexibility within the departments.

## **6.7 Strategic Factors**

Project function knowledge management strategies, internal and external benchmarking, project function performance metrics, and inclusion in an organisation's strategic planning are all examples of the strategic factors group of project function success factors (Valle & Soares, 2012). The interview was used to gather factual information from the various leadership hierarchies of each organisation, in order to establish each one's benchmarking and performance metrics, while also examining the specifics of these metrics, vision, goals, and objectives alignment. The answers to the questions about these factors are shown in chapter 5 sections 5.3.6 and 5.3.7, and are also covered in more detail in this chapter's section 6.7.2. In addition, while providing a thorough but brief discussion, section 6.7.1 shows the outcomes for strategic planning and knowledge management for each organisation's project function.

### **6.7.1 Strategic Planning and Knowledge Management**

According to Valle and Soares (2012), strategic planning in project functions offers a deeper comprehension of the current supply chain, within the organisations, as well as effective management of resource conflicts. Project function is also the intersection of project management and knowledge management. A valuable opportunity to hone organisational knowledge through the project function is presented by the project closure process, particularly the gathering and analysis of lessons learnt. Project functions offer their members a perspective on managing programs and portfolios and acts as a knowledge base for the project manager. The following questions were posed in order to evaluate the effectiveness, sufficiency, and efficiency of the strategic factors under knowledge management and strategic planning, within each project function under review:

- There is a clear vision of the roles and benefits of the projects I am involved in.
- There is a project closure process that follows at the end of each project.
- Lessons learnt during projects are captured, analysed, and shared.
- Project function members are offered a perspective on managing programs and portfolios.

The results are shown in Figures 6.27 to 6.29, which show the percentages of how true each of the above statements is. The applicability or efficiency rate of each element, as reported by respondents and averaged ratings, is what the results present, but not the population percentage.

**a) Organisation A**

The outcomes of Organisation A's strategic planning and knowledge management factors are shown in Figure 6.27 below. These findings demonstrate that the organisation is not doing well when regarding strategic factors categories elements. The results show that knowledge management factors are even lower than 50 percent. This is where the members are provided more information to avoid repeating previous errors, deviations, or even techniques that aren't working. Members also don't fully comprehend the purpose and necessity of the projects they are a part of. So, how are they supposed to give their all when they don't even know why they are doing it? Regarding these factors, there is still a lot of work to be done within the organisation. It is a cause for concern to have a team that does not even fully comprehend the vision, goal and needs of their own projects. Exposure to programs and portfolios can be excused but not the others.

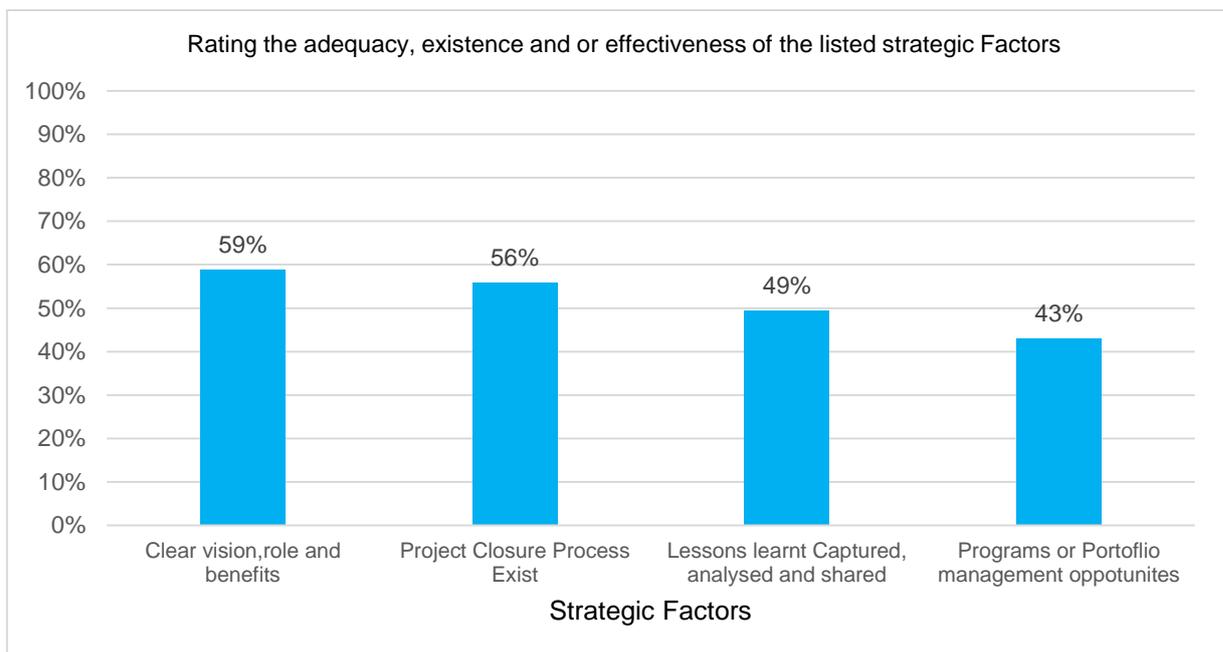


Figure 6.27 – Organisation A Strategic Factors Results

**b) Organisation B**

The outcomes reported on Organisation B are shown in Figure 6.28. In comparison to other organisations, this organisation is performing well on these factors. The team members may not fully understand the purpose, role, and advantages of the projects they work on, but at least there is a level of understanding that rates at about 7 out of 10. Clearly, it is possible to

address some deviation. These results leave room for improvement but do not raise any red flags. The findings also indicate that the members occasionally have a chance to manage programs and portfolios, which is reasonable, given the nature of their work scope within the project management discipline. Having a clear process of project closure where lessons learnt are also captured, analysed, and shared among members also provides members with an opportunity not only to learn from their experiences but also from the experience of others and Organisation B is doing well in that respect.

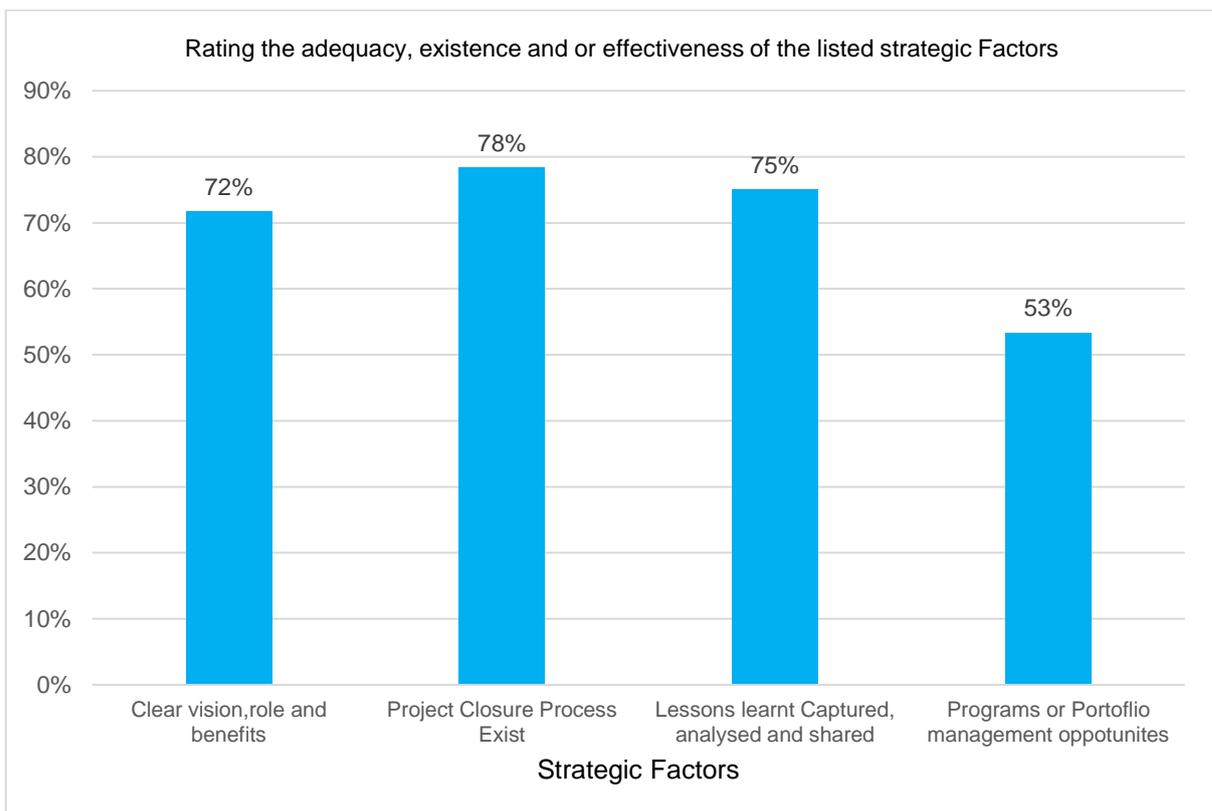


Figure 6.28 – Organisation B Strategic Factors Results

### c) Organisation C

As shown in Figure 6.29 below, Organisation C is performing better than Organisation A but not better than Organisation B. The results in this figure show that there is a clear project closure procedure that everyone must adhere to, but the method for gathering capturing, analysing, and sharing lessons learnt only received a mean rating of 5.9 out of 10. Other elements, such as comprehension of the mission, purpose, and advantages of the projects that members participate in, need a lot of work because the mean rating is only 6 out of 10. A mean rating of 6 out of 10 for the opportunity to participate in programs and portfolio is not particularly concerning, but it does demonstrate how well the organisation can rely on its members and their capability. However, if this organisation intends to run a successful project function and reap the benefits, it also needs to improve its knowledge management and strategic planning factors.

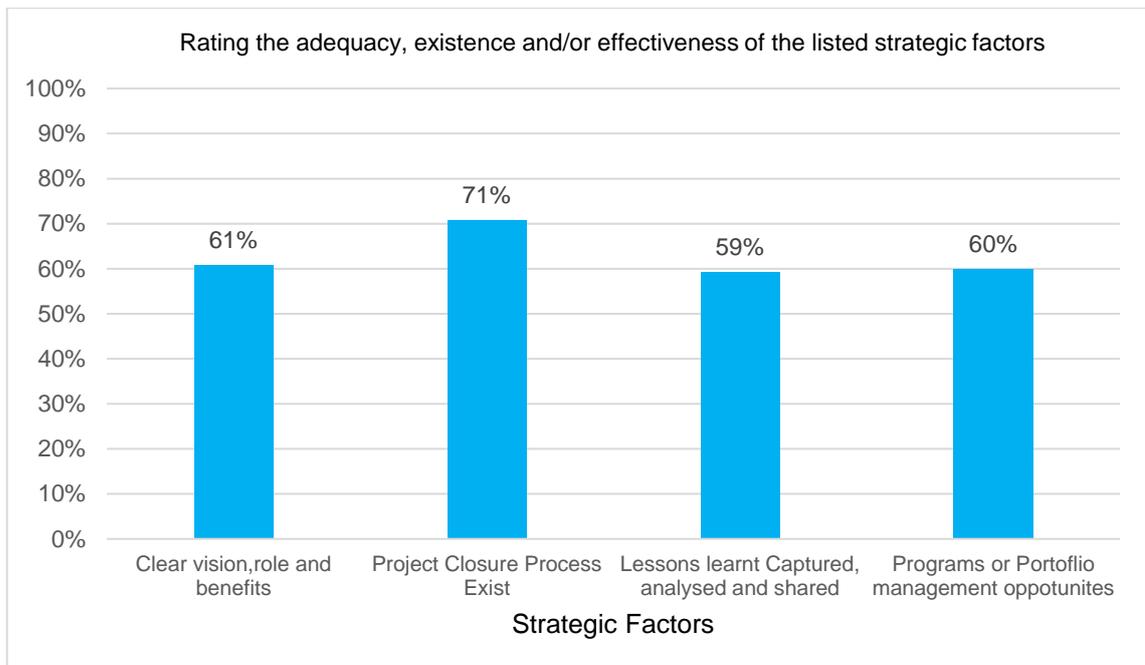


Figure 6.29 – Organisation C Strategic Factors Results

### 6.7.2 Reflecting on Interview Question 6 and 7

During interviews, respondents were asked questions that were presented in Chapter 5 sections 5.3.6 and 5.3.7. The initial question was, "What are the typical goals, roles, and benefits of your project function projects?" and second question was "What are your key business metrics and how are they measured? and how are performance and productivity measured?". These inquiries were made to determine whether the vision, role, and benefits actually exist, as the respondents to the survey questionnaires were tasked to rate their adequacy and efficiency. Although it is typical for leaders to comprehend an organisation's strategic plan, do other employees share this understanding?

The knowledge gap may therefore be filled by looking at the assessment ratings we just discussed in the previous above sections in comparison to the interview responses. In order to determine the business metrics of each organisation and, if applicable, how performance and productivity are measured, strategic questions about the interview process were also asked. All of this forms part of the strategic planning factor assessment.

#### a) Organisation A

The responses from Organisation A to the question, "What are the typical goals, role, and benefits of your PMO projects?" produced answers showing that there was agreement between various levels of project management leaders on how the goal, benefit, and role of projects within their project functioned. A senior program manager answered, *"To have better availability of the network. The end goal is being reliable, affordable, and providing safe*

*network. We are spending time and money on the network, so its availability is crucial for the clients and economical support*". Another program manager answered, *"Maintaining current network capacity while renewing its life. Protect the market share through expansions of network and the safe operations of the mode of our transport"*. However, the second project manager's answer showed a lack of understanding. He continued, saying, *"For the safe movement of our transport mode and not deviate from the project's outputs"*. Even though the answer still touches on the subject of maintaining a safe network, the understanding is based on the output rather than on the organisation's output.

The key business metrics for this organisation are measured in terms of finances, customers, processes, and learning. One respondent addressed the business metrics by stating that the key business metrics are financial perspective, customer, internal processes and learning and development. These and productivity are normally measured through scorecards, Microsoft project management, tracking processes as well as presentations. The other respondent, who claimed that performance is not consistently measured and is primarily done for compliance reasons, agreed with this.

As a result, it can be seen from these interviews that while there are undoubtedly some goals, benefits, roles, and business metrics, there is no mutual understanding or consistency in the performance measurements. The results seen in the preceding sections may have been influenced by this and/or other factors, so making improvements in these areas may also lead to better results.

#### **b) Organisation B**

A mutual understanding of the gap is presented by Organisation B along with a clear understanding of the vision, role, and benefits of the projects they carry out. Their goal is to have the best transportation network in the world. One respondent summarised the goal, the role, and the benefits by saying, *"The vision is clearly defined as being the world's best, and our role is to provide well developed assets and the benefits of the projects we do is something we are working on at the moment and we do acknowledge there is something not right with the brief hence the need for work towards improvement. At the moment the benefits expand from the organisations' benefits to economical contributions"*. Additionally, one of the project managers provided a brief and mentioned that when they receive a project, it usually comes with a brief. They are told what they are going to do, how much it will cost, and given the go-ahead to conduct an investigation according to that brief. Following a stakeholder meeting, a charter outlining the vision, role, and benefits is created. It is typically the responsibility of the project manager to deliver the project's goals within the allotted time, cost, and quality constraints while also providing and developing the best assets that are at a high level and meet various standards.

It was also discovered that there is some degree of shared understanding of business metrics within this organisation, but there is also a gap in that each leader only comprehends the metrics up to the level of their authority and not the full range of business metrics, with the senior program manager being the sole exception, who said, *“The most important one is Service Quality. It is an international measurement across all the organisations in our category of the same capacity. Standards must always be in place and in compliance to independent assessors’ requirements, including people management, convenient security management, and cultural responsibility. Profitability metrics is one of the major business metrics. Best Practice, which is the standard in terms of governance, safety, and security must be up there with the best practice in the world to keep the operating licence as part of regulatory compliance and provision modes of transport for low-income communities.”*

Therefore, it can be seen that even though there is some mutual understanding of these strategic factors, there is a deviation in the ratings shown in the preceding section, due to the difference between the level of in-depth understanding and authority.

### **c) Organisation C**

Organisation C's interviewees, like those from the other two organisations in the study, have some understanding of the goals, vision, benefits, and roles of their projects, but only to a limited degree. Like Organisation B, their vision centres on having the best network in the world. The senior program manager described the organisation's vision as to be the industry leader in the provision of superior networks and said that their role was to strategically plan, design, construct, operate, restore, and maintain South Africa's national transportation network in order to mobilise the economy. The benefit offered is the creation of economic value for the country, through the provision of reliable networks. Additionally, it was mentioned that engineering standards and community improvement are the main business metrics. One project manager said, *“Our business metrics include better value for money, efficient business practices, maintaining market confidence and achieving international best practice. All of these are in alignment with the team’s scorecards, and this exercise was just to name a few.”*

The respondents showed some understanding of the project goals, vision, benefits, and business metrics, despite there being some ambiguity in this area. The discrepancy in these understandings may have contributed to the low mean rating in the section, but the interview clearly shows that all of these components exist; it is only their effectiveness that is in doubt.

## **6.8 Results Comparison**

The results of each factor group of project function success factors, namely; personal, organisational, structural, and strategic factors per organisations, are summarised in this

section. These findings show the performance of each organisation's project function for each factor group on a single graph, allowing for a clear comparison of each project function's performance expressed in percentiles. In addition, the findings from earlier sections that contributed to the overall results findings are highlighted and the results are briefly discussed.

### 6.8.1 Personal Factors

Personal factors determine the success of project function within an organisation, as shown throughout the results and primarily on section 6.4 of this chapter. The implementation of the project function, the time factor for implementation, reward and recognition, as well as internal people integration, make up this group of factors. Before being combined, each of these factors was separated into its component parts and evaluated separately to determine its merit. The results shown in Figure 6.30 below represent the sum of all these factors and show how each organisation's personal factor group performed while providing a comparison to the other organisation in study.

The results show that Organisation B is performing remarkably well when it comes to personal factors, with average rating of 85 percent from the respondents. Organisations A and C, on the other hand, are just performing averagely, which is not impressive. The results from these two organisations project functions are concerning, and if this organisation wants to manage a successful project function, any deviations should be addressed with no hesitancy.

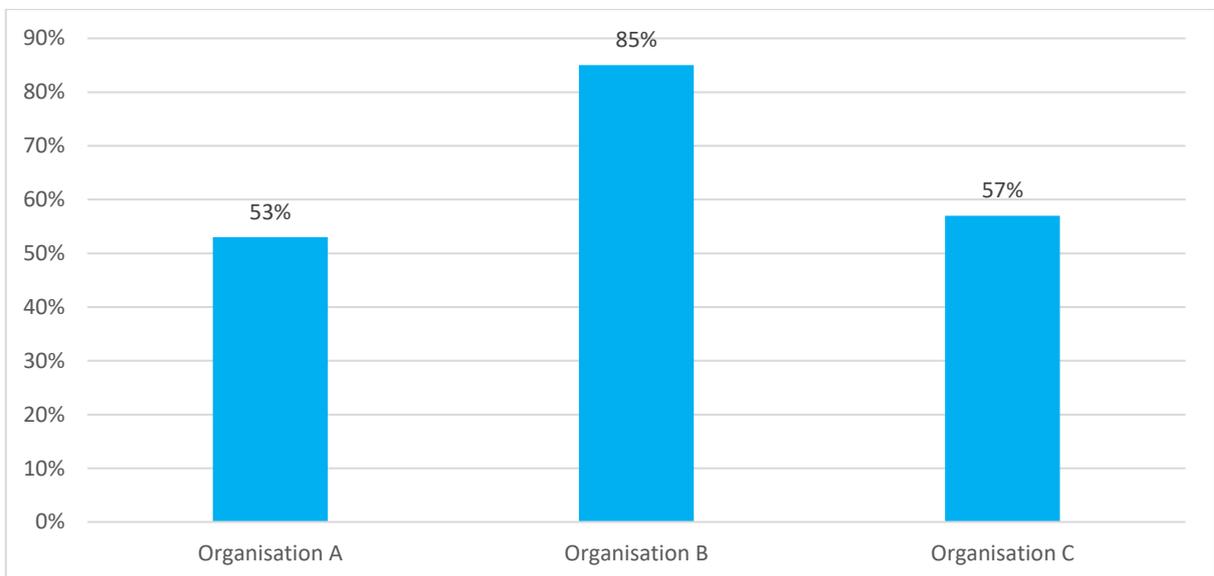


Figure 6.30 – Comparison of Personal Factor Results Across Organisations

### 6.8.2 Organisational Factors

Project management maturity, top-down commitment, power granted to project functions, and member competency make up each organisational factor group. Section 6.5 discusses the individual results for each of these factors, as with personal factors, after they had all been

dissected into their component parts and evaluated separately. Thus, each organisation's combined results are shown in Figure 6.31 below. The results show that, similarly to personal factors, Organisation B is performing exceptionally well with an average success rating of 80 percent, while Organisation A continues to perform averagely well and Organisation C has slightly improved to just above average. However, Organisations A and C's performance still warrants concern, and discussion of intervention and improvement strategies should begin right away.

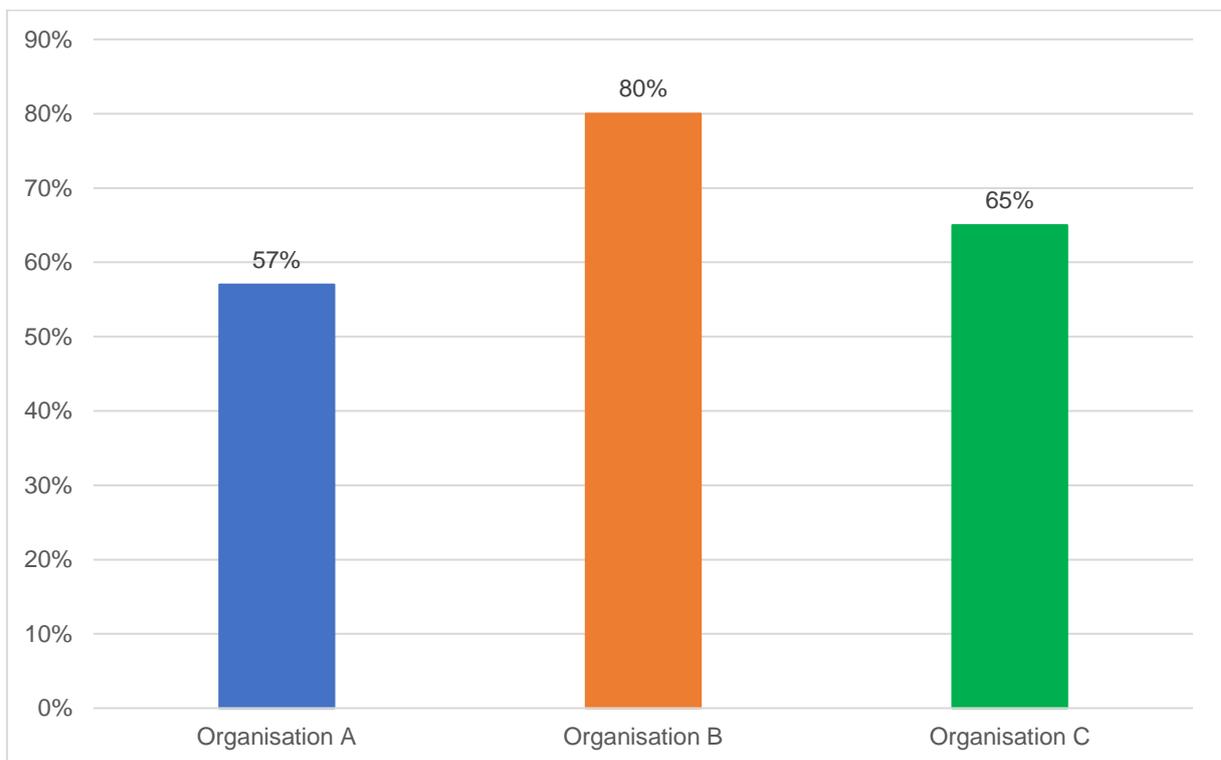


Figure 6.31 – Comparison of Organisational Factor Results Across Organisations

### 6.8.3 Structural Factors

The structural factor is divided into a number of components, all of which were evaluated in section 6.6. The size and position of the project function within the organisation, the organisation's project-based structure, and structured information systems all played a role in the evaluation. With a mean structural factor rating of 80 percent, Organisation B maintains its consistency by providing exceptional performance, as shown by the results in Figure 6.32.

However, the same cannot be said about Organisations A and C when they are used interchangeably. Organisation A performs better than Organisation C in the structural factor, but with pretty mediocre outcomes. Regarding structural factors, Organisations A and C are achieved mean ratings results of 62 percent and 57 percent, respectively. Intervention is really necessary and ought to be a part of these organisations' strategic plans for improving the performance of their project functions, given the results seen in the previous group of factors .

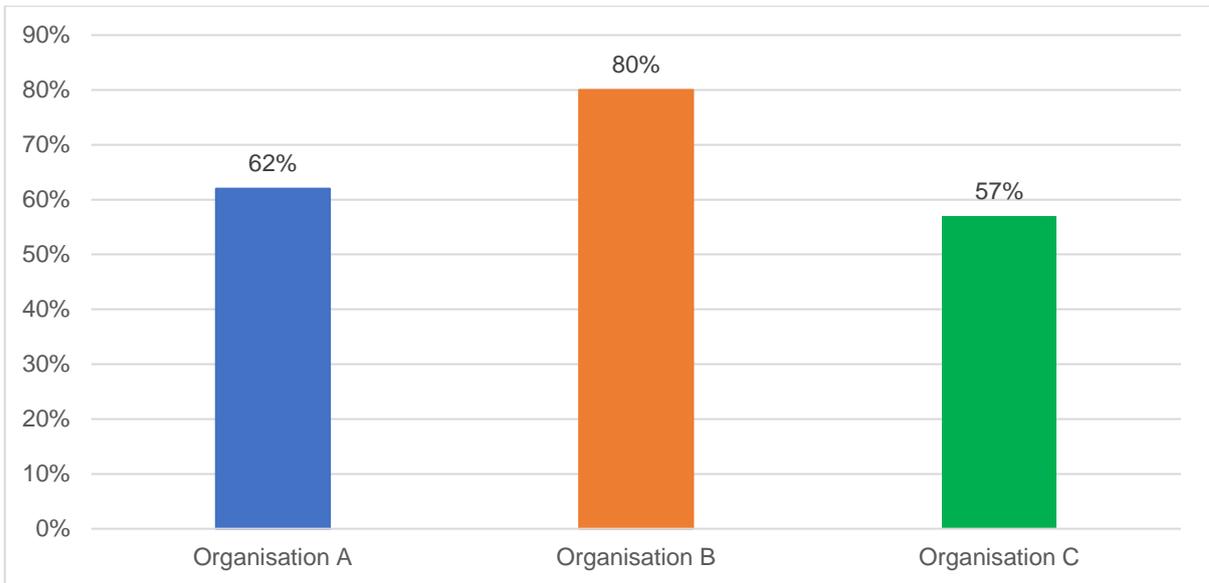


Figure 6.32 – Comparison of Structural Factor Results Across Organisations

#### 6.8.4 Strategic Factors

Strategic factors include performance metrics, knowledge management, internal and external benchmarking, and strategic planning. In section 6.7, the assessment results for these components of strategic factors are presented and discussed. The overall strategic factors result for all organisations is shown in Figure 6.33, and it is clear that Organisations A and C continue to struggle with just over average mean ratings at 52 and 63 percent, respectively. The overall results will be discussed in the next section, but this is already showing a pattern of average performance between these organisations. Organisation B's performance under this factor was still better than that of the other two organisations being investigated. Even though 70 percent of the deviations are still well within acceptable limits, there is still room for improvement. The project function's strategic performance starts to raise warning signs if the results fall below 70 percent.

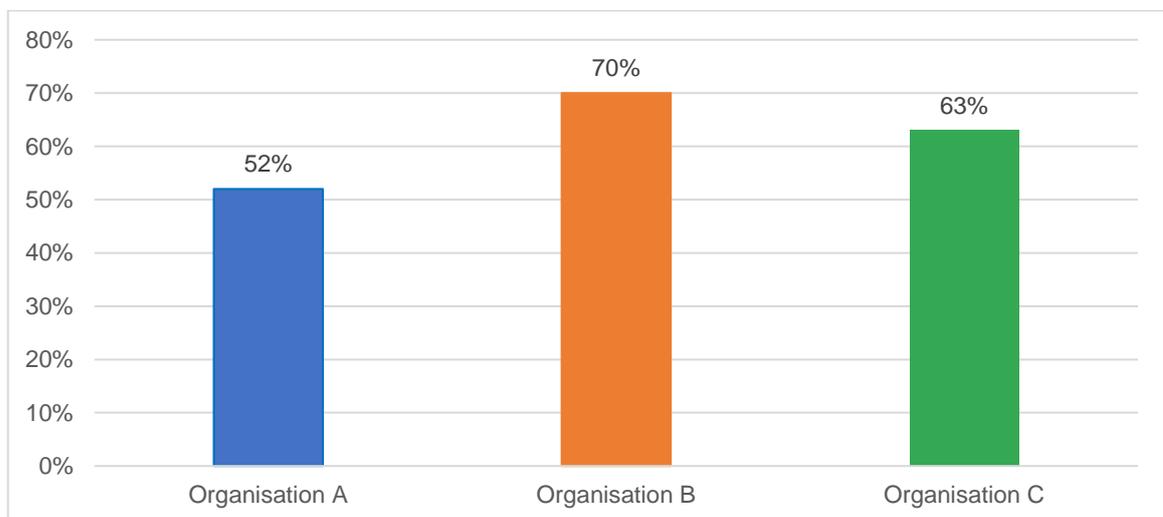


Figure 6.33 – Comparison of Personal Factor Results Across Organisations

## 6.9 Overall Results Comparison and Findings

Figure 6.34 shows the results for all factors for each project function within organisations are combined in this final section of the results analysis; thus providing an all-inclusive result on the performance of the entire project function within each organisation. The percentile rankings demonstrates the overall performance of success of these project functions. The question is whether or not, and if so, to what extent, the project functions under study are successful in terms of the success factors employed in the study.

With an overall mean rating of the success of the project function of 79 percent, the data and results as a whole demonstrate that Organisation B is performing remarkably well in comparison to the other organisations under study. Organisation C comes in second with a success rate of 61 percent, followed by Organisation A, which performs on average at 56 percent. All the organisations have room for improvement, but there are undoubtedly lessons that Organisation A and C can learn from Organisation B; as Organisation B's performance remained consistent across every category of factors with only a small number of outliers.

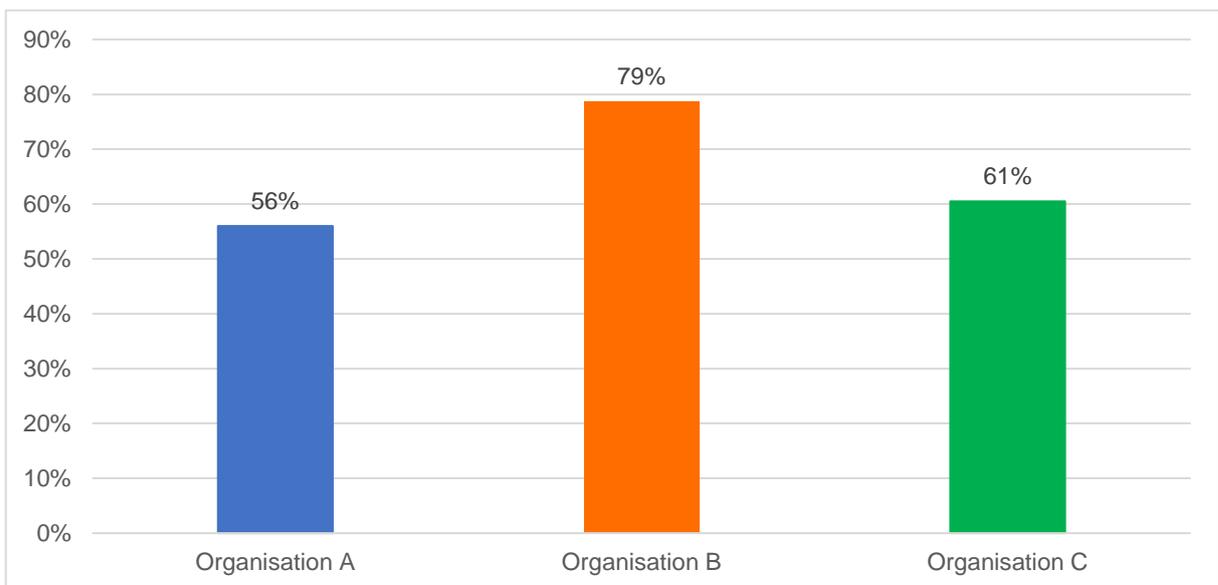


Figure 6.34 – Comparison of Project Function Success Factors Results across Organisations

## 6.10 Responses- Theory Relation

Even as the study evaluates the influence of project management qualifications and certifications on project function success. According to the responses to the questions, although some organizations value these certifications and qualifications and make them a requirement for project functions, for others, they are just an additional advantage but not considered necessary. However, regardless of the organisation, most individuals within these project functions value these certificates and qualifications. "Project management Certification is the key to project function success," one individual is quoted as saying. Despite some of the

respondents' unhappiness with their project functions, which also affects the results, they also demonstrate a clear understanding of what makes a successful project function. This demonstrates that the majority of respondents place a high value on project management certifications and qualifications, and the results paint a clear picture, which will be further examined in the following chapter.

## **6.11 Chapter Summary**

The results of the study were presented, analysed, and discussed in this chapter. In order to provide a thorough understanding of where the deviations originate, the results were divided into various groups of project function success factors, each of which was then divided into smaller components. The findings were further discussed further in light of comparisons among the study's participating organisations. The outcomes of this chapter's findings identified Organisation B as the organisation that outperformed the others. Organisation B showed consistent performance from factor to factor with only minor outliers. Additionally, the results showed that Organisation A is the worst-performing organisation, with performance on a small number of factors rarely exceeding a slightly above average rating.

The aim of the study was *"to evaluate the impact of project management certification and qualification on the success of project functions within major capital organisations"* so the entire exercise was done to produce the results that will be used to evaluate the success of the dependent factor of the study, which is 'Project function,' against the independent variable '*Project management qualifications and certifications*'. These findings could then be used to determine how each organisation's dependent variable performed. The availability of the independent variable was also shown in this chapter, and section 6.3 shows the percentages of each organisation within each project function.

To determine whether there is correlation relationship between the study's variables, the findings from this chapter's dependent variable will be combined with those from independent variables on section 6.3 and to draw a conclusion. The next chapter will then discuss further conclusions regarding how well this addresses the research question, the problem statements, and the objectives before offering any recommendations.

## CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

The thesis navigation map shown in Figure 7.1 shows that all six chapters of the study have been completed; and this is the last chapter which will cover conclusions and recommendations before summing up the study.

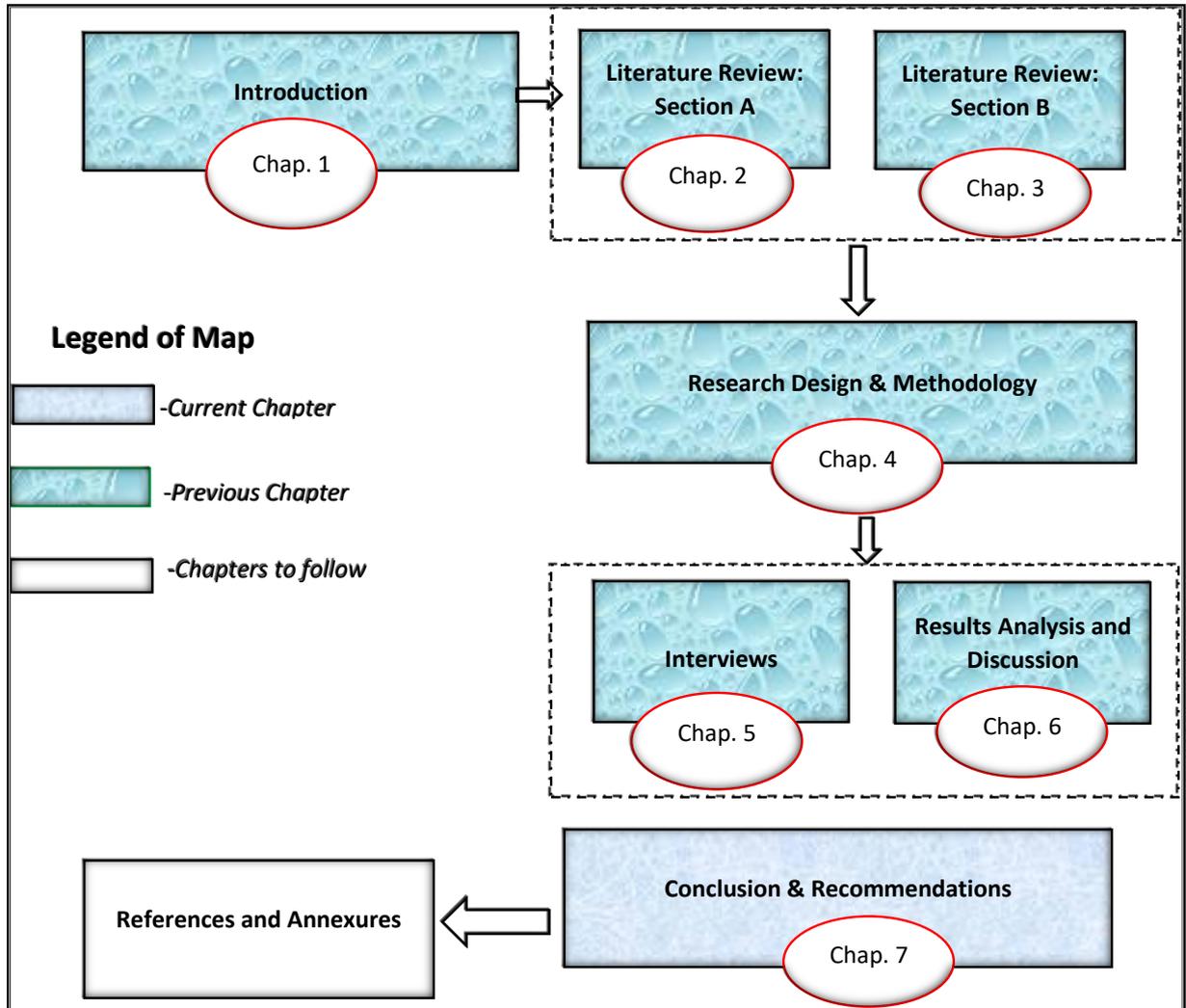


Figure 7.1 – Thesis Chapters Layout Map – Chapter 5

### 7.1 Chapter Introduction

This chapter presents a conclusion based on the study's findings by first considering the study's Introduction Chapter 1, which outlined the study's aim, objectives, the research problem, research questions, and expected outcomes. A brief discussion of the study's findings and questions follow regarding each objective as well as each post-study expected outcome. The problem statement is also addressed, along with the main aim of the study.

In order to draw conclusions and address the study's aim, this chapter refers to the findings from the study that were covered in Chapter 6. This will help to confirm whether the dependent and independent variables in the study have any correlation relationship at all. It also discusses

the study's limitations with respect to the time and resources allotted for research, while highlighting the strengths of the study. Recommendations are then made for future studies that researchers could pursue to take the subject of project management forward.

## 7.2 Conclusions

The study is concluded in this section; having covered all the areas, namely; responding to the research questions, offering a solution to the research problem, addressing the study's objectives, addressing the study's aim and the overall findings.

### 7.2.1 Research Objectives and Questions versus Outcomes

#### a) Objective 1: To identify and comprehend various project management qualifications and certifications available on a global scale.

The first objective of the study was to comprehend various project management qualifications and certifications that a person can pursue on a national and global scale with the question being 'What are the various project management qualifications and certifications available on a global and international scale that project function members can pursue?' This objective was addressed in the literature review in Chapter 2, where the various project management certifications and qualifications were discussed and are also presented in Table 7.1 below.

Project Management Qualifications (2.4.3)	Project Management Certifications (2.4.4)
PMP - PMI	Higher Certificate
APM	Advanced Certificate
PPM	National Diploma
CPMA	Advanced Diploma
Others	Postgraduate Diploma
	Bachelor's Degree
	Honours Degree
	Master's degree
	Doctoral Degree

Table 7.1 – Project Management Certifications and Qualifications

During the interview and on survey questionnaires the respondents were asked to mention the various project management qualifications and certifications they possessed, as follows:

- PMP – Certification
- PrCPM – Certification

- Advanced Diploma – Qualification
- Post Graduate Diploma – Qualification
- Bachelor’s Degree/B.Tech

**Objective 2: To identify the factors that influence the success of project functions within MCOs.**

Objective two addressed one of the questions of the study by asking, ‘What are the factors that influence the success of project functions within MCOs?’ This question was asked to establish a baseline measure for successful project functions, which then aided the establishment of key performance indicators for addressing the main aim of this study. It was found that the success of project functions is dependent on various factors that could be classified in terms of groups. Table 7.2 below presents the group of factors that determines the success of project functions. The final result of the study is assessed and based on these factors.

Organisational Factors	Structural Factors
<ul style="list-style-type: none"> <li>• Project Management Maturity.</li> <li>• Top-Down Commitment.</li> <li>• Competency of Project Function Members.</li> <li>• Power given to Project Functions.</li> </ul>	<ul style="list-style-type: none"> <li>• Position of Project Function.</li> <li>• Size of Project Function.</li> <li>• Structure Projectized.</li> <li>• Information Systems.</li> </ul>
Personal Factors	Strategic Factors
<ul style="list-style-type: none"> <li>• Implementation of project function as a project.</li> <li>• Time Factor.</li> <li>• Reward and Recognition.</li> <li>• Internal Integration of People.</li> </ul>	<ul style="list-style-type: none"> <li>• Project function in strategic Planning.</li> <li>• Award and Recognition.</li> <li>• Bench Marking.</li> <li>• Performance Metrics.</li> </ul>

Table 7.2 – Project Function Success Factors (Valle & Soares, 2012)

It can thus be concluded that project function success is dependent in a number of factors and when one factor in a group is neglected it can affect other factors within the same group.

**b) Objective 3: To evaluate the relationship between project management qualifications and or certification and project functions success within an organisation**

Objective 3 of the study aligns with the main aim of the study which will be addressed in the next section below.

**7.2.2 Addressing Research Problem and Aim**

This study’s research problem was defined as *‘The impact of project management qualification and certification on the success of the organisation’s project functions rather than the success*

of individual projects remains relatively unexplored'. The results of the study added to the body of knowledge about project management while exploring the relationship between project management credentials and project functions. This offers a significant platform for further research into this topic and the relationship between the two variables under study while also providing some preliminary data or future points of reference to build on.

Figure 7.2 below is the representation of the results of the study in the form of a line graph. The dashed line graph represents the dependent variable which is project function and the success rate as per the results discussed in Chapter 6. The dotted line graph represents the percentage of people who have project management certifications while the solid line graph represents the percentage of people that have project management qualifications, in each organisation that was studied.



Figure 7.2 – The Final Results of the Study (Dependent Variable versus Independent Variable)

Figure 7.2 above illustrates the following conclusions:

- Across every organisation, there is less demand for project management certifications than there is for project management qualifications.
- When compared to other organisations, Organisation B has the highest proportion of respondents who have both project management certifications (67 percent) and qualifications (84 percent). It also has the highest rating of success of the project functions (79 percent).
- In Organisations A and C, 17 percent of the respondents have project management certifications.

- Organisation C has 12 percent more project management certifications than Organisation A, thus Organisation C has a project function success rate of 56 percent which is slightly higher than Organisation A at 61 percent.
- Thus, it can be seen that the success rate of the project function rate increases as the proportion of members with project management qualifications increases. Also, the success rate of the project function also increases as the proportion of members with project management certifications increases.
- It can also be seen that the project function success rate, is declining along with the proportion of people with project management qualifications and certifications reduction rate.
- One can therefore conclude that these impacts are based more on the proportion or number of respondents who hold these qualifications rather than merely on the presence of project management qualifications and certifications within these project functions. This could also mean that all the organisations being studied have some level of project management certifications and qualifications, but it is only when the percentage of members who hold these credentials rises that we start to see increases in project function success rates.

Therefore, it can be concluded from these results that have been discussed in Chapter 6 above and the observations made from the graph in Figure 7.2 that project management certifications and qualifications have an impact on the success of project functions within MCOs. However, one must then ask - is it a correlation or a causation relationship? The conclusion on this is provided in Section 7.2.3 below.

### 7.2.3 Conclusion Summary

The main question of the study asked, “*What is the impact of project management qualification and certification on the success of project functions within major capital organisations?*” To answer that question the following was concluded:

- a) It was found through the literature review that project management is ‘*the application of **knowledge, skills, tools and techniques** to project activities in order to meet or exceed stakeholders needs and expectations*’ (Mnkandla & Marnewick, 2011). The terms were dissected and defined as follows:
  - ‘**Knowledge**’ - refers to what the project manager knows about the management of project including project processes, standards, regulations, procedures,

*understanding of projects application area and knowledge of project environments (Mnkandla & Marnewick, 2011).*

- **‘Skills’** - *generally refers to skills like leadership skills, technical knowledge, managerial skills, administrative skills, communication skills, negotiations skills and problem-solving skills amongst many others. Sets of skills are unique based on the projects and the people (Stakeholders, sponsors, and project team) involved (Mnkandla & Marnewick, 2011).*
  - **‘Tools and Techniques’** – *are normally used to convert inputs into outputs and are often referred to as software programs used to automate complex project activities or tasks. They include reporting tools, estimation techniques and collaboration tools. They are optimally used to enhance productivity (Mnkandla & Marnewick, 2011).*
- b) These definitions state the anticipated skills, knowledge, tools, and techniques that someone pursuing project management qualifications and certifications should have or should be equipped with after having received the appropriate credentials needed. Certain project success factors, particularly the composite of the structural group of success factors, such as the power given to project function, size and position of the project are not or cannot be accounted for in this pursuit. These factors also have an impact on project function success but vary depending on the organisation; and are typically controlled by policies, procedures, and governmental governance.
- c) The question of correlation and causation between the independent and dependent variables can therefore be addressed. It is frequently emphasised that correlation does not imply causation. The association between two variables must be caused by the independent variable affecting the dependent variable in order for the causation relationship to be established, and in this case, it was found that there can be other factors or variables that can have an impact on the success of project function, making the relationship spurious as discussed in Chapter 4 Section 4.4.1 where the causation and correlation criteria were discussed. However, there is no denying the existence of the correlation between the two variables.
- d) Finally, in order to address the study's primary aim and provide an answer to the research question, it can be concluded that project management qualifications and certifications have a directly proportional impact on the success of project functions within Major Capital Organisations. This conclusion is reached through observation of Figure 7.2 above.
- e) The impact is that the greater the percentage of project function members with project management qualifications and those with project management certifications, the higher the success rate of the project functions within MCOs.

### **7.2.4 This Study results in relation to the other studies**

The primary aim of this research was to evaluate the impact of project management qualifications and certifications on the success of project functions within major capital organizations. This study discovered that there is a correlation relationship between the two variables. Unlike Walker (2008) and Mnkandla and Marnewick (2011), who argued on the industry value of project management qualifications and certifications, this finding concurs with Mahaney and Greer (2004), who place a higher value on these credentials and encourage their attainment for the benefit of organizations and their internal project structures. The benefits of project management certification for organisations include the fact that it produces better and improved project managers who are forced to study and learn PMBOK and its applications rigorously, as part of their exam preparations. Employee skills assessment, where employers can assess project managers' weaknesses, higher billable rates, where organisations can charge clients more, based on the level of competency evidenced by the certifications that the project manager provides. The project manager also provides a common project management language that speaks to the elements of PMBOK and also contributes to the improvement of project managers' confidence (Mahaney & Greer, 2004).

### **7.3 Strengths and Limitations of the Study**

This research was conducted to evaluate the impact of project management qualifications and certifications on the success of project functions within MCOs. The factors that determine the success of these project functions had to be identified first, in order to evaluate the success of these project functions. This required a thorough review of the literature, where findings were correlated and the best, most inclusive factors from Valle and Soares (2012) were compared with others, before being adopted in their groups in such a way that even the factors that may be regarded as not particularly important are catered for in one way or another.

The study used a mixed methodology approach in which both survey questions and interviews were used to collect data. This helped the research to uncover the intricate details of the project functions that were the subject of the study and ensured that all project function success factors had an equal opportunity to be evaluated and taken into account by the respondents that were chosen to take part in the research. The factors from different groups were also observed in order to ascertain whether a change in one factor might also have an impact on another, and that was covered in Chapter 6.

The success factors that affect how well project functions perform were not only covered in the literature review, but they were also broken down in the results discussion in Chapters 5 and 6, and, furthermore, they were highlighted in this chapter in section 7.2.1. The study's

organisations now have access to enough information about their project functions to understand where things are working well and where they can do better (Chapter 6). This further helps other organisations that weren't involved in the study by providing them with information about aspects of project function they can evaluate and enhance to enable greater success within its factor grouping.

The interview responses from the stratified sampled respondents also gave insight into how well various project function members understood the operational procedures, mission, goals, and business metrics of their organisations. This gave the organisations under review a clear understanding of where the relationship between information sharing, structural, organisational, strategic, and personal factors breaks down, or where other aspects are not comprehended at a sufficient level.

Due to the lack of comparable studies, it was necessary to create the survey questionnaires and interview questions from scratch, using a grouping of project function success factors from various experts that had already been established by other researchers. Therefore, no established technique for assessing the effectiveness of project functions was used. Instead, the variables were each independently assessed before the association between them was determined.

This study only looked at a limited number of organisations, and only within the narrow confines set forth by the consent letters, due to a lack of time and resources. Furthermore, the fact that the organisations under study are parastatals, which demand multiple levels of signatories and a DOA before conducting a study hampered the researcher's efforts, while a significant proportion of these organisations have their own signatories in each region.

#### **7.4 Recommendations**

The following are the recommendations arising out of this study, going forward:

- a) Organisational, structural, strategic, and personal factors are the four categories that determine project function success factors. While investing in personal factors can automatically improve the other factors within other groups, most organisations have a tendency to ignore personal factors. Therefore, it is recommended that organisations account for all factors, including personal ones; rather than just focusing exclusively on one particular set of factors.
- b) Interviews revealed that most organisations place a higher priority on output, and if projects appear to be being carried out successfully, everything else is presumed to be on track. That's not the case though. While attempting to eliminate all chances of failure, some organisations spend all of their time making sure projects succeed while

neglecting to invest in other aspects that could guarantee the success of the strategic elements. Therefore, it is recommended that each organisation evaluate all sets of factors that contribute to the success of a project function and focus on overall improvement.

- c) This study concentrated on MCOs that are SOEs, commonly referred to as clients in construction industry, and in particular on those that specialise in the development and upkeep of large-scale infrastructure projects in the civil engineering sector. It is therefore recommended that additional research be done on what are known as "contractors"; i.e. private organisations, so that the correlation between the variables can be expanded and it can be determined whether the same holds true for other organisations with completely different governance and compliance arrangements.
- d) Depending on the size or type of the organisation, the impact of project management certifications and qualifications may also differ. Therefore, it is recommended that the two variables being studied here should also be studied in other smaller organisations.
- e) The study also considered project management qualifications and certifications as an independent variable, but no conclusion was reached in that regard, based on the fact that project qualifications are not a distinct credential from project certifications in terms of outputs. The researcher advises that further research should be done using project management qualifications and certifications as separate independent variables.
- f) The findings of the study also did not place much emphasis on the kind of accreditation bodies that issue project management certifications or project management qualifications. But presented such accreditation rather simply as certifications and qualifications with a common objective. In order to further understand what members who, hold these positions bring to the table, further study is recommended whereby the curriculum output of each could be examined more fully, in relation to expected performance.
- g) It is also recommended that other researchers investigate other variables that may have a correlation relationship with project function success since this study only evaluates the association between project management certifications and qualifications as independent variables and project function as a dependent variable.

## **7.1 Chapter Summary**

This chapter served as the study's conclusion and confirmed the existence of the correlation relationship between the dependent variable, project function, and the independent variable, project management qualifications and certifications. It was explained that there is a direct correlation between the proportion of project function members who are certified or qualified in project management and the success rate of the project functions within their organisations.

Where and when the proportion grows, so does the project function success rate. Additionally, the research problem and questions were also addressed in the process.

The chapter went on to describe the study's strengths in terms of the use of mixed methods, the grouping of success factors, the methods of results presentation, analysis, and discussion, as well as its limitations in terms of resources, time, and the existence of more comparable studies. Due to this study, organisations will be able to at least gain a basic understanding of how to evaluate the project functions and the detrimental consequences that a lack of knowledge of the factors that contribute to a project function's success can have on a project functions and organisation's overall success. Additionally, the organisations being studied will be able to determine where to boost their project management investments in order to see positive change.

In summary, this study provided sufficient data and evidence to draw the conclusion that project management qualifications and certifications have an impact on the success of project functions within MCOs and their relationship is one of correlation.

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## APENDICES

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ANNEXURE A: ATTACHED BELOW:

 P.K.

# Thesis Survey Questionnaires

Participants have the option of answering questions anonymously. Whether or not participants provide their names, all data will be kept confidential and will adhere to all terms of the Non-Disclosure Agreement signed by the researcher and the organization. Participants are encouraged to be as honest as possible in their responses to help the research be as accurate as possible.

\* Required

Introducing myself and my study



<http://youtube.com/watch?v=-FKHX5AqTWM>

[FKHX5AqTWM](http://youtube.com/watch?v=-FKHX5AqTWM)

## ADMINISTRATIVE QUESTIONS

1. Name of Respondent (Optional)

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2. Name of your organization \*

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3. Department \*

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4. Area of Work (Example: Bellville) \*

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5. Age \*

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6. Gender \*

*Mark only one oval.*

Female

Male

7. Position/Job Description \*

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8. Years of service in position above \*

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9. Highest Educational Qualification \*

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#### PROJECT MANAGEMENT EDUCATION

10. 1. a) Do you have a project Management Qualification? If yes, tick the relevant one below \*

*Mark only one oval.*

Yes

No

11. b) Please select the Project Management Qualification that you have, if any or "None" if you do not have. \*

*Check all that apply.*

National Certificate

National Diploma

Post Graduate Diploma/ Degree/B.tech of Honours

Masters Degree

Doctoral Degree

None

Other: \_\_\_\_\_

12. 2. How long have you had the above qualification? Please answer "None" if you do not have. \*

\_\_\_\_\_

13. 3. a) Do you have a project management certificate? If yes, tick the relevant one below \*

*Check all that apply.*

- YES
- NO

14. 3. b) Please select the Project Management Certification that you have, if any or "None" if you do not have. \*

*Check all that apply.*

- PMP
- CAPM
- APM
- PPM
- None
- Other: \_\_\_\_\_

15. 4. How long have you had the above Certification? Please answer "None" if you do not have. \*

\_\_\_\_\_

16. 5. Please rate the importance of a project management certification and or qualification on Project Management Office/(PMO)/ Project Function. (1 is least important and 10 is most important) \*

*Mark only one oval.*

	1	2	3	4	5	6	7	8	9	10	
Least important	<input type="radio"/>	Most Important									

17. 6) What was your primary motivation for acquiring project management certification? If any? Please answer "None" if you do not have. \*

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PROJECT  
FUNCTION/PMO

Project Management Office (PMO) /Project Function is defined as a group or department within a business or organization that owns project-based activities that split throughout operational activity to achieve the benefits of standardizing and following project management policies, processes, and methods, as well as serve as a source of guidelines, documentation, and metrics for managing and executing projects in an organization amongst many other organizational established functions.

18. 7. a) What is your role in your organization PMO/Project Function or Project Department? \*

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19. b) Are your roles and responsibilities clearly defined? \*

Mark only one oval.

- Yes  
 No  
 Maybe

20. c) Is your organization flexible when it comes to roles within the project team? \*

Mark only one oval.

- Yes  
 No  
 Maybe

21. d) What is the lowest project value you've worked on in your PMO/Project Function?

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22. d) What is the highest project value you've worked on in your PMO/Project Function? \*

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23. 8. What do you think is the key factors that makes a Project Management Office/Team a success? List as many as you possibly can. \*

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24. 9. From the list above which do you believe are lacking within your team/PMO? \*

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**PROJECT SUCCESS FACTORS**

25. PERSONAL FACTORS: Implementation of PMO as a Project: Answer by ticking \* yes , no or maybe to the following statement.

*Mark only one oval per row.*

	Yes	No	Maybe
<hr/> <b>There is an existing PMO/Project function in our organization</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<hr/> <b>I know all the PMO/Project Function Stakeholders</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<hr/> <b>There are regular PMO/Project Function meeting to which I form part of</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<hr/> <b>The results and performance of our PMO/Project functions are regularly tracked</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<hr/>			

26. PERSONAL FACTORS: Reward & Recognition and People Internal Integration: Rate how applicable the following statements are to your Project Function/PMO on a scale of 1 to 10, with 1 being the least applicable and 10 being the most applicable? \*

Mark only one oval per row.

	1	2	3	4	5	6	7
<b>PMO/ Project Function members are regularly recognised and rewarded for excellent performance?</b>	<input type="radio"/>						
<b>There is internal integration of people within the PMO/Project Functions</b>	<input type="radio"/>						
<b>There is existing efficient relationship between PMO/Project Function members and Stakeholders/Seniors – Where requirements are collected</b>	<input type="radio"/>						
<b>There is existing efficient relationship between PMO/Project Function members and Stakeholders – Where measured results are analysed</b>	<input type="radio"/>						
<b>There is existing efficient relationship between PMO/Project Function members and Other stakeholders – where results are distributed</b>	<input type="radio"/>						



27. ORGANISATIONAL FACTORS: Project Management Maturity: In relation to the PMO/Project function to which you belong. Answer by ticking yes, no or maybe to the following statement. \*

*Mark only one oval per row.*

	Yes	No	Maybe
<b>There is a standard data collection system in place that we use in our PMO/Project Function</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>There is an existing data processing system in place</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>There is an existing support for systematic decision making</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>There is standardized documentation of project reports</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. ORGANISATIONAL FACTORS: Top-Down Commitment: Rate how applicable the following statements are to your Project Function/PMO on a scale of 1 to 10, with 1 being the least applicable and 10 being the most applicable? \*

Mark only one oval per row.

1 2 3 4 5 6 7 8

**Our organisation consistently incentivises and awards staff for outstanding performance within our PMO/Project Function.**

**Our organisation has an effective education, skill development, and training program in place**

**Senior management in the PMO/Project function and lower level PMO/Project function members receive support from the organization's top management.**



29. **STRUCTURAL FACTORS: Structure of the organization by Projects and Structured Information Systems:** Rate how applicable the following statements are to your Project Function/PMO: On a scale of 1 to 10, with 1 being the least applicable and 10 being the most applicable? \*

Mark only one oval per row.

	1	2	3	4	5	6	7	8	9	10
<b>There are adequate integrated systems for project management</b>	<input type="radio"/>									
<b>There are adequate and effective project controls</b>	<input type="radio"/>									
<b>There is an existing effective Information system for project management</b>	<input type="radio"/>									
<b>There is adequate communication between professionals of the projects</b>	<input type="radio"/>									
<b>There is effective information sharing system in place</b>	<input type="radio"/>									



30. STRATEGIC FACTORS: Strategic Planning and Knowledge Management: On a scale of 1 \* to 10, with 1 being the least applicable and 10 being the most applicable?

Mark only one oval per row.

	1	2	3	4	5	6	7	8
<b>There is clear vision of role and benefits of the projects</b>	<input type="radio"/>							
<b>There is a project closure process followed at the end of each project</b>	<input type="radio"/>							
<b>Lessons learnt during projects are captured, analysed, and shared</b>	<input type="radio"/>							
<b>Project Members are offered perspective of managing programs and portfolios</b>	<input type="radio"/>							



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