

UNIVERSITY OF KWAZULU-NATAL

EXPLORING THE EFFECTIVENESS OF THE PROJECT MANAGEMENT SYSTEM: A
CASE STUDY OF THE KWAZULU NATAL DEPARTMENT OF PUBLIC WORKS

By

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Candidate Declaration

I, **Nkosingiphile Zelda Mbeje** declare that:

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Dedication

This study is dedicated to my family, especially my mother and my son for the support afforded to me during the research period.

Abstract

Project Management has been widely used in different geographical regions and across different cultures using different methodologies as well as different processes. The KwaZulu Natal Department of Public Works has a challenge of completing projects on time due to funding delays, community interference and unrests, sometimes leading to halting of projects, budget problems, scope creep, and late payments of contractors by client departments, and projects that started late and can't meet the deadline. The study aimed to examine the effectiveness of the project management system used in the implementation of projects within the KwaZulu Natal Department of Public Works by looking at the tools and techniques used. The PMBOK was used as a theoretical framework to support this study. The study was conducted through qualitative research methodology and was exploratory in nature. Purposive sampling was used to select the 26 participants. The findings showed that the Department uses Gantt charts, progress meetings, WIMS, IPDMS, IPAC, IPIP, and SOPS. The findings further revealed that some of these tools are not effective as project team members don't know how to use them, some aren't aware of them and sometimes there aren't enough licences to use the Gantt charts leading to no monitoring of project milestones. Furthermore, the Department also takes long in implementing current frameworks causing challenges during project implementation as current tools and guidelines set for project tasks are not implemented for improvement, there is not enough information on WIMS limiting IPDMS, and the manual IPIP makes it difficult to monitor project budget. There is no PMO for IS projects. Weekly progress meetings monitor progress of all projects. The manual IPIP makes it difficult to manage new project changes made and this indicates how important project planning is and how project expenses must be managed in accordance to the Project Cost Management knowledge within PMBOK. The overall analysis of the information shows that the challenges faced consequently affect the project timelines, budget, and the project scope changes. Compliance risk is analysed for mitigation which advocates for progress on policies that control and restrict the usage of land. It is recommended that training and development is provided for all project team members and that the Department formulates the IS PMO for ease of project implementation and monitoring of milestones and that frameworks must be implemented on time for effective project management of projects.

Keywords: Assistant Director; Deputy Directors; Frameworks; Gantt Chart; Information and Communication Technology; Infrastructure Projects Approval Committee; Infrastructure Procurement and Delivery Management System; Infrastructure Project Implementation Plan; IT Specialist; KwaZulu Natal Department of Public Works; Premis; Project Management; Project Management Body of Knowledge; Project Management Office; Standard Operating Procedures; System Administrator; Tools and techniques; Works Information Management System;

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List of Acronyms

ACRONYM	MEANING
AIS	Automated Information System
AG	Auditor General
AHoD	Acting Head of Department
APM	Agile Project Management
APP	Annual Performance Plan
AD	Assistant Director
BEC	Bid Evaluation Committee
BIM	Building Information Modelling
CR	Critical Realism
CSF	Critical Success Factors
DAC	Design Approval Committee
DD	Deputy Director
DPW	Department of Public Works
DRC	Design Review Committee
EPWP	Expanded Public Works Programme
ETRO	eThekweni Regional Office
FIDPM	Framework for Infrastructure Development and Procurement Management
HRD	Human Resources Development
IPAC	Infrastructure Projects Approval Committee
IPD	Integrated Project Delivery
IPDMS	Infrastructure Procurement and Delivery Management System
IRM	Infrastructure Reporting Model
IS	Information Systems
IT	Information Technology
KZN	Kwa-Zulu Natal
MTSF	Medium Term Strategic Framework
M&E	Monitoring & Evaluation
MRO	Midlands Regional Office
NCRO	North Coast Regional Office

NDP	National Development Plan
OSRD	Office of Scientific Research and Development
PM	Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PMO	Project Management Office
PRINCE2	Project in Controlled Environments
PMS	Project Management Systems
PGDP	Provincial Growth Development Plan
QS	Quantity Surveyor
RDD	Regional Deputy Director
SOPS	Standard Operating Procedures
SRO	Southern Regional Office
TA	Technical Advisor
WBS	Work Breakdown Structure
WIMS	Works Information Management System

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CHAPTER ONE

1.1 INTRODUCTION AND BACKGROUND OF THE STUDY

This study investigates the effectiveness of the Project Management Systems (PMS), using the KwaZulu-Natal (KZN) Department of Public Works (DPW) as a case study. Project management (PM) has been widely applied in numerous regions and cultures by utilizing a range of practices and techniques. A study conducted by Auernhammer and Roth (2021) stated that the whole PM practice emerged as a result of humans inhabiting the land. At a later time, Henry Lauren Gantt, an American mechanical engineer, ensured that the Gantt charts were used widely towards the end of the 1800s for scientific management as part of his development work. With its complexity and challenges, the Gantt chart has been adopted by many projects, and they all became successful.

Regrettably, up until the 1940s, when organizations started implementing systematic tools and techniques, such as the Harmonogram, which attempted to display how tasks developed throughout the project in a floating chart, there wasn't enough adequate evidence to support PM systems (Malik et al. 2021). In order to guarantee that public initiatives were effectively facilitated, particularly for military purposes, such as coordinating battle activities, what to train soldiers/armies on, etc., the federal government in the United States established the Office of Scientific Research and Development (OSRD) in 1941.

A very significant project that contributed to the development of PM practices was the Manhattan Project, which was initiated in 1942. This project was about the design and development of atomic bombs, which were used in the Second World War. This was a big project that brought together about 125,000 resources and was tested successfully in July 1945 during the Second World War. The project is significant in that it showed the government's great leadership and also the brilliance of academia because it brought in the atomic age and paved the way for the next war, the Cold War, which later would be fought (Nawaz et al. 2023).

Ayamolowo et al. (2022) stated that the South African government's important initiatives, just like the Expanded Public Works Programme (EPWP), participated in the program's implementation by many spheres of government, such as the uMsunduzi Local Municipality and other local governments. Although this program produced a large number of job opportunities, the processes employed within the municipality still proved to be unsuccessful

as the municipality still performed poorly and failed to meet project deliverables due to inadequate project management. The study also revealed that the EPWP program is questionable in achieving goals such as poverty alleviation, as it is only a temporal program that still leaves many unemployed youths destitute.

Additionally, a study conducted by Dladla (2023) found that the whole EPWP program lacks a dedicated, clear project management office even though it engages a large number of participants. Involving a large number of people complicates the project, and a large number of people are required to get involved. Ward councillors are usually the ones who conduct the recruitment of beneficiaries for the EPWP program. This is done by registering the beneficiary's contact information in the database; after that, they can be selected from the database.

Winch et al. (2022) asserts that organizations did not begin implementing PM concepts, strategies, and tools to execute multiple projects until much later, in the 1900s. Ciric Lalic et al. (2022) as a project plan is carried out, the Project Management Office (PMO) phenomenon evolves. According to the PMO's philosophy, projects must be completed in accordance with all requirements and procedures that speak to the organization and guarantee that all subsequent projects follow the same procedure for success. In order to guarantee organizational success and serve as a structural instrument for competitive international marketplaces, the PMO was formally developed in organizations. Project management techniques were developed to guide the procedure of effectively executing a project's intention (Portny and Portny, 2022). With an understanding of model-based theory, PMS's primary goal is to equip project managers with the information they need to select effective approaches for developing, implementing, and overseeing projects (Parekh and Olivia, 2024).

The PM approach is frequently used to control company goals and gain a competitive edge, even though certain organizations in Africa still consider PM skills as a gray area (Sayed, 2023). In order to be productive and produce high-quality work, a project manager should possess a variety of skills, including the ability to multitask, communicate effectively, comprehend the political climate of the company, and resolve conflicts (Agarwal et al. 2023). Statistics reveal that eight out of ten project managers lack the competency for project completion (Szczepańska-Woszczyna and Gatnar, 2022). The ability of African organizations and government Departments to identify and manage this risk lies in the skills from top management down to the tools used by labour force (Pathuri et al. 2022). This is crucial where

big projects entail large sums of public funds and monitoring & evaluating project progress is important for project success but not much research has been conducted to investigate the effectiveness of the tools employed within the government sector.

Implementing building projects for clients and contributing to the upkeep of the province's infrastructure are the responsibilities of the Department of Public Works. It is also responsible for implementing rules and regulations related to the built environment. According to the DPW 2021/2022 Annual Report, the Department had intended to deliver at least one facility per financial year, however due to delays in the procurement process, this goal was not met. Over and above that, the department had planned to refurbish about 22 facilities, however, that was not achieved as about 10 facilities were not attended to due to non-availability of funds to complete the projects and non-availability of resource materials. As also stated in the Acting Head of Department's (AHOD) statement in the 2020/2021 annual report that many service providers indicated discontentment due to the Department's failure to make payments timeously when invoices had been submitted. According to Malakoane et al. (2020) payments that are late or not made at all after the predetermined 90-day window exacerbates the situation.

The performance of the specified goals set by the Department of Public Works is the basis for the Auditor General's (AG) audited annual report, which offers an assurance in the form of an audit conclusion. According to a report filed by the AG, the accomplishments listed in the proof provided to the AG for certain metrics that were predetermined at the beginning of the fiscal year for particular projects did not match the Annual Performance Report for the 2019–2020 fiscal year. This being evidence that there was a lack in the oversight function to measure performance and monitoring of progress in achieving goals for the annual financial year. Following that, the auditor's report will include a conclusion or opinion regarding the department's stated performance in relation to predefined goals.

According to Paananen et al. (2021) The auditor's general audit report reveals the actual state, condition, and financial status of the department as well as an equitable distribution of expenditures and internal control over the management of public funds in which the public has an interest. Because the auditing process involves a wide range of situations and reports on the actual performance and financial status of government departments, officials are under time pressure to provide the necessary documentation on time, which has a substantial impact on the audit's quality.

The Sustainable Development Goals (SDGs) in South Africa mandates the Department of Public Works to develop a principle governing procedure for the built environment and the use of properties in the state sector through infrastructure projects. However, the 2019/2020 Annual Performance Plan shows that there was a delay in the completion of some of its infrastructure projects as well as some information system projects. Additionally, the National Development Plan provides a clear mandate for the Department of Public Works to be a selected and competent implementer that can effectively address the demands of the provincial departments needs for building sustainable infrastructure projects. As a department, there is a high expectation to manage the implementation of all of infrastructure projects effectively but the shortage of professional and technical skills within the department becomes a barrier of effective implementation of projects (Kang and Hwang, 2021)

Presently, the evidence to support strategies that could be adopted to assist in strengthening project management systems within the Department is very limited. Hence, there is a need to explore the experiences of all project team members for both infrastructure and information system projects (Vignali et al. 2021). It is essential to explore the effectiveness of the current project management system that is being used by the KZN DPW to implement its infrastructure and information system projects. The objectives and questions of the study will look at key elements, which are the tools and strategies used within the Department in order to showcase the steps that the researcher will take in to achieve the research aim of the study using the KZN DPW as a case study.

1.2 MOTIVATION FOR THE STUDY

The failure by the KZN DPW in meeting the priorities particularly set out in the National Development Plan (NDP) and Provincial Growth and Development Plan (PGDP) which was the foundation for the Departments strategic planning process leading to the formulation of the 2015-2020 Strategic Plan is evidence enough that more studies are required to identify the causes of project failures for both infrastructure and IS projects (Mokgokong, 2024). This is despite the fact that the department has a budget that includes funds for infrastructure, administration, and administration works.

Since project team members as well as project managers have been found to be the key role players in project implementation, there is a need to identify key challenges that contribute in the non-delivery or late delivery of projects within the department. There is a need to identify

the challenges and possible solutions that can be implemented to improve the implementation process of projects within the department (Picciotto, 2020).

According to the 2015-2020 Strategic Plan, there was a fluctuating trend that had taken over in the previous 7 years based on certain infrastructure projects. The fluctuating trend also showed that there were significant trends of carry-through costs that took place for work that needed to be completed which could not be completed on time, for example the Richmond Development Community programme for ablution facilities, which needed to be completed before the Reed Dance ceremony. The Service Delivery Improvement Plan (SDIP) stated in the 2019/20 Annual Performance Plan had indicated that the Department planned to improve problem areas under its core mandate to ensure that it achieves its specific priorities and targets (DPW, 2020). The SDIP showed that there was no proper engagement between the Department and its client Departments regarding their projects which affects planning and scope drafting negatively. Further to that it showed that the Department does not have a proper brief template that was developed, adopted and implemented for all its projects (Alsharari, 2022). Since Project managers need to maintain the smooth flow of information and knowledge, they have been found to lack some of the skills required to keep the project going forward, they require both technical expertise and first-hand understanding of the responsibilities they delegate to others (Magano et al. 2020).

Since it has been established that project managers form part of a barrier of successful implementation on the subject of coordinating, scope writing, executing, supervising, controlling, and completing initiatives, there is a need to provide evidence based findings which can help establish effective strategies to strengthen the implementation of projects within the department (Szczepańska-Woszczyna and Gatnar, 2022).

1.3 STUDY FOCUS

Research has shown that infrastructure and e-Government Information Systems projects have complex and inadequate project management issues in South Africa (Nyansiro et al. 2021). As a result, an investigation into the KZN DPWs PMS is crucial towards determining its effectiveness, the challenges faced and how to mitigate the challenges. This has significantly influenced the need for more study on the efficacy of the PMS, its current challenges and the evolution of an improved PMS and thereby bridge the gap on how a new methodology can be devised which can mitigate the current challenges (Picciotto, 2020).

1.4 RESEARCH PROBLEM

Herath and Herath, (2023) revealed that the aim of the DPW is to successfully develop, maintain and operate government infrastructure projects that produce sustainable service delivery and support the National goals in the National Development Plan (NDP) Vision 2030. According to the Constitution of the Republic of South Africa No. 108 of 1996, which serves as the highest law of the nation under Section 195, the Department is constitutionally obligated to deliver services impartially, fairly, equitably, and without prejudice.

The institutionalization of the public sector projects, both at National and Provincial DPW, is best explained by the PMS. During the Departments' Strategic Planning Sessions annual targets are set and stated in the Annual Performance Plan (APP). The APP is then used during the annual period to keep track of the targets set out during the initial planning by using Output Indicators. In addition to establishing of annual targets, funding is also allocated for projects for the specific year.

To guarantee the completion of the projects and programs outlined in the APP, the Department is expected to provide sustainable infrastructure development and property management through the use of an appropriate PMS. However, even with the established goals, the Department still struggles to complete projects on time due to community disruptions and interference, which can occasionally halt project progress. Other challenges include scope creep, budget prioritization, late payments from client departments to contractors, projects that started late and cannot meet deadlines, and inclement weather. That is why according to Konstantinou et al. (2023), there is a growing interest in conducting studies on the project management strategies.

The Department's APP 21/22 also mentions challenges in obtaining qualified professional consultants for project tasks that must be completed. This results in project development progressing more slowly than expected because of setbacks faced during project implementation. Research by Yap et al. (2022) identifies several factors as contributors, including insufficient design, ineffective communication, and lack of coordination among stakeholders. As per the APP, there has also been a minor decline in payments, which can be linked to financial losses resulting from assets written-offs (Campiglio et al. 2023).

Furthermore, another issue highlighted in the Department's APP is the lack of skills in the field like Information Systems, Construction Procurement, Contract Management, Inventory

Services and technical staff including Valuers, Architects, legal professionals and Works Inspectors who are all essential for achieving project success.

Sadik-Zada et al. (2024) suggest that to guarantee effective service delivery, initiatives tackling various major challenges must utilize a PMS that incorporates techniques and processes. Nevertheless, a lack of skills occurs when standard project management practices are not observed, like following project directives, employing skilled staff, or using the correct techniques. This can be linked to a frail project governance framework, leading to inferior project and service delivery. As stated by Mkhize (2021), the Department usually addresses project issues in a reactive manner instead of a proactive one, thus, there is little focus on the application of controls in project phases and principles. The elements ultimately result in inadequate delivery, implementation and oversight of projects. Ineffective project delivery is likewise attributed to governance structures, frequently changing organizational frameworks, inevitable schedule adjustments, and communication challenges (Heracleous and Bartunek, 2021).

A challenge noted by Layton et al. (2020) is the manner in which the KZN DPW's executive management oversees the project implementers to ensure successful project delivery, as well as the reasons for inadequate project management results during the project execution. He also recognized that there is a deficiency of trust and lack of accountability among those executing and the executives. The execution of projects has faced various hurdles, including inadequate collaboration from officials and absence of appropriate standard documentation to validate project achievements.

Based on Mathenjwa (2020) research, certain projects fail to meet their objectives; this includes Information Systems (IS) and infrastructure construction projects, with a majority of existing literature focusing on these two areas. Minister Patricia De Lille, as stated in Magubane (2020) remarked, "We need to prepare a credible project pipeline. What was also missing in the past was the issue of project preparation. The lack of preparation led to many failures of infrastructure and that is why you find incomplete projects littered around the country."

It can be argued that the conventional method of project management within governmental agencies heightens the likelihood of inadequate results by choosing contractors and subcontractors primarily based on cost instead of their skills, expertise, and ability to provide solutions that fulfill the objectives of both the department and its clients (Jääskä and Aaltonen, 2022).

Additionally, Kaufmann and Kock, (2022) mentioned that the success of projects is closely associated with how the organisation manages and executes the projects. The time required by the Department for the construction and IS projects to successfully execute, achieve, and complete a project can be uncertain, as there are often requests for deadline extensions that result in extra expenses. This issue also stems from disturbances created by the ‘construction mafia’, a group of armed men who go around halting construction projects demanding to take over government construction projects.

Moreover, other elements need to be factored in to achieve a thorough complete star to guarantee effective and efficient project completion; management of scope, cost, and schedule should not be the sole aspects considered to support the project’s success (Mkhwanazi, 2019). Inadequate project planning concerning scope, costs, and schedule management increases the chances of project failure due to changes in scope, budget increases, and addition of more resources, resulting in delays (Melaku Belay et al. 2021).

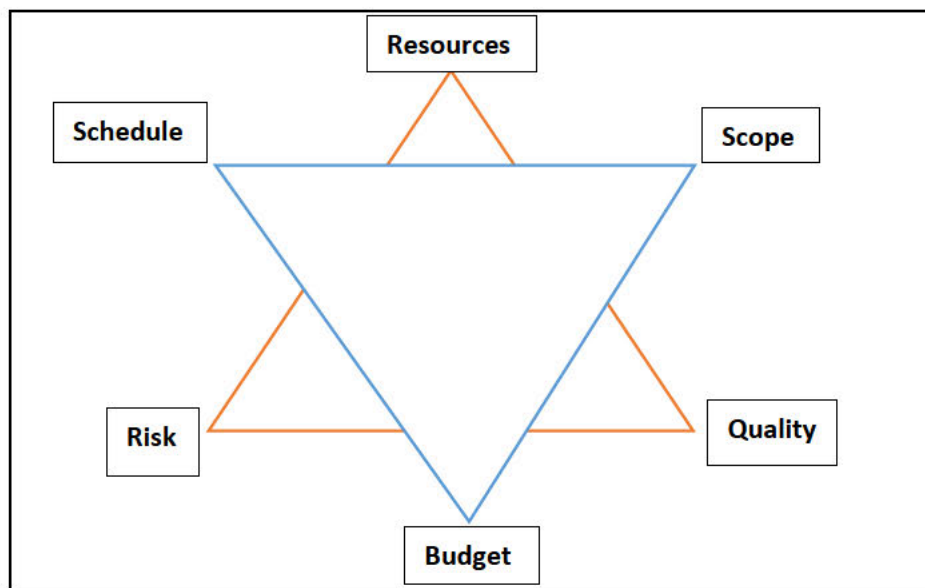


Figure 1.1: Project Management Star

Figure 1.1: Is Mkhwanazi (2019) depicting the 6 elements of Project Management, an additional star of elements has been added.

Source: Mkhwanazi (2019:16)

This study describes the effectiveness of the PMS being used by the KZN DPW for its IS and infrastructure projects and has identified the challenges which affect the PMS. Information identified will then assist in improving the PMS within the Department.

1.5 RESEARCH AIM

The purpose of this research is to investigate the effectiveness of the PMS within the KZN DPW. The study investigates how project teams implement construction and information systems projects within the Department by looking at the tools and techniques being used. It is important to plan and schedule time accordingly in order to ensure project success.

Given that the Department manages immovable assets and infrastructure development, it employs various teams for projects related to both infrastructure and information systems. It is crucial to utilize an effective methodology for planning and scheduling correctly to guarantee the project's success, since the information systems support the Departments operations in functioning efficiently.

1.6 RESEARCH OBJECTIVES

In order to achieve the purpose and satisfy the aim of the research, the following objectives will be addressed:

- To investigate the tools and techniques of the current Project Management System in Kwa-Zulu Natal Department of Public works
- To investigate the challenges facing the Project Management System in the Kwa-Zulu Natal Department of Public works.
- To investigate the strategies that have been implemented to mitigate the challenges affecting the Project Management System in the Kwa-Zulu Natal Department of Public works.
- To establish a methodology that would be effective in implementing the Kwa-Zulu Natal Department of Public Works projects.

1.7 RESEARCH QUESTIONS

- What are the tools and techniques of the current Project Management System in Kwa-Zulu Natal Department of Public works?
- What are the challenges facing the Project Management System in the Kwa-Zulu Natal Department of Public works?
- What are the strategies implemented to mitigate the challenges affecting the Project Management System in the Kwa-Zulu Natal Department of Public Works.?

- What methodology would be effective in implementing the Kwa-Zulu Natal Department of Public Works projects?

1.8 SIGNIFICANCE OF THE STUDY

Numerous studies have been carried out in the field of Project Management, however, challenges facing government driven projects and the challenges that hinder proper project management still remain as a gap as not much literature is available (Pinto et al. 2022). A report published by Auditor-General, Tsakane Maluleke for the 2019/2020 financial year showed an overview of government's spending on irregular projects. The report showed that R 20.2 million was spent on construction projects where contractors were not successful in completing the construction work. In order to overcome these challenges, this study will help the organization develop an efficient project management culture that will embrace a methodology for managing all projects made up of standardized practices for managing both small and complicated projects.

The findings will have a major impact on the expansion of the body of knowledge. By making recommendations to improve numerous disciplines that must be completed when undertaking a project, the recommendations will aid in improving many elements, including the practices being employed within the Department. Mechanisms based on empirical evidence will be offered to fill in the gaps.

1.9 STUDY FRAMEWORK

The study is represented in 5 chapters:

- **Chapter one:** This chapter covers the introduction and background of the study. The background makes it clear why the research is important, whereas the introduction provides background information about the topic that the reader will read on. The motivation of the study shows the reason the researcher chose to embark on the study. The study focus shows how the topic has been narrowed down so that a good understanding can be shown. The problem statement highlight the issue that the research tends to address. The study aim, objectives, and the goals to be achieved by the study are discussed, as well as the questions to be answered by the research.

- **Chapter two: Literature Review:** This chapter reviews relevant literature that have been written by different scholars. It highlights the gaps in the literature. Furthermore, it settles disputes between earlier researches that seemed to contradict one another. In order to avoid effort repetition, the chapter also mentions topics of previous study. Various subtopics have been discussed, including the need of monitoring and evaluation in project management. We've talked briefly about the function of the KwaZulu Natal Department of Public Works and the services it offers. The chapter examines and discusses the project management system, project life cycle, definition of a project, challenges in both managing and executing projects. Project management techniques, project methodology, and the role of the project manager were also explored and analysed, along with measures to enhance project execution success. There is discussion of the theoretical foundation that guides this investigation. Under project management systems, two distinct frameworks for project initiation, implementation, and maintenance are examined. These frameworks are PMBOK which acts as the guide for all projects and is based on the so-good practise of processes, tools and procedures, and PRINCE2 which is based on the so-called controlled environment and acts as the guide for decision making and processes. The PMBOK was adopted by the study to shape the objectives of the study and provides a way on how the study used the framework to arrive at its objectives.
- **Chapter three: Research Methodology:** This chapter described how the research was conducted, the methods and techniques used to gather data. This study described how it was conducted using qualitative research methodology to help clarify the questions on the subject matter with the participants. Furthermore, the study detailed the demographic of interest, the research site, the participants who were specifically chosen, and the sampling techniques applied to the broader public. Prior to conducting the in-depth qualitative research interviews, the data was pre-tested with a limited number of participants to develop strategies to address any potential threats or constraints. In order to assure the study's ethics, the chapter also covered how data was documented, maintained, and analysed once it was acquired. Additionally, it covered how consent forms were obtained from participants prior to interviews.
- **Chapter four: Data Presentation and Analysis:** This chapter analyses, presents and interprets the data provided by the participants. The response rate is discussed where the number of people who participated in the in-depth interviews divided by the number

of people in the sample. Qualitative data as aligned to the four objectives was analysed, discussed and presented as findings. Relevant quotations from participants were extracted and used as part of supporting findings.

- **Chapter five: Conclusion and Recommendations:** This chapter is the final chapter where conclusions and recommendations were made for the improvement of the PMS within KZN DPW. Further to that limitations of the study were discussed and recommendations for future studies were made.

1.10 CHAPTER SUMMARY

The study was introduced in this chapter, which also covered the following subjects: background of the study, motivation for the study, study focus, the problem statement, the research aim, research objectives and questions. The study also gave a summary of the rest of the study chapters.

Having stated the problem statement, an effecting project management system in implementing projects is crucial in achieving National Development Goals coupled with the provincial. Implementing tools and strategies. The literature affirmed that the project managers and project teams play a role in hindering the successful implementation of projects. The questions that have been formulated together with the participants will assist in providing evidence based findings. The author will then make recommendations based on the findings.

The following chapter, chapter two, reviewed relevant literature on the PMS and its challenges in the execution of projects.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

Literature review critically analyses many segments of published sources on a specific topic in the body of knowledge (Chigbu et al. 2023). The review is done theoretically to provide a framework that is an essential instrument when attempting to conduct a successful study that gives the researcher direction as to what other theorists have researched and written about cases similar to the researcher's area of study (Yoon and Uliassi, 2022).

The previous chapter provided an overview of the study. It highlighted how PM practises were developed over time and it highlighted challenges faced by current PMOs in executing projects. The research problem is supporting this by citing relevant literature which highlights challenges in strategies which contribute to inadequate PMS strategies. The chapter shows how these challenges have contributed to the ineffective project management system indicated by the non-accomplishment of meeting the goals set out in the department's APP as part of its annual targets.

This chapter reviewed literature written by other researchers and provided an insight on the monitoring and evaluation process of PM and systems that are being used in KZN DPW. It further reviewed literature on the DPW, the PMS, definition of a project, PM, project life cycle, challenges in management of projects, challenges in the execution of projects, strategies to improve success of project execution and management, the project management practices, project methodology and principles, and the project manager's role in project management and how project managers and project team members have been managing all project management stages.

The *2021/22 Annual Performance Plan* showed that there was a financial spending decrease in the 2018/19 financial year due to the slower than anticipated progress on projects due to delays encountered while the Department was trying to secure skilled consultants for emergency work that needed to be undertaken. This had an effect on the Departments 2015-2020 Strategic Plan which was drawn in line with the Medium Term Strategic Framework (MTSF), the National Development Plan (NDP), and the Provincial Growth Development Plan (PGDP) for the Department to be competitively responsive and contribute to economic and social infrastructure demands.

The literature being reviewed is based on the scholars' published academic work and articles that there are challenges with the PMS being used at the KZN DPW which result in the non-success, non-delivery or late delivery or delay of projects, be it infrastructure or IS projects as there is a need in the Department to employ, on a limited time project to project basis, specialised services to transfer skills and expand knowledge within the Department.

This chapter discusses major areas being covered in this literature such as monitoring & evaluation, the KZN DPW as the implementing agent, the definition of project according to other scholars, different literatures on project management as a methodology described by other scholars, the whole project life cycle as described by other scholars, challenges in the management of projects, challenges in the execution of projects, strategies that have been implemented to improve the success of project management strategies, and the role played by project managers in the delivery of projects and reference is made to other case studies conducted by other scholars which gave the researcher direction to the study. The chapter also discusses the theoretical framework, which is guiding this study from which conclusions will be drawn from, particularly PMBOK which is the model for this study and the 5 process groups.

2.2 ORIGIN OF PROJECT MANAGEMENT

PM has been widely applied in different geographical regions and across different cultures using different methodologies and processes. PM emerged as a result of human inhabitation of the land (Ukhurebor et al. 2022). Later, an American mechanical engineer, Henry Lauren Gantt, popularized the use of Gantt Charts in the late 1800's as part of his work in the development of scientific management. As it stands, many project have embraced the use of Gantt Charts, and despite the complexity and challenges of the projects they all became successful.

In 1941 in the United States, the OSRD was founded by the federal government. This office was created to be a PMO in order to guarantee that government initiatives were properly coordinated and that the relevant military objectives—such as how to prepare for combat and what to teach an army—were taken into account while coordinating project operations (Al Khoori and Hamid, 2022).

Since the beginning of time, people have been working on projects of all kinds. The pyramids were built by the ancient Egyptians about 4500 years ago. 2500 years ago, Sun Tzu said on strategy and planning: "Every battle is a project to be first won; then fought." Buildings of

various sizes and complexity have been developed for as long as people have lived in stable settlements, and multiple transcontinental railways were built throughout the 19th century. However, the term "project management" didn't become popular until the second half of the 20th century; prior endeavours were viewed as acts of religion, feats of engineering, the establishment of nations, etc. And the individuals in charge went by the titles of priests, engineers, architects, etc. While the Manhattan Project in the 1940s worked to develop the atomic bomb (Chadwick, 2021).

The field's focus grew from overseeing engineering and defence projects to providing information systems and supporting organizational change, and managing megaprojects to satisfy national infrastructure demands, project management approaches have evolved. Project management evolved from being a tactical tool to delivering corporate and national agendas and adopt the technological niches to meet changes that appear at the landscape level (Sankaran et al. 2021).

2.2.1 MONITORING AND EVALUATION

M&E is a systematic process that is used to assess projects and assists in performance improvement in order to achieve results. This program development and assessment was formally introduced to South Africa in the 1990s as local scientists started showing more interest in the subject, as up until the early 1980s, assessment research was mostly unknown (Giacomazzi et al. 2022).

According to Vanessa and Gitahi (2023), to guarantee sustainability and success at every level of the project, building and system development projects, like most others, depend on efficient monitoring and assessment. Despite its challenges, project sustainability mostly depends on project planning. Project managers are thus held accountable when projects fall short of their goals, and it is their ongoing duty to make sure that the project goals are met. Mutesi and Odhuno (2021) agrees that monitoring & evaluation techniques should be included in projects implementation activities to support project execution. The evaluation and review of projects, or program evaluation review technique, is a systematic way that helps all activities get organised accordingly in a network chart and assist in tracking and assessing the progress of a project.

According to Ospina et al. (2021) M&E objective is to enhance the management of outputs, results, and impact both current and the future. It is mostly used to evaluate how well

institutions, projects, and programs established by governments and other organizations are performing. Further to that, in M&E, resources such as skills, time, and access to stakeholders, within a project must be planned for and budgeted for or else a project's management and accountability will be compromised.

In a study done by Makiva et al. (2022) in order to mediate policy processes, planning, and service delivery, monitoring and evaluation must be effectively institutionalized, resourced, supported, and placed. This will help the organization's monitoring and evaluation implementation approach.

2.2.2 THE DEPARTMENT OF PUBLIC WORKS

The KZN DPW is the primary implementer of choice for construction infrastructure, accommodation, and related services that benefit the public for all government departments. The department aligns itself to the national and provincial development priorities as expressed in the National Development Plan to eliminate poverty and reduce inequality by providing infrastructure development and maintaining infrastructure to support economic growth and social development.

According to Huseien and Shah (2022) The Department of Public Works is typically given a sizable budget to ensure that the required services are provided because it is required to provide services like property management, infrastructure development, land and building acquisition, maintenance of public buildings, and disposal of land and buildings. She further states that budgets are aligned with the line function department which is large enough to undertake programmes for that department to a large scale. However, she states that the budget poses a major challenge as it becomes difficult to influence the expenditure of the line-department when its budget is highly decentralized. Furthermore, the Annual Report for the 2020/2021 financial year also reveals that there was non-achievement in the number of new buildings and the refurbishment due to delays in the procurement process and Covid19 implications as well non-availability of resource materials.

2.2.3 PROJECT MANAGEMENT SYSTEMS (PMS)

A project management system is an organized approach to planning, organizing, overseeing, and every phase of a project, including tasks, resources, budgets, and schedules, in order to guarantee a successful completion of a project (Davies, 2024). The PMS started back in the

ancient times and started taking shape in the middle of the 20th century with the introduction of the tools CPM and PERT. Henry Gantt, in particular, made a significant contribution to this development by popularizing the Gantt chart as a project management tool (Pan and Zhang, 2021).

According to a study by Yu et al. (2022), since government funding has been allocated there needs to be a uniform and standardised process in place for projects to help with strategic direction and fewer project failures. According to Arefazar et al. (2022), project management systems use tools to expedite procedures; they also require resource planning and organization to guarantee projects are completed successfully. In accord, Badewi (2022) said that institutionalizing project management frameworks strengthens the project's success and the role that project managers play in keeping an eye on the project's progress and rearranging priorities. However, in most Government Departments many issues are still associated with frustrating project management challenges; issues such as scope creep, risk management, accountability, budget constraints, unrealistic deadlines, and many other challenges.

According to a study conducted by Rosenzweig et al. (2020) PMS has contributed many techniques and tools to project management, which also has standards, models, and conceptual developments to phases. Which starts by conceptualising the first phase by proving that there is a demand or opportunity for the given project. The Design and Development Phase uses the parameters established by the feasibility study, the second phase designs the product, describes the construction process, and develops specific timetables and plans for producing or implementing the project. Implementation Construction Phase is based on the initial plan created in the first, second, and third phases; the project is carried out in the fourth and fifth phases. Phase six is the Handover phase, this final stage concludes the project and verifies that it has been completed or implemented according to plan. Accordingly, the majority of project managers entrusted to oversee projects are unable to ensure that project phase deliverables are delivered appropriately and on schedule because they lack the necessary skills training and experience.

Ekung and Adu, (2020) outlined how project analysis has been acknowledged as an economic assessment technique in the construction sector that can estimate all costs related to building and asset ownership and integrates initial capital costs with future costs, including financial costs, operation costs, maintenance and replacement costs, and salvage costs over an expected lifespan. Project management has developed many approaches from project start to end using

a variety of approaches, strategies, and technologies. If project management procedures are followed appropriately, efficiency and productivity can be raised (Kerzner et al. 2022).

To demonstrate how these techniques can be tailored to fit projects, project management and implementation approaches are utilized in actual projects. This covers ideas like project governance, risk management to produce the specified product, service, or result, cost analysis as a core driver and measure, resource allocation, training modification, and the function of the Program Office. The strategy aims to align business, project management, and technical project management as complementary building pieces that form the core of a holistic strategy (Dladla, 2023).

2.2.4 DEFINITION OF PROJECT

According to a Mabika (2021) study, a project is a universal set of tasks and sequence that are required to be performed for certain objectives within a given amount of time. In a similar vein, Sowińska-Świerkosz and García (2022) described a project as a collection of activities intended to generate a good or service. Together, tasks are completed in order to accomplish a particular objective. Pinto et al. (2022) states that a project originally came from an identified problem within an organization which sparked providing a solution to the problem.

By applying certain methodology-based concepts, a project methodology is employed to get it to where it wants to go. In order to document the process, a structured methodology is used in a project life cycle to steer the project in the right direction and a well-defined desired outcome might be the consequence of following the methodology phases with each one building on the other with their activities and tasks (Almelhi, 2021). However, projects are subject to requirements change which impacts project completion time and budget. Teoh et al. (2021) states that clients play an important role in the customization or change of requirements throughout the life cycle of the project. The changes are some of the uncertainties which may cause significant impact on the time and cost of the project.

In a study done by Seerpath (2020) the projects most critical factors are the project plan and project brief at the inception of the project. These demonstrate the requirements of the project being developed that must be met. Naidoo (2020) adds that initiating, developing, monitoring, and controlling a project while adhering to the authorized project plan are all part of the management process. Once the intended results have been attained, the project is handed over to the client.

2.2.5 PROJECT MANAGEMENT

Project management is a systematic approach enabling project managers to plan, execute, monitor, and finalize projects in collaboration with a project team (Venczel et al. 2021). In a study conducted by Lalmi et al. (2021) states that the contemporary iteration of project management commenced its evolution in the late 19th century, influenced by figures such as Frederick Taylor and Henry Gantt, who introduced concepts like task analysis and scheduling charts, respectively, which were essential instruments for project management.

Naidoo (2020) states that the PMBOK guide and best practice standards from the Project Management Institute (PMI) are the foundations of PMSs in many developing nations. According to Seerpath (2020), PM is the process of managing how specific goals are achieved. According to Peters (2020), implementing project management procedures in an agile setting can lead to project success. According to Kadakure (2023), the project's success is contingent upon the project management method chosen, taking into account the challenges presented by the project and the need to establish an analytical model for analysing⁵ the organization's performance.

Similarly, Thoha and Avandana (2020) stated that project management is a process that methodically combines a project's technical and human resources. It is utilized to carry out control tasks and to monitor all project activities so that it can operate smoothly and be finished on schedule. If a project can be finished on schedule, to the desired quality standards, and within the allocated budget, it is considered successful. However, Jääskä and Aaltonen (2022) indicated that time can be one of the factors leading to failure in project management. Any construction project that performs well will be free of flaws, complete its tasks on schedule, and continue to get better over time.

In general, project complexity and the dynamism of a project both are recognised as characters that influence the outcome of a project, be it a construction project or a software development project. There are less consensus statements about which is superior. When deciding which project management technique is best for a given project, it depends on how well it fits the project's complexity and dynamic environment (Butler et al. 2020).

2.2.6 PROJECT LIFE CYCLE

Project lifecycle as an effective methodology broken down into phases used for project beginning to end encompassed by a formal framework of corporate governance (Naidoo, 2020). According to a study by Saltz (2021), there are phases to project lifecycles worldwide, and tasks or activities are completed during each phase. He went on to say that the scope is established prior to the start of the project and includes an indication of the resources that will be used in each phase. Moreover, project sign-off signifies that all phase deliverables have been fulfilled and concludes the final phase.

Across the world there is a lack of systematic review of project lifecycle from the actual beginning up to the end. In developing countries project lifecycle is complex and dynamic as it begins from project identification where identification steps need to be followed in order to conclude that there is a need for a project. Then followed by the project preparation stage where project work is defined and appropriate decision-making process is defined for the management of the project. Once these two stages have been completed, you then move on to the procurement stage of identifying a suitable service provider to undertake the implementation of the project. The last phase of the project lifecycle is the transfer phase where project deliverables are handed over to the client which then becomes the starting point of the post-transfer phase for support and maintenance (Silva et al. 2023).

Roman et al. (2022) showed that the phases of information implementation and emergence that make up a construction project's life cycle are referred to as the start, planning, execution, performance, monitoring, and closing phases. Building information modeling, or BIM, is a project management technique that entails gathering and integrating and processing all pertinent architectural, design, technological, economic, and other data about a building and all of its interconnections and dependencies. When the building and all of its parts are seen as one cohesive unit, this is accomplished. Approaches to managing important parameters like content, timing, and cost throughout the life cycle of a capital construction project become relevant in the context of cost optimization and the selection of high-tech solutions at this stage of the development of the project management methodology, which serves as the cornerstone for investment and construction activities.

However, in South African government, poor and inaccurate risk assessment that is done during the preparation stage, inflicts delays and many other undesirable effects on the project lifecycle.

Further to that, any requirements changes made during the project lifecycle are extremely difficult to manage as that requires certain competency from employees, Project Managers and top management (Seerpath, 2020).

2.2.7 CHALLENGES IN MANAGEMENT OF PROJECTS

With every project implementation, uncertainty develops. Because a project is unique, there is inherent risk, which can take many different forms when it comes to project uncertainty. Sometimes the difficulties are caused in part by a lack of funding (Jahan et al. 2022). Project overruns face the danger of occurring when there is insufficient or inadequate funding, which could hinder the project's effective completion. ORONI (2023) went on to say that while projects may be well-planned, poorly managed project activities can make them difficult to finish on schedule and under budget in many organizations throughout the world. In addition Flyvbjerg (2021) stated that it takes a long time to complete a project, and costs a lot of money to initiate a project. Therefore, any activity, especially one on the critical path that is delayed has the ability to cause the project to be delayed as a whole. Delays could put more strain on the available resources, which could further lead to work of substandard quality.

Another key challenge is that stakeholders become unaware of various constraints, such as lack of cooperation from stakeholders, which may negatively affect the project implementation (Luthuli, 2020). Lack of accurate reporting, lack of good governance, by the project team to their seniors on the progress of the project also poses a huge risk in dealing with challenges faced in the implementation of the project (Luthuli, 2020).

Most ICT projects are problematic in many organisations as organisations try to meet all the demands and needs of the organisation simultaneously and not organise ICT tools and functions categorically, though they may argue that they are increasing service delivery and minimising costs by implementing sophisticated technologies which are comparatively expensive which will impact business performance positively (Glyptis et al. 2020). However, the end product is never as anticipated as they, most of the time, lack clear goals and objectives, poor communication and lack of collaboration from team members. Organisations are encouraged to pay attention to a set of prerequisites for interorganizational collaboration when choosing to adopt collaborative project management techniques (Saukko et al. 2020). Project implementers must at least show technical and soft abilities that are required by the workplace to ensure they provide leadership and be able to balance priorities accordingly as lack thereof may result in

project failure. Project management involves accountability, defined as “being responsible for upholding project expectations from audiences and fulfilling commitments, duties, and other charges by performing to those standards” as the development of the project and the outcomes can be significantly impacted if the internal and external teams are unclear about who is accountable for the overall outcomes and who is responsible for specific tasks (Saukko et al. 2020).

In support of these challenge Morandini et al. (2023) articulate other challenges such as lack of skills, organizational development, and legislative enablement in planning and management of projects, challenges with supply chain management policy, the need to improve project planning among the three spheres of government, crime and violence, unsatisfactory progress in youth, women, and disability development programs, and service delivery backlogs and delays. It is reasonable to assume that skills remain a crucial and demanding part in assuring project management and ultimately project delivery. Equipping stakeholders with the needed knowledge and the right skill and completely managing and executing projects is crucial for turnaround service delivery initiative (Otundo Richard, 2024).

2.2.8 CHALLENGES IN EXECUTION OF PROJECTS

The process of putting all of your team's preparations into practice is called project execution. Your group works hard to ensure that initiatives get off to a good start. For a project to be effectively finished, information must be sent on time, in the right format, and to the right people. Since information is needed to support several tasks occurring at the same time, communication is a crucial instrument for successful project execution. A requirement for efficient project execution is the timely procurement of resources (Zita, 2020).

Numerous challenges can be identified in the implementation of projects. In a study conducted by Akaba (2022) in PMBOK (2013) a project is a sequential, time-bound endeavour that is carried out to develop a good or provide a service. During project execution there is a growing challenge of low prioritization of payments from an organisation/client, which is a significant concern as it consequently frustrates the project workers causing them to threaten suspension of work until payment amount due to them has been paid in full. Further to that, in other cases the project gets prolonged, and it can go on for longer than the time predicted by the project initiator.

During project execution there are changes, all kinds of variances may occur, this falls under the responsibility of the project manager to handle all these changes and avoid any impact they may have on the project (Jordan, 2020). There will be change request from the client organisation which will need to be recorded and managed accordingly. Should anything go wrong, it is the responsibility of the project manager to ensure the project goes according to plan and is delivered on time and within budget. An exercise that needs to be conducted prior to project inception is risk analysis to avoid future challenges in the project, risks need to be identified and described, using the right tools and techniques, and classify risks to ensure that the organisation, in terms of performance, quality and reputational damage, is not negatively impacted (Guo and Zhang, 2022).

In a study done by Elmezain et al. (2021) it was found that across the world project managers must have basic skills training to ensure effective communication, advanced reporting skills, budget, time and cost management. He further indicated that the roles of the project manager are as following:

- Project initiation

- Resource allocation in accordance to competency

- Planning and scheduling of tasks

- Execution of project plan

- Reviewing of project outcomes or deliverables

Additionally, Seerpath (2020) indicated that project managers must have extensive knowledge of the methodology to be used, be it Agile, Prince2 or Traditional, as this sets out the tone and direction of the project.

Project manager's sustainability and project success is defined by the value delivered to stakeholders (Sitohang et al. 2020). However, it is also important to evaluate the competency of the assigned project manager to ensure the project manager is competent enough to handle any irregularities that may occur during project implementation.

2.2.9 STRATEGIES TO IMPROVE SUCCESS OF PROJECT EXECUTION AND MANAGEMENT

Though they may be challenges there are some strategies that can be used to improve and ensure project delivery success, such as; scope management, risk management, communication plan and reinforcing the roles and responsibilities of the project manager. This can significantly diminish delays caused by project challenges (Sanni-Anibire et al. 2022). According to a study done by Pozzi et al. (2023) project performance can be determined by the critical success factors (CSFs) being used to ensure project success. Therefore, project managers must assess each factor's influence and take into account when making decisions about the project.

The most common CSFs as noted are clear and effective communication, cooperation between project participants, effective project planning and control, client involvement and commitment, setting of clear goals and objectives (Herath and Chong, 2021). A study done by Hauashdh et al. (2022) proved that it is a much more improved procurement process which can address the current organisational demands as well as challenges by establishing clear expectations. The growth and successful implementation of construction industry projects is significantly aided by the creation of suitable project management concepts, tools, methods, and standards for managing construction projects and improve performance (Al Kuhail et al. 2021). Therefore, it has become necessary to include new measures to enhance the golden triangle model —scope, time, and budget— in order to support the conventional project success metrics. Investigating new methods that keep up with the evolution of project success measures is also important in order to alleviate some of the shortcomings of the golden triangle model.

2.2.10 PROJECT MANAGEMENT PRACTICES

Project management practises are a business discipline on how an organisation applies processes, skills, techniques and tools (Barbosa et al. 2021). However, the processes, skills and techniques are not homogeneous, they are not a one size fits all. Project management practices when followed right, can yield good performance and efficiency for the organisation when conducting projects where standard practices are set within a government framework in order to suit the organisation's needs. In a study done by Luthuli (2020) it was stated that project management offices are solely established efficiently within an organisation to assist in providing standard templates for best practices, support, ensure compliance and lessons learned from previous projects. Further to that he adds that project management offices facilitation of

standardisation of practices and tools ensures organisational accountability and consistency in reporting for management decision making.

In the South African public sector, it is imperative to gain an understanding of the current project management practices and tools being used by benchmarking accordingly for the organisation the project is for in order to implement the best practices for service delivery (Armoed, 2020). Project managers are then required to conduct business analysis and create business cases according to the need for the organisation to justify undertaking the project (Sirbadhoo, 2021). According to Lock (2020), an organisation should have their own preferred practises and standards that should be drafted carefully as accepted moderate practices.

Performance of construction projects is a concerning issue, not only to clients but to contractors, stakeholders and professionals. This is due to complex construction project management processes (Aigbavboa et al.).

Regular reports and meetings should be held to monitor any scope creep so that issues may be fixed right away. In order to uncover any potential concerns, an open conversation should be encouraged during these sessions. It should also be communicated when money is spent on the project because this has a direct impact on the project budget. This procedure makes sure that project expenses are kept apart from departmental operating expenses. According to the scope of the department's mission, the project budget is in line. Project-based activities and operational activities must be kept apart by the department (Mishra, 2023).

2.2.11 PROJECT METHODOLOGY AND PRINCIPLES

A project methodology is a set of guidelines, methods, and processes followed by practitioners of a discipline on a project. The top approaches involve distinct outputs, workflows, and even project management software development, in addition to differing in how they are structurally organized. While the project should be well-intentioned and have a primary goal. The goal should motivate the project managers to work hard; else, time and resources will be wasted (Nieto-Rodriguez, 2021).

While project principles require that a project must have clearly defined milestones and progress thresholds. The project objectives, team members' responsibilities, and everyone's understanding of the objectives, goals, and scope are all necessary. To guide and direct its decision-making, departments should first establish their purpose and performance objectives,

which are a set of common principles. In the end, this will be an organization's project management approach (Ciric Lalic et al. 2022).

In different parts of the world, the PMS with its methodologies being guided by principles, tools and techniques are significant in that it's fundamental in ensuring project and consequently service delivery. A PM methodology may contribute to the completion and delivery of a project by using tools to control costs and reduce risks to ensure optimum performance and effective resources (Alzoubi, 2022). According to Foschini (2021), it is important to understand the different methodologies used in PMS such as Agile, Waterfall Model, and Contract Management.

Agile: Agile methodologies were developed as an alternative to traditional methods focused on detailed and sequential planning (waterfall models). This methodology is founded on the idea that all projects, regardless of size, are very complicated due to the numerous variables and inputs that might have an impact on how they turn out. Agile methodologies value adaptive development by using brief continuous cycles of planning, action, correction, and adjustment to produce valuable increments in outcomes rather than devoting the efforts of the participants to forecasting events and associated tasks that may affect the project in the long-term and fighting change to stick to a series of rigid requirements and predefined functionalities (Cobb, 2023).

Waterfall Model: There are five sequential steps in the waterfall paradigm which are business analysis, design, implementation, testing, and maintenance. The Waterfall model simplifies the implementation process by treating a project as a linear process with a set of fundamental sequential steps, each of which must be explicitly validated before going on to the next step. One of the first development life cycles established and still frequently used today for system development is the waterfall systems development life cycle, often known as the Waterfall model or Waterfall approach. The progress used to flow from one phase to the next in the waterfall method when it was first introduced. This approach was successful, and many industrial manufacturers and development firms have embraced it as their main development framework (Aroral, 2021).

Contract Management Methodology: The process of managing contract formulation, execution, and analysis is known as contract management. Its goal is to increase an organization's operational and financial performance while lowering financial risk. Organizations are under growing pressure to save expenses and boost performance.

Contract management is a proposed conceptual approach that strengthens accountability, transparency, and security in project management by integrating smart contract technologies. By allowing for automatic contract execution, immutable record-keeping, and real-time monitoring of project progress, this methodology has the potential to completely transform project management (Palaniyappan and Taherdoost, 2023)

There's an ever-growing need for performance improvement in organisations as a critical factor that is necessary for improved productivity and enhanced satisfaction. Many approaches have been developed and the most that has proved to be reliable is sustained commitment to the principle and activities in the performance loop (Shaharudin et al. 2023).

Certain abilities and techniques are required to recognise the actualisation of the project requirements. A project is believed to have undergone a complete sequence of activities as part of a project process with its own principles to have fulfilled the commitment of the start and anticipated finish time (Mabika, 2021). He further states that PM comprises of different tools and techniques for an effective PMS which requires certain skills and competency to employ resources to complete a project within a certain time and budget. However, in a study conducted by Zondo (2020) it was noted that the South African construction industry is faced with challenges of skills shortage and lack of paying attention to quality. According to Seerpath (2020), project managers as a whole, be it for construction or information systems, possess a different perspective on what constitutes a project success within South African government, they focus on the dominant perspective of delivering a project after a set time. Construction project managers must possess construction technical skills.

2.2.12 PROJECT MANAGERS' ROLE

According to Irfan et al. (2021), project managers are responsible for the planning, procurement, execution and completion of a project. They must be flexible, accessible, and easily prioritise issues of intervention. In a global context Seerpath (2020) notes that project managers must ensure that milestones and deadlines are met despite the fact that they may be working on up to three projects per month. He further stated that despite the challenging responsibility on their shoulders, they still have the responsibility to satisfy their customers and stakeholders as well as manage issues that may arise on a daily basis and practice good ethics.

He further stated that the evaluation should be undertaken to identify any competency that the project manager may have and know how to fix them. The low capacity and capability of project managers and local contractors and consultants is caused by weak resource base and inadequate experience which hampers the performance of project managers, consultants and development of projects, (Mohamed, 2023). The role of management as well as project managers within the public sector has most influence in decision making and unduly appointing unskilled contractors to do work that requires human capacity, a mismatch between the available and required skills leads to project collapse(Ribeiro et al. 2021). According to Stats SA (2004), in 2004 up to 532 construction companies were liquidated due to public sector supply chain management processes that were not being followed to employ qualified construction contractors.

In light of the above, more still needs to be done in the public sector to curb the failure to achieve projects of engineering, construction, Information Systems (IS) and property related activities for the benefit of the citizens and which contribute to government's New Growth Path, National Development Plan and Outcome 3 & 4.

2.3 THEORETICAL FRAMEWORK

A theoretical framework was described as a theory that has been formulated and tested by the research community. It describes the cause and effect of relationships between two or more variables such that they answer the questions and objectives for a researcher to arrive at the theoretical explanation. Research is then based on the theoretical foundation and holds repercussions for all the decisions taken during the research process Mapongwana (2020).

According to Ardito et al. (2022), The theoretical framework is important in that it provides a rational guide for the literature review and helps to get an understanding of the different parts of a particular phenomenon. He further states that it provides a guide for the researcher to epistemologically, philosophically and methodologically approach the research dissertation.

There are many methodologies that can be used to monitor project progress as there are several frameworks that can be used to initiate, monitor, and implement projects to achieve its aims. According to Kerzner (2022), a framework is a guide used by organisations as a conceptual structure to address a project implementation or an issue. According to Lock (2020), PMS is a model that helps in overseeing the project execution. It provides a framework which assigns activities and responsibilities to project members. He further indicates that PMS's use tools

and techniques in a hierarchy of tasks to ensure the project takes shape for effective and efficient completion.

According to Sobieraj et al. (2021), there are different frameworks; amongst those are the Project in Controlled Environments (PRINCE2) and Project Management Body of Knowledge (PMBOK) under project management systems that can be used to initiate, implement and maintain projects. While PMBOK acts as the guide for all projects and is based on the so-good practise of processes, tools and procedures, PRINCE2 is based on the so-called controlled environment and acts as the guide for decision making and processes. With PRINCE2, much emphasis is also put on risk management, a process that must be performed before the project commences (Sobieraj and Metelski, 2021).

Contrast between PMBOK and PRINCE2

PHASES	PMBOK	PRINCE2
Integration	Identify, define, combine, unify and co-ordinate process & PM activities	Combined processes and components, change control
Scope, time and cost	Triple constraint which means the project's success is impacted by its costs, time and scope	Project Plan and emphasis is put on the development of the Business Case
Quality	Broken down to 3 main processes: • Quality Planning • Quality Assurance • Quality Control	Quality Review technique
Risk	Systematic Process: Identify, analyse, and respond	Risk Management Procedure: identify, assess and control
Communications	Communication Management: Creation, compilation, distribution, storage, recovery, and final disposition of all information to be accurate	Communication Management Approach

Figure 2.1: Comparison of PMBOK knowledge areas and PRINCE2 components

Source: Uploaded by Christina Chin |

Link: https://www.researchgate.net/figure/Comparison-of-PMBOK-knowledge-area-and-PRINCE2-components_tbl1_233835850

According to Vila Grau and Capuz Rizo (2022), both Prince2 and PMBOK have been adopted by project managers in different organisations to use their underlying tools, processes and techniques in order to plan, monitor and execute their projects for successful delivery. In a

study conducted by Sobieraj et al. (2021), it was discovered that PMBOK is more likely associated with knowledge and adaptability as it is a comprehensive guide, whereas PRINCE2 is more likely to be associated with rigidity and control and emphasizes the need to develop a business case prior to continuing with the project. Simply put, selecting the appropriate approach may also be influenced by a variety of other criteria's, such as project size, environmental conditions peculiar to it, organisation size, and others. They further state that, though PMBOK is complex as compared to Prince2, however, it contains many practical tools and thoroughly outlines the project management process, including the inputs and outputs of each phase.

Due to its popularity and relevance, this study will adopt the PMBOK theoretical framework which is an industry framework with a set of standard terminology and guidelines for project management that aligns project stages in a sequential approach. PMBOK is the full set of procedures, industry-accepted best practices, terms, and rules that make up the project management sector (Singh and Williams, 2021). Just as how monitoring and evaluation plays a critical role in the effective management and implementation of projects and so does PMBOK. Monitoring & Evaluation techniques focus on what makes a project successful and not unsuccessful as this contributes to the fulfilment of the project objectives which contribute to the department's overall performance by tracking the progress of a project and the achievement of outcomes (Jacqueline and Ogbe, 2022).

According to Faraji et al. (2022), The PMBOK theoretical framework is process-based and comprise of 49 processes, 10 knowledge areas namely; integration, scope, time, cost, quality, human resource, communication, risk, procurement and stakeholders, and 5 major process groups which are project initiation, project planning, project controlling & monitoring, project executing & closing . Further to that she indicates that the processes assist in the effective project flow during the project life cycle. And it will assist in the fundamental skills of how to become a successful project manager and build on the development.

The figure below illustrates the relationship between the PMBOK process groups (Horizontal) and PMBOK knowledge areas (Vertical).

Knowledge Areas	Project Management Process Groups					
		Initiating	Planning	Controlling & Monitoring	Executing & Closing	Closing
	Project Integration Management	Develop Project Charter Develop Preliminary Project Statement	Develop Project Management Plan	Monitor and Control Project Work	Direct and Manage Project Execution	Close Project
	Project Scope Management		Scope Planning, Scope Definition and Create WBS		Scope Verification and Scope Control	
	Project Time Management		Activity Definition, Activity Sequencing, Activity Resource Estimating, Activity Duration Estimating, Schedule Development		Schedule Control	
	Project Scope Management		Cost Estimating and Cost Budgeting		Cost Control	

Figure 2.2: PMBOK Methodology horizontal process groups and vertical knowledge areas.

Source: Adapted from (Kuchta and Mrzygłocka-Chojnacka, 2020)

According to Alwaly and Alawi (2020), the knowledge areas are important in ensuring project success by providing a framework for effective project planning, project execution and closing.

They further state that the vertical knowledge areas, as the main subject matters, take place at any time during the horizontal project process group stages.

The main factors are centered on delays in project completion and delivery. According to Shields et al. (2021), projects ranging from small to big vary in size, scope, cost and time. Cost being the function of scope and time. He further states that cost, scope and time form part of the golden triangle, which, if one fails the other 2 need to be adjusted in order to keep the triangle. However, PMBOK has 10 knowledge areas which provide the effective management of project up to close-out.

Alwaly and Alawi (2020) indicated that a process is a set of procedures and activities that are related to each other, undertaken to achieve projects success, and every process makes use of a range of inputs, tools, and techniques. These processes can be repeated at every stage of the project and overlap one another. They also states that there are two basic categories into which the PMBOK processes fall: processes for project management groups and knowledge areas for project management.

2.3.1 PROJECT MANAGEMENT 5 PROCESS GROUPS

1. **Initiating:** The initiation process is the process of when the project is created and project planning begins. According to Bonnel and Smith (2021), project initiation involves writing the scope statement, milestone planning must also be indicated and high end information such as that from the project charter must be included.
2. **Planning:** According to Rosenberger and Tick (2021), the project planning phase is all about ensuring that the information related to the project stages is well prepared, recorded, processed and classified during the project lifecycle. They further explain that the project complete date should established during the project planning, the work breakdown structure (WBS) and cost-effective solutions should be well established.
3. **Controlling & Monitoring:** The project implementation stage and organisational operations should be controlled throughout the project lifecycle (Rosenberger and Tick, 2021). According to Del Pico (2023), the monitoring and controlling processes, which include measures to continuously track, review, change, and report on the projects performance, should occur simultaneously in a project.

4. **Executing & Closing:** These are processes related to executing, finalizing and completing the project. According to Mwesiumo et al. (2022), this process involves issues with the project and lessons learnt and managing resources and people as well as integrating and carrying out project activities in accordance with the project plan developed during the initiation process.
5. **Closing:** Project closing date and success criteria should be stated Zaheri et al. (2022). According to Rowe (2020), the project manager must ensure that they draft the project closure document, with all the project success and failures. Even though it does not require that much detail, but a close-off template is required.

2.3.2 PMBOK 10 KNOWLEDGE AREAS

1. **Project Integration Management:** This is the area where most tasks that make-up and hold up the project integrate into a unified whole. This is where the Project Charter is created which initiates the project and the Project Management Plan which ensures successful outcome to the project. According to Choi and Ha (2022), proclaims that one of the knowledge areas of project management is project integration. It is a strategy for getting several methodologies to work together; it takes different approaches being utilized in a task and ensures that they are sorted out.
2. **Project Scope Management:** This is the area where all the work that is to be included within a project is indicated. In a study done by Gobov and Huchenko (2021), they state that scope management refers to the collection of processes that guarantees the precise definition and mapping of a project's scope. Elicitation is a crucial step in the scope management process called "Collect Requirements" that aids in gathering information from stakeholders or other sources. The outcomes of the elicitation process are used as inputs for the activities of requirement analysis and management.
3. **Project Time Management:** This is the area where Project Managers must divide the work into tasks and create a time management schedule for all tasks during the project. Marcelino and Domingues (2022) describes time management as the act of planning, arranging, and exercising deliberate control over the finite amount of time spent on particular activities, especially to maximize their effectiveness, efficiency, or

productivity, can be referred to as time management. Further to that, they state that time management was once not seen to be significant outside of commercial or work-related activities, but eventually the phrase came to embrace personal pursuits as well

4. **Project Cost Management:** By using different techniques, the project budget is established in this area. In a study done by Poorhassan (2020), cost management is the first step which gives managers who require assistance options and advice so they can accurately predict costs and control expenditures within the anticipated budget framework. According to Takagi and Varajão (2020), they state that, it is necessary to implement an appropriate cost management methodology and techniques. They further state that this can be accomplished if the project managers can only accomplish have a list of cost-influencing elements in advance and are taking the necessary steps to reduce the factors.
5. **Project Quality Management:** This area forms part of the golden triangle trio; Time, Cost and Quality. To obtain better quality you need to put in more time or increase cost. According to Berényi (2023), quality management is the knowledge area where process monitoring and documentation need special consideration in the field of project quality management. Competencies provide a more expansive view of quality-related activities, with less importance placed on quality assurance and more on quality management and inspection. Further to that, quality management is a comprehensive plan to guarantee that our initiatives adhere to criteria. The measurement of the quality of each project activity and the subsequent implementation of remedial measures are critical components of project quality management. Furthermore, quality management aids in project cost control, the creation of standards, and the choice of methods to reach and validate those standards (Rahmana, 2022).
6. **Project Resource Management:** This knowledge area you must ensure that you have the right team and track their performance. According to Alwaly and Alawi (2020), the project manager must define resource requirements, which includes determining the types of resources, the time they should be available, and the quantity required. The project manager must also make the necessary arrangements to ensure the timely arrival of resources and monitor their implementation.

7. **Project Communication Management:** This area you must ensure that there is constant communication with the stakeholders. A communications plan must be developed from the inception of the project. Yap and Skitmore (2020) note that the use of project experiences to increase project time and cost control requires effective communication tools for sharing and learning in a project-based setting, and the learning-provoking circumstances involved. According to Urbinati et al. (2021), each project's communication management strategy is created by taking stakeholder needs into account as well as the applicability of the project's communication activities. The PMBOK standard and the requirements of each communication activity are referenced in the document template. Meeting agenda documents, meeting minutes, problem reporting, project status reporting, and text and email distribution formats are just a few of the activities that constitute a communication strategy.
8. **Project Risk Management:** This area ensures that all risks are identified, even the unexpected risks are addressed during the project implementation. According to Meyer and Reniers (2022), risk management strategy involves the control of risks, it detects major threats and creates strategies to stop them or lessen their effects. Further to that, they note that in PMBOK risk management can be divided into 6 phases: recognition of risk, identification of risk factors, monitoring and control, planning risk responses, determination of possible risk responses, and choosing a reaction to risk.
9. **Project Procurement Management:** This area involves getting external subcontractors with more experience to get the job done quicker. Fleming (2022) notes that procurement management is the process that is necessary to get goods and services from outside the performing organisation in order to complete a project's scope. According to Watermeyer (2022) procurement management must have an assessment criteria when procuring goods and services to ensure that the right and skilful service provider is selected. Further to that, they state that PMBOK has process standards and in each process steps; plan procurement inputs, conduct procurement management, and control procurements.
10. **Project Stakeholder Management:** Having the right stakeholders can assist the project's success. According to Shaukat et al. (2022), today, practically every project

is conducted in a setting where stakeholders are integral to job completion. The project is frequently sensitive to the decisions and actions made by the stakeholder. Clients, end users, contractors, consultants, labour unions, line organizations, government agencies, financial institutions, insurance companies, controlling organizations, media, third parties, and rivals are just a few examples of project stakeholders.

This research adopted the PMBOK framework, which, according to Marcelino and Domingues (2022) was published in 2017 by the Project Management Institute (PMI). It is difficult to manage such a broad range of knowledge areas and process groups as Project Management as a field of management has been developing quickly, and it is a part of the general science of management that includes managing businesses, other systems, and organizations. As a result of hard work, project managers are required to perform best practice, standards and guidelines (Crawford, 2021).

2.4 CONCLUSION

In this chapter literature by other scholars and researchers was reviewed and more insight was given to PMBOK and its process groups and knowledge areas. Factors that influence PMS were discussed as well as strategies that can be used to mitigate and improve the challenges faced during the implementation of the project using PMS. A discussion of the knowledge areas was covered which indicated what is required to be known by project managers as well as the process groups which refer to what needs to be done and steps to be taken in order to ensure project success. The following chapter discusses the research methodology used in this study to address the study objectives and which will allow the reader to critically evaluate the study's validity and reliability.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter provides a description of the research design used, research techniques, study site, study population, sampling, data collection methods, data quality control, measurements, data analysis, and ethical considerations. This chapter clearly outlines the steps the researcher followed to conduct this study. The research methods used in conducting this study assisted the researcher in answering the research questions

3.2 RESEARCH AIM, OBJECTIVES AND QUESTIONS

Every research conducted is conducted with the aim to examine or investigate some problem or issue. The aim of this research is to investigate the tools and techniques of the current PMS within the KZN DPW, the challenges facing the current PMS, and the strategies implemented to mitigate the challenges affecting the PMS within the KZN DPW.

3.2.1 RESEARCH OBJECTIVES

- To investigate the tools and techniques of the current Project Management System in Kwa-Zulu Natal Department of Public works
- To investigate the challenges facing the Project Management System in the Kwa-Zulu Natal Department of Public works.
- To investigate the strategies that have been implemented to mitigate the challenges affecting the Project Management System in the Kwa-Zulu Natal Department of Public works.
- To establish a methodology that would be effective in implementing the Kwa-Zulu Natal Department of Public Works projects.

3.3 RESEARCH PHILOSOPHY

According to Tamminen and Poucher (2020) a research philosophy is a set of fundamental ideas that drive the planning and conduct of a research study. Various research philosophies provide various perspectives on how scientific research is understood. In order to envision what may be, philosophers seek to shed light on and examine people's unconscious assumptions, values, and principles. The research philosophies function as a logical framework that guides the researcher's actions. The philosophical background is frequently left out of study, which has an impact on how research is conducted (Ali et al. 2023).

Positivism

According to Park et al. (2020) Positivism is a philosophy that upholds the idea that only information that is "factual" and derived from observation (the senses), including measurement, is reliable. The researcher's involvement in positivist studies is restricted to gathering data and providing an unbiased assessment of it. Stated differently, the researcher conducts the study as an impartial analyst, distancing herself from her own values. Research results in these kinds of investigations are typically measurable and observable.

The positivist perspective on reality is impartial. It adopts the ontological idea that knowledge can be confirmed after it is revealed by the researcher (Malima, 2020). Further to that Mbanje and Tefera, (2023) Positivism includes the quantitative method and describes the relationship between causes and effects that results in outcomes. It is associated with "the philosophical stance of the natural scientist and entails working with an observable social reality to produce law-like generalizations and it emphasizes the positivist focus on strictly scientific empiricist method designed to yield pure data and facts free from human interpretation or bias."

Interpretivism

Interpretivism, commonly known as interpretivist research, involves human interest into a study by having researchers interpret certain aspects of it. A study done by Pervin and Mokhtar (2022) states that "interpretivism" refers to methodologies that emphasize the importance of people's personalities and participation in social and cultural life. It further states that this information is philosophically connected to a researcher's worldview by selecting a paradigmatic camp that includes a number of underlying assumptions about reality.

Consequently, "interpretive researchers assume that social constructions like language, consciousness, shared meanings, and instruments are the only ways through which one can access reality (given or socially constructed)".[1] The critique of positivism in social sciences is formed by the foundation of interpretivist philosophy's development. Thus, qualitative analysis takes precedence over quantitative analysis in this worldview (Alharahsheh and Pius, 2020).

Critical realism

Lawani (2021) explains that a philosophical school called critical realism (CR) distinguishes between the "observable" and the "real" world. The "real" is invisible and exists independently of ideas, theories, and perceptions held by humans. Our perspectives and experiences in life

have created the cosmos that we see and understand through the use of what is arguably "observable." According to critical realists, people can only comprehend the social reality by comprehending the structures that generate events, since visible events are a result of unobservable structures.

Pragmatism

According to Kelly and Cordeiro (2020) Pragmatism recognizes that there are various approaches to comprehending reality and conducting research; combining these approaches can lead to a more thorough understanding of the phenomenon being studied, even though positivist and interpretivist approaches are incompatible. Pragmatic researchers make operational decisions based on "what will work best" in their research designs to get answers to the research questions. Research challenges can eventually be resolved thanks to this method, which enables pragmatic researchers to carry out their work in fresh and engaging ways.

In order to get answers to the research questions, pragmatic research designs contain operational choices based on "what will work best." According to Allemang et al. (2022) as a paradigm is founded on the idea of using the best techniques to look into real-world issues, enabling the utilization of numerous sources of data and information to address research challenges. In addition Van Greuning and Bratanovic (2020) state that many academics have emphasized that pragmatism is regarded as "the philosophical partner" of the mixed research methodology since its underlying beliefs give the essential for combining research methodologies, it can provide a philosophical underpinning for the strategy.

Constructivism

Kratochwil and Peltonen (2022) since constructivism recognizes it is a creation of the human mind, reality is viewed as subjective. Furthermore, relativism and pragmatism are relatively linked to this philosophical perspective. Constructivism essentially holds that human experience is the source from which all knowledge is created. The premise of this perspective is the inseparability of knowledge and knower. The foundation of constructivism philosophy is cognitive psychology, with roots in the ancient Greek Socratic Method. However, constructivism has gained more traction recently as an epistemological viewpoint.

Postmodernism

Postmodernism disavows the idea that knowledge may be objective. Postmodernism places more weight on the diverse and subjective viewpoints of individuals and communities than it does on set guidelines for behaviour. Instead of valuing the singular, authoritative voice of the knowledgeable researcher, it gives weight to several interpretations (Mauthner, 2020).

Post-positivism

Post positivism rejects positivism, which maintains that a researcher can make an independent observation of society. A researcher's identity and opinions influence their observations, which in turn influence the conclusions they reach, according to post-positivists. In its pursuit of impartial answers, post-positivism attempts to recognize and rectify inherent biases in the theories and information that theorists generate (Maksimovic and Evtimov, 2023).

According to Kutu (2020) Any interpretation of reality is based on actual research, an already developed theory, and the fundamental ideas of quantification and generalization. Critical realism is the ontological belief of post-positivists, and their ethical conduct (axiology) is predicated on respecting respondents' privacy by obtaining their informed consent before doing research.

Phenomenology

According to Williams (2021) As a philosophy and an investigative technique, phenomenology is not restricted to a way of knowing; rather, it is an intellectual process of interpretation and meaning-making that is employed to comprehend the conscious lived reality of humans.

The overall purpose of a phenomenological study is to fully comprehend, characterize, and capture the essence of participants' lived experiences with a particular occurrence. The ideal-material duality is the foundation of phenomenology's reality; each experience has both an ideal and a material component (Alsaigh and Coyne, 2021).

For this study, the researcher adopted an interpretivist research approach which was most suitable for this type of research due to its ability to reveal reality rather than to convey statistics and the approach and is based on the idea that a single phenomenon can have multiple interpretations hence it is an interpretive paradigm. The process of research can be classified as an activity of steps to be followed in order to provide a clear understanding of a topic at hand (Taherdoost, 2021). According to Alharahsheh and Pius (2020) A paradigm known as

interpretivism assumes that reality is arbitrary and may change depending on who is considered. On the other hand, interpretive research may be criticized for rejecting data that has been created as a foundation base and presented as a universal norm, questioning its validity, and advocating for different standards than those employed in the positivist paradigm.

This study employed the qualitative approach to data collection and analysis; and applied the interpretive paradigm which subjectively looked at the world as it is with understanding from individual experiences who believe that knowledge is subjective (Pervin and Mokhtar, 2022). The chosen study was influenced by the knowledge to be investigated and the researcher's deep desire to gain understanding of the phenomena in a natural setting which provides emphasis to the experiences of the participants.

3.4 RESEARCH DESIGN

A research design is the overall strategy chosen to integrate the various study components in a coherent and logical way, ensuring that the research problem will be adequately addressed as it provides a framework for a study. It can be thought of as the master plan necessary to investigate the research objectives (Naicker, 2022). And, if the best findings are to be achieved, a research study must be a planned, systematic, and disciplined strategy. A research method is crucial since it determines the validity, dependability, and effectiveness of a study (Sayed, 2022).

According to Abule (2022) A research design method uses a variety of approaches. It is a complete strategy of the entire study project, and it can be classified as either qualitative, quantitative, or mixed methods approaches that offer set principles for procedures in a research study. It addresses the entire study agenda as a model for a research enquiry. A research design can be thought of as the overall strategy chosen to integrate the various study components in a coherent and logical way, thereby ensuring that the research problem will be adequately addressed. It is also the master plan necessary to investigate the research objectives. The study design outlined the procedures for gathering data and how the data was analysed in order to fully address the research objectives and questions (Naicker, 2022). The research design can be further broken down into the following types:

Cross-sectional

According to Wang and Cheng (2020) a cross-sectional study is a kind of research design where data is gathered at one time from a large number of different participants. When doing cross-sectional research, variables are observed without being changed.

Action Research

Action research aims to simultaneously investigate and address a problem. In other words, action research combines study and action, just as its name suggests. In the social sciences, action research is a very engaging approach that is frequently used, particularly in educational settings. Since it stresses reflection and bridges the gap between theory and practice, it is particularly popular among educators as a method of systematic inquiry. Because of the nature of the research, it is frequently referred to as a cycle of inquiry or action (Sandars, 2021).

Case Study

Hancock et al. (2021) declare that if you want to gain specific, contextualized, in-depth information about a given real-world topic, a case study is an appropriate research strategy. It allows you to look into the key aspects, interpretations, and implications of the case. Case studies are often a good option for a thesis or dissertation. They assist you in keeping your project modest and focused when you don't have the time or resources to carry out in-depth study. You can do multiple case studies to compare and clarify different aspects of your research problem, or you can use one comprehensive case study that addresses a specific topic.

Causal

According to Eggers et al. (2024) the goal of causal research is to determine the kind and strength of cause-and-effect correlations between two or more variables. It is sometimes referred to as explanatory research or causal-comparative research. Businesses frequently utilize it to assess how changes to features, goods, or services affect important business indicators.

Cohort

A kind of observational research known as cohort studies follows a group of people across time to examine how different factors—like exposure to a specific risk factor—affect the participants' health outcomes. Each cohort member has a unique life experience or trait, such as birth year or residency. There are other types of cohort studies, including open, closed, and

dynamic, but the two most common types are as follows: Cohort studies, both prospective and retrospective (Khurshid et al. 2022).

Descriptive

Siedlecki (2020) explains that although quantitative research is the main research approach, descriptive research design uses a range of qualitative and quantitative data to gather information in order to create precise predictions about a given problem or hypothesis. Descriptive research designs, as a survey tool, assist researchers in identifying traits within their target market or specific demographic. To help in decision-making, these traits in the population sample can be found, noted, and assessed.

Experimental

Saxena et al. (2020) describes experimental as a series of steps are created by experimental design in order to methodically examine a hypothesis. A thorough understanding of the system you are examining is necessary for an effective experimental design.

Historical

Huntington-Klein (2021) states that an accurate reconstruction and interpretation of history are the goals of historical research design, a qualitative research methodology that entails methodical investigation into historical events. Using primary and secondary source analysis, this research method aims to comprehend historical events, their causes, and their influence on later developments.

Longitudinal

In a longitudinal study, scientists look at the same people more than once in an effort to spot any changes that might happen over time. In longitudinal studies, which are a kind of correlational research, investigators watch and record many variables without attempting to manipulate them (Neale, 2020).

Sequential Designs

According to Kazdin (2021) one type of experimental design known as sequential design involves gathering data gradually or in phases. This makes it possible to modify or change the experimental design when new data about the analysis's goal is gathered throughout the trial. Because one can iteratively develop more informative designs by learning about the parameter values over time, sequential designs are especially helpful in nonlinear contexts.

3.4.1 RESEARCH PARADIGM

According to Sokhulu (2021) A research paradigm is a philosophical framework or school of thought that guides how phenomena deduced from research data are understood, reasoned, and interpreted and reflects the worldview of the researcher. In addition, a paradigm is a conceptual framework that frames how a research study interprets its findings and holds its views. As a philosophical lens that defines a researcher's worldview and affects participants' answers in a certain environment and how they perceive the world, it is significant because it shapes the researcher's creation and interpretation of reality (Akinmolayan, 2020). Furthermore, Kamal (2019) argued that a paradigm is a set of beliefs about how certain problems occur and a set of agreements about how to study those problems

To enable the full understanding of research paradigm and what it consists of there are four most prevalent research paradigms—pragmatism, interpretivism, positivism, and post-positivism—and how information research will adopt them must be investigated in every research study (Gannon et al. 2022).

The research paradigm shows how all the other major parts work together to address the research questions. The parts of the design include qualitative research methodology with purposive sampling, thematic analysis of qualitative content. An interpretivism approach will be undertaken. Sallis et al. (2021) shows how the goal of research design is to convert a research problem into data that can be used analytically to produce accurate answers to research questions at the lowest feasible cost. Furthermore, study design is primarily focused on the goals, uses, objectives, intentions, and plans that can be accomplished given the practical constraints of time, money, space, and the researcher's availability.

According to Masiya (2020) researchers undertake an interpretivist study as it is predicated on the idea that social reality is formed by social settings and human experiences rather than being singular or objective. Further to that an interpretivist approach can be used to seek an understanding of someone's reality through their experience of that reality, which may be different from another person's shaped by the individuals' historical or social perspective (Alharahsheh and Pius, 2020). This study was conducted in an interpretivist manner to obtain more information on the current Departmental PMS and to encourage more study on the subject matter for improvement.

According to Nkomo and Kalisz (2023) research design can be defined as a strategic framework that acts as a bridge between research objectives, research questions and implementation of the research. It's an investigative empirical enquiry of a phenomenon within a real-life context. It acts as a master plan of the research work which conveys how the research study will be conducted. Hendren et al. (2023) states that research design acts as an enhancer in the legitimacy of collected data of a particular research problem being studied.

The Deputy Directors situated at Head Office, 4 Regional Deputy Directors from the only 4 regional offices within the Department, 12 Project Leaders who act as the construction project managers and implementers at a regional level. These individuals perform project management for construction projects from inception to project close-out. The Deputy Director for ICT, Deputy Director for WIMS, Assistant Director for ICT, Assistant Director for WIMS, System Administrator for Premis and the IT Specialist who deals with ICT Governance. Due to their experience, opinions, and subjective interpretations of the infrastructure and IS project implementation within KZN DPW, these participants were purposefully selected. The study's main goal was to comprehend, clarify, and interpret project implementation from their point of view. Finding out if the department's present tools and methods are effective in terms of the current PMS being utilized to implement the projects was the primary goal of the study.

3.4.2 RESEARCH METHODOLOGY

Research methodology shows the precise steps or methods used to find, pick, process, and evaluate data on a subject. The methodology part of a research article gives the reader the opportunity to assess the general validity and reliability of the study. It explains how a researcher intends to carry out their research. It's a logical, systematic plan to resolve a research problem. The research methodology details a researcher's approach to the research to ensure reliable, valid results that address their aims and objectives (Pandey and Pandey, 2021).

According to Verma et al. (2024), there are three types of research methodologies that offer different approaches. These types are; Qualitative Research, Quantitative Research, and Mixed Methods. The research methodology is chosen based on the research objectives. The research methodologies are explained below:

Qualitative: To better understand people's attitudes, beliefs, and motives and their social reality, qualitative research aims to gather and assess non-numerical data (Kang and Hwang, 2021). Additionally, according to Nasri (2023) Focus groups, observation, and interviews are just a few of

the many techniques utilized in qualitative research.[1], [2], [3] In unstructured interviews, open-ended questions can be used, and the interviewer can answer them. Every participant receives the identical set of questions during organized interviews.

Quantitative: Nene (2021) states that quantitative research methods place a strong emphasis on collecting and evaluating numerical information. The development of a statistically significant conclusion within the population being studied forms the basis of this research technique approach. Statistics and things that can be measured methodically are the main focus of the quantitative research approach. This research methodology includes surveys and experiments, statistical techniques, tests, the verification of ideas or explanations, numerical measurements of the information, and statistical techniques (Mngomezulu, 2022).

Mixed Methods: According to Hansraj (2021) mixed-methods research involves gathering and analysing both quantitative and qualitative data. This strategy incorporates two types of data in various ways. It can give one or both of the data collection methods precedence. Additionally, it can enable the use of the data in several stages of a study or in a single study. Naicker (2022) argues that better research methodologies are now necessary due to the progress of research. To completely study research challenges, more adaptable research methodologies are needed. Mixed methods research, a combination of traditional qualitative and quantitative research techniques, can be employed to strengthen the study investigation. As a result, the drawbacks of a single method approach are lessened.

This study was conducted using qualitative research methodology to help clarify the questions on the subject matter with the participants. The choice was informed by the need to explore broadly on the research topic and build additional knowledge on this study subject matter. The data collection and analysis; and applies the interpretive paradigm which subjectively looks at the world as it is with understanding from individual experiences who believe that knowledge is subjective (Pervin and Mokhtar, 2022). According to Mohajan and Mohajan (2023) with qualitative research methodology, one can maintain chronological flow, identify precisely

which events have what effects, and extract insightful explanations using qualitative data. The goal of qualitative approaches is to understand human behaviours within the context of the social systems in which it is embedded.

3.5 STUDY SITE

The study site is the location where research will be conducted. According to Oyaro (2021) explains that the study site is selected according to the type of data to be collected and determining the appropriate sample size. Further to that she states that a study site is a place where you can easily go to in order to obtain the required information.

The study site was the DPW in the KZN Province, which is mandated to be the custodian and portfolio manager of government's provincial immovable assets. The Department also provides land and accommodation management services for other government Departments. As the infrastructure implementing agent, it also provides infrastructure and maintenance services for client Departments as per their needs as they submit their office and accommodation need requests to the Department of Public Works for implementation. The Department is also the custodian of the accounting tool for all government infrastructure as well as land, buildings, and newly implemented infrastructure projects.

The Department has four regional offices namely, Southern Regional Office (SRO), eThekweni Regional Office (ETR), Midlands Regional Office (MRO) and lastly North Coast Regional Office (NCR) each with its own number of district offices totalling 14 district offices for the whole Department. The study focused on Head Office and the four Regional Offices, namely Southern Region, eThekweni Region, Midlands Region and North Coast Region as that's where project management takes place.

The district offices are where maintenance of provincial owned buildings takes place as well as the identification of government owned properties.

3.6 TARGET POPULATION

According to a study done by Luthuli (2020) a target population comprises of individuals that are of interest and relevance to the study who meet the specific criteria of the research. Similarly, Zondi (2020) states that a researcher may want to draw inferences from a unit of analysis, and the target population represents the entire set of units or includes all the

components that make up that unit. Furthermore, Soni (2022) added that assuming that the sample selected for this study is a true representative of the target population. Every unit in the sample must have an equal chance at providing a sample as they've been chosen purposively for the study.

The Department's main mandate is to provide infrastructure development and property management. Due to the Department being the implementing agent which provides infrastructure for the Department and other client Departments, Project Managers also known as Deputy Directors who manage different portfolios, such as the Education Portfolio, Health Portfolio, and Other Clients Portfolios were chosen to participate and share their knowledge in this study. The Deputy Directors have been employed by the Department to ensure project phases such as initiation, planning, design, execution, monitoring up to project close out and hand over to the client Department. They ensure that projects are executed accordingly. They provide strategic leadership and ensure compliance to policy and legislative prescripts for the development and maintenance of state infrastructure. These Deputy Directors are situated in Head Office and the 4 Regional Offices and they formed part of the target population. Project Leaders also formed part of the participants as they implement projects in accordance to the methodology and frameworks provided by Head Office for implementation. A chosen target population is a group of participants with common similarities who will be able to provide answers to the research question, as defined by the researcher (Casteel and Bridier, 2021).

3.7 PARTICIPANTS

According to Stratford and Bradshaw (2021) Participants are integral to the cases or examples we choose, and they can have different identities, values, agencies, and behaviours. Any reliable research should take into account the questions being asked, the situations and subjects we include in our studies, and the methods we use to assure the rigor of the work. It typically takes some sort of in-depth interviewing to understand the opinions of participants in complex cultural contexts. Sikhosana (2020) agrees, however, the researcher must ensure that none of the questions are insensitive to the participants throughout the interview. The primary university's ethical approval must be served as another source of guidance for the researcher. As a result, participants must be given their informed consent, which the university will grant, before the interviews begin.

The study was conducted within the KZN DPW Head Office and the 4 Regional offices. Participants were chosen as following; four (4) Deputy Directors situated at Head Office, 4 Regional Deputy Directors from the only 4 regional offices within the Department, 12 Project Leaders who act as the construction project managers and implementers at a regional level, these individuals perform project management for construction projects from inception to project close-out within their designated Regions in the Department. They also prepare cost estimates as well as project schedules.

There was a selection of 6 more participants who are working for the Information and Communication Technology (ICT) section as that acts as the project management office for Information System (IS) projects whenever there is a need for process automation within the Department. These participants are the Deputy Director for ICT, Deputy Director for WIMS, Assistant Director for ICT, Assistant Director for WIMS, System Administrator for Premis and the IT Specialist who deals with ICT Governance. The rationale for choosing particular people to take part in the study, making sure that the group represents the target population and is capable of providing useful information to address the research questions, while also taking into account the potential risks for participants and the ethical ramifications of including particular demographics. These participants play a significant role in overseeing the IS and infrastructure projects.

The ICT section facilitates the implementation of system development projects within the Department. They oversee IS projects by ensuring that the system development life cycle is followed with all its stages such as the planning phase, elicitation of requirements, system design, system implementation, and testing up to system maintenance. The ICT section provides the oversight role by ensuring the principles and processes are followed, and that projects meet the objectives of the Department. Infrastructure project teams are essential to infrastructure projects because they facilitate effective collaboration, diverse expertise, streamlined execution, and improved decision-making.

The 6 participants from ICT Head Office play a role in the implementation of the much-anticipated Departmental Integrated System also known as Archibus. The information system is an integration of Property Management processes and Infrastructure projects which are core functions for the Department, and which are both relevant to this study. The information system has been in implementation since 2014, so for the purposes of this study it was appropriate to investigate the challenges faced in the implementation of this information system project.

A total of 26 participants was a reasonable number to use in this study and was used as the population of interest as they all have direct influence on the use of practises, techniques, and tools used for each project and also these participants meet the benchmark used for this study. Deputy Directors have the direct decision making power, final report writing responsibility, and the experience to provide accurate responses. Hennink and Kaiser (2022) state that, in qualitative research, a typical sample size is thought to be relatively modest, typically ranging from 10 to 30 participants. The precise number depends on the research question, technique, and the idea of "data saturation," which is the point at which additional data collecting produces no new insights. When a researcher has gathered enough information that no new themes or insights are showing up, suggesting that more data collection is probably unnecessary and that the sample size is sufficient to thoroughly investigate the research topic; in other words, the data is "saturated" with information and no important new details are being discovered (Aguboshim, 2021). Research questions that were used contributed to the study theory and the findings were generalised the study findings from the sample of the population of interest.

3.8 SAMPLING STRATEGIES & DESIGN

According to Sikhosana (2020) Sampling is done to gather information on larger populations. It is the process of removing certain characteristics from a population with the intention of learning more about the entire group from which they were drawn. In research, sampling techniques are essential. Getting a representative sample made up of a limited number of units or examples selected from a much larger group or population is the main goal of sampling. Based on the findings of the smaller group, the researcher can do research on the smaller group and draw reliable generalizations about the larger group (Rahman et al. 2022).

Kutu (2020) adds that sampling strategies have two main categories of sampling methods which are "Probability" and "Non-probability" samples. Convenience/purposeful sampling, quota sampling, snowball sampling, and other techniques fall under non-probability sampling. Although each sampling technique has benefits and drawbacks of its own, probability sampling is preferred because of the generalizability of its findings. Simple random sampling, systematic random sampling, stratified random sampling, cluster sampling, etc. are all examples of probability sampling. Probability sampling requires the employment of a sampling frame since random sampling from that frame cannot solve the research problem if it is not properly chosen from the population of interest (Lohr, 2021).

A study done by Nxumalo (2020) states that purposive sampling can only be achieved with a specific group that meets the purpose of the research as they can only provide desired answers to the research questions. Further to that, Gamede (2021) states that purposive sampling is done based on the knowledge of the researcher for the selected population as well as research objectives. Mashingaidze (2020) describes the five processes that make up a sampling strategy: identifying the target population, creating a sample frame, choosing the best sampling method, determining the sample size, and finally carrying out the actual sampling.

Purposive sampling, under non-probability sampling, was used for this study to identify all relevant participants as mentioned above. The participants were selected because they could provide the required information based on the everyday duties they perform when working or implementing projects as well as challenges faced. They were chosen in view that they oversee the methodologies used to execute the projects from inception to project closure and hand over. This technique was employed to fulfil the variations of common pattern that emerges from the research of a particular interest.

According to Saharan et al. (2020) Sampling design is the method you use to choose your sample. There are many different types of sampling designs, and each one serves as a guide for selecting your study sample. The purpose of sampling design is to enable you to generalize your findings to the entire target population. There are two primary types of sample design: probability sampling and non-probability sampling. The probability sampling technique is used to choose samples from a larger population, and it can be used as a guide (Pandey and Pandey, 2021)

Probability: Rahman (2023) states that probability sampling, sometimes referred to as chance or random selection, is the act of choosing a sample from a population using the randomization principle. Compared to non-probability sampling, probability sampling is typically more complicated, expensive, and time-consuming. When probability sampling is used, each member of the target population has a fixed chance of being selected for the sample. According to Lehdonvirta et al. (2021) examples of probability sampling methods include cluster sampling, stratified sampling, systematic sampling, and simple random sampling.

Non-probability: A subjective (i.e., non-random) way of choosing units from a population is known as non-probability sampling. Non-probability sampling is a quick, simple, and affordable method of gathering data because it doesn't require a whole survey frame (Pace, 2021)

According to Sandstrom-Mistry et al. (2023) non-probability sampling is a sampling strategy where samples are chosen by the researcher based on their subjective assessment rather than by chance. It's a less strict approach. The proficiency of the researchers is a major factor in this sampling process. Researchers frequently employ it for qualitative research because it is observation-based.

Further to that, Beaumont and Rao (2021) states that unlike probability sampling, non-probability sampling gives some individuals of the population a lower chance of taking part in the study. Every person in the population has an established probability of getting chosen. The majority of exploratory research, such as pilot surveys, benefit from non-probability sampling (deploying a survey to a smaller sample compared to pre-determined sample size). Researchers employ this approach in investigations where it is impossible to draw random probability sampling due to time or cost considerations.

This study used non-probability purposive sampling method. The Deputy Directors, team leaders and project members were ideal for the exploratory research as the research was aimed at a particular group who have the experience and knowledge of working in projects within the department.

3.8.1 SAMPLE SIZE

According to Lakens (2022), the sample size is the total number of observations or participants in a study or experiment. The number of individuals, objects, or data points selected to statistically represent a larger population is known as this. The sample size is a crucial consideration since it has a substantial impact on the reliability of research findings and their ability to be extrapolated to a larger population.

The department has a total of 10 infrastructure Deputy Directors, 6 at Head Office and 4 in the 4 regional offices. Out of the 10 Deputy Directors, 8 were selected, 4 at Regional offices and

4 at Head Office. This number was adequate because they are hands on and would be able to provide informative data, making it easy for the researcher to draw valuable conclusions. Out of 16 project leaders within Regional offices, 12 were selected which makes it 3 project leaders per regional office who lead individual projects that contribute to a larger program. They report straight their regional Deputy Director who provides reports to Head Office Deputy Directors.

In addition of 6 out 16 ICT and systems staff members were selected. 3 of the 6 system administrators were selected because they play a part in the implementation of the Archibus system and the other 3 were selected from the 10 staff members within ICT as they play a part in overseeing system development projects. In total, these participants were the Deputy Director for ICT, Deputy Director for WIMS, Assistant Director for ICT, Assistant Director for WIMS, System Administrator for Premis and the IT Specialist who deals with ICT Governance.

The total number of participants who were selected and participated in the study was 26. This number's composition was acceptable and purposeful in order to complement the study's scope and to achieve the required results (Kang and Hwang, 2021). This number included 20 infrastructure personnel and 6 IS personnel that work for KZN DPW. The participant's number may seem small but they were chosen purposively for this research study because they can provide the required information based on the everyday duties they perform when working or implementing projects as well as challenges they face.

3.9 DATA COLLECTION METHODS

According to Chaka (2020) indicates that this is the first stage of any project that focuses on leveraging data that is now underway. He mentions that what is acquired at this stage will be available for use later, similar to brainstorming in the product design process. Because it contains the necessary information and is in a readable format or can be transferred simply to another one, the collected data is very beneficial.

This research relied on in-depth interviews technique to collect data and existing documents and archives. According to Salifu (2021) she states that in-depth interviews are a data collection method used by the researcher to explore a participants experience on a subject matter. In-depth interviews were conducted to solicit responses from participants and get detailed information on the subject matter. These were used to uncover many underlying issues in order to obtain detailed results. All interviews were audio recorded, after obtaining permission from the

participants to capture the interviews and this allowed the interviewer to concentrate on asking questions and engage in a purposive conversation with the participants. The interviews were held in English considering that all participants of the Department are employed on the basis that they can understand and can communicate in the English language. In the opinion of Mahlaba (2021) data collection in the form of in-depth interviews can be used as a way of obtaining 'rich' and relevant information.

3.9.1 SEMI-STRUCTURED INTERVIEW

In a study done by Ruslin et al. (2022) they indicate that the first stage of data collection for any project is the semi-structured interview and is more powerful for any study conducted as what is acquired at this stage will be available for use later, similar to brainstorming in the product design process. Because it contains the necessary information obtainable from the participants which is in a readable format and can be translated fairly as collected data is very beneficial. According to Adeoye-Olatunde and Olenik (2021) semi-structured interviews allows the researcher the autonomy to investigate and probe the participant further with regard to the responses provided that may require further probing. Similarly, Ahlin (2019) states that semi-structured interviews are conducted by allowing the participants to provide open-ended responses which allows them to provide their expertise and input on the topic at hand.

This study conducted semi-structured interviews where predetermined open-ended questions were asked to allow participants to provide further information on the topic at hand. This allowed the participants the flexibility of expressing themselves and this also afforded the researcher the opportunity for an in-depth exploration of participants perspectives and experiences. The responses provided by participants allowed the researcher to probe further questions.

Moreover, a study done by Erima (2022) indicates that interview findings can be kept as reference for future use. Further to that he indicated that they could appear in recursive nature and can appear at different stages. Bucknall (2021) added that interview findings can be used as data repository that can be used to formulate new data knowledge within academic spheres.

The data collected was used to answer questions that were formulated by the researcher. In this study an informed consent form was signed by all participants as a declaration form. The collection of primary data was used to address a particular problem at hand concerning a particular research phenomena (Taherdoost, 2021). This method also assists in gaining insight

into the point of views, experiences, feelings, and perspectives of the participants. Ganesha and Aithal (2022) also adds that it is important for a researcher to obtain first-hand data on the research subject so as to analyse it themselves and obtain valid answers.

3.10 DESIGN OF INSTRUMENTS FOR COLLECTION

According to Adosi (2020) tests, questionnaires, inventories, interview schedules or guides, rating scales, survey plans, and any other forms used to gather data on essentially identical items from ten or more respondents are all considered "data-collection instruments.". The validity, dependability, application, and generalizability of the research findings were taken into account by the researcher. In qualitative research, the most common research instruments include observations, interviews, focus groups analysis, and document analysis (Granzow and Camci, 2020).

3.11 PRE-TESTING & VALIDIBILITY

In a study done by Bhalla et al. (2023) they state that in order to improve validity of the data collection methods pre-testing is highly recommended as it is an effective way to evaluate the reliability and validity of the data collection methods being used in the research. Therefore, pretesting is conducted to test the validity of the research methods chosen and if the formulated questions provide the desired outcomes.

This study conducted pre-testing by doing pre-test interviews with a small number of participants to formulate measures to address any limitations or threats that could arise before the full-scale qualitative research study interviews were carried out. The Director ICT, Admin Officer ICT, and Deputy Director under the Premis system were used for sampling and the questions were not changed as they were providing the desired outcomes.

3.12 ADMINISTRATION OF INTERVIEWS

According to Knott et al. (2022) one technique in qualitative research for gathering primary data is the interview. It entails finding out what one or more people think about a business, a product, or a subject. Researchers can get comprehensive data with this strategy that may not be possible with other research techniques.

This study used semi-structured in-depth interviews with open ended questions. In-depth interviews allowed the respondents to elaborate on their answers and for the researcher to get in-depth knowledge of the subject matter. Due to the semi-structured nature of the interviews, all topical areas given in the interview guide were used by the interviewer to elicit thoughtful responses from the respondents.

3.13 DATA ANALYSIS

According to a study conducted by Dlomo (2022) data analysis is the process of going over, analysing, and improving data using logical and analytical reasoning. It is a process of examining data to find relationships, patterns, and trends. The information is analysed to identify facts that may be relevant to the study's phenomenon and to show how the independent and dependent variables relate to one another. Mutinta (2020) cites that data analysis is the methodical application of logical tools for the description and illustration, compression and summarization, and evaluation of data. She further states that it's a technique that uses conclusions to understand the phenomenon being studied.

Furthermore, in a research study, data analysis is used to determine and contextualise events and phenomena through research design (Kumatongo and Muzata, 2021). After interviews data analysis is the most crucial part of any research as it summarizes collected data and aims to interpret data collected through the use of analytical and logical reasoning to determine trends and draw conclusions from the raw data.

Data collected from the objectives was analysed using NVIVO content analysis to identify, analyse and interpret patterns. The data was imported from the participant's interview transcripts for exploration to identify key words. Content was then selected to code by dragging the selected content into a node and to identify patterns.

Content analysis was used to find any repeated patterns in the responses from participants. This assisted the researcher to answer the research's objectives by looking at the processes and methods being used in the Department.

Mölder et al. (2021) states that raw data collected entails multitudes of steps to be undertaken from the application up until drawing of conclusions, such as preparing the data, storing the data, interview transcribing and cleaning the data collected.

The data was transcribed by listening to the pre-recorded interviews and words were typed out as they were spoken. This process included pauses during interviews and sighs just to clarify the script. After transcribing, the scripts were proofread to ensure all words were captured and that the transcript was well formatted, clean, and ready for analysis.

3.14 DATA MANAGEMENT

Data management is the process of ensuring research data cannot be tampered with by any outside person and is kept safely (Yaqoob et al. 2022). According to Huang et al. (2020), the process of data management is challenging and complex because you have to consider data security and management effectiveness.

Therefore, data collected via interview questions from each participant was documented and reflective analysis was done after interviews to ensure all missed information was stored in a computer that is password protected. Body conduct and feelings towards questions were documented and stored in a computer that is password protected. Any issues brought up by participants was handled carefully to protect participants, these were also stored in a computer with a password. Response provided by other participants was not shared with other participants as they were protected by the consent forms they had signed. Interview transcripts were stored electronically in a password protected computer. For the integrity of the Department, information gathered and consolidated for this research paper will not be shared with any public members except for the supervisor of the researcher.

3.15 DATA STORAGE

According to Matange et al. (2021) data storage is a dense and long lasting information storage process. A gap between information processing and ability to store data. Each participant's information was gathered through interview questions and kept on a password-protected computer. Electronically stored on a password-protected computer were the transcripts of the interviews. Except for the researcher's supervisor, no members of the public will be given access to the information collected and compiled for this research report in order to maintain the department's integrity. Every voice recording and transcript is kept on a password-protected computer, and a CD-ROM is kept as a backup.

3.16 DATA QUALITY CONTROL

According to Taleb et al. (2021) data quality is data that is deemed to be appropriate for its intended purposes in operations, decision-making, and planning, it is said to be of acceptable quality. Similarly, Haukkala (2022) states that the ideal definition of "data quality" is "fitness for use," which suggests that the idea of data quality is a matter of opinion. As a result, data that is deemed suitable for one use may not be sufficient for another. The popularity of data warehouses as an example of the trend toward diverse applications of data has brought attention to the issue of data quality.

In this study, all participants were requested to sign a consent form giving the researcher permission to involve them in the research and to also be used as an agreement between the participants and the researcher. Permission to record the interviews was requested from participants prior to recording the interviews. All voice recordings, transcripts are stored in password protected computer and as backup, locked away in a CD-ROM. Interviews were documented as well as well saved on external drives to be listened to for clarity and ensure answers are captured correctly. All transcripts and recordings are kept safe in a locker with a key for five years.

3.16.1 TRUSTWORTHINESS

In a study done by Cloutier and Ravasi (2021) states that when doing qualitative work, evidence supporting ones claims must be used to provide clarity and this should lead the researcher to focus on available evidence that confirms the participants claims on the subject matter. Mabaso (2021) added that as a researcher one should claim that the findings are true by relying on the dimensions of trustworthiness, which can be described as credibility, dependability, transferability, and conformability. Further to that, Thabakgolo (2023) defines trustworthiness as using the criteria of accuracy, authenticity, and record reliability to reflect true views of the subject. And further defined it as the structure or content of the record itself that might be used to characterize the public's trust in record keeping.

Therefore, these factors were used in the study to make sure the results were genuine, accurate, and well-supported in order to produce new knowledge. To ensure the validity and rationale of the findings, Departmental annual reports, AG reports, and APPs have supported them.

3.16.2 DEPENDABILITY

According to Janis (2022) dependability establishes the consistency and repeatability of the research study's conclusions, which is important to trustworthiness. It is important for researchers to ensure that their findings are consistent with the raw data they gathered.

Ahmed (2024) states that dependability is linked to reliability in qualitative research. Dependability is the extent to which a study may be repeated by a different researcher and get the same findings. It all depends on how rigorous the research methodology is: using open-ended questions to get honest and impromptu responses; taking detailed notes; carefully analysing the transcripts; and using digital recordings. Focused data collection should be ensured by using a thorough discussion guide or set of respondent tasks.

Prolonged engagement with data was used to ensure a high level of dependability. The data was collected from the 26 participants at different times by way of semi-structured interviews around the same phenomenon to ensure that there was validity and reliability. The interviews were digitally recorded and transcript are stored in a password protected computer. The questions asked were not biased nor were any preconceptions caused.

The body language of all participants were also taken into consideration during the interview process for ease of analysing data. Participants were given enough time to express themselves by giving detailed descriptions and interpretations that answer the research objectives during the interview without having the interviewer interrupt them. The researcher's values were put aside to allow the participants to be free in responding to the questions.

3.16.3 CREDIBILITY

According to Wood et al. (2020) Credibility is a measure of the truth value of qualitative research, or how true and accurate the study's results are. It is contingent, in part, on the researchers' research methodology and level of credibility.

Triangulation was used to ensure credibility because two participant groups, IS and infrastructure, were used to collect data at different time periods to verify and strengthen the reliability of the research findings. Comparing and cross-checking was done to compare interpretations and perspectives. The triangulation helped to validate findings and enhance their credibility. Data was collected from different sources like interviews, and observations for a

more accurate picture. The researcher also made sure to summarize findings with participants at the end of each interview. The participants were re-contacted in order to review the interview, confirm the results, and make sure the researcher had understood what the participants had stated during transcribing. During these follow-up summaries, participants also had a chance to provide their perspectives and clarify or validate their feedback and add additional views.

3.17 ETHICAL CONSIDERATION

According to Suri (2020) the ethical issues that are particularly pertinent to the epistemological orientation of their systematic reviews must be given special attention by systematic reviewers. For example, the following categories of frequent errors should be avoided by all post-positivist systematic reviewers: The validity of the review can be questioned if it exhibits unjustified selectivity, fails to differentiate between evidence of different quality, uses incorrect contextual factor coding, exaggerates claims beyond what the evidence reported in primary studies can support, and fails to adequately consider findings that contradict the generalizations made in the review.

Further to that Khan et al. (2021) state that an essential part of a research study's research ethics is informed consent. It has been noted that the majority of research ethics in many countries have been influenced by the Western culture. Therefore, it is crucial to understand how research ethics are understood and applied in other countries with various sociocultural norms, values, and standards. The more important question in the context of informed consent is, "How informed is the informed consent?"

The KZN Department of Public Works office and regional office participants were informed on time about the whole study and the nature of the study. The participants were informed that, during the study, they are at liberty to either opt in or opt out of the study at any time. The participants were informed of the purpose, benefits, and risks behind the study before they agreed or declined to join participation in the study. The participants were informed that they will remain anonymous to encourage confidentiality. They were ensured that there is no potential harm, and the results will be communicated to them once analysis has been undertaken.

Ethical approval was secured from the University of KwaZulu Natal, School of Management, IT & Governance. Ethics Research Committee (Protocol Reference No:

HSSREC/00006403/2023). An approval letter from a Gatekeeper, allowing the study to proceed, was obtained from the KwaZulu Natal Department of Public Works. Informed consent was secured from every participant involved in the study.

3.18 SUMMARY

Research Methodology is a about procedures and techniques used to collect, analyse, and report on data pertaining to the study topic. This chapter discussed the research aim, objectives, the research philosophy which guides how the research should be conducted, the research design used to plan for the research study and the research methodology. The sampling methods used and the sampling size were also discussed. The study site and participants who provided the data using in-depth interviews were also discussed. The chapter further discussed the methods used to collect the data and how raw data collected from the participants was transcribed for analysis to find themes and patterns. Data quality control was also discussed which focused on trustworthiness, dependability and credibility and how pre-testing of the collection instrument was done to ensure no problems occur. Ethical considerations that guide the whole research were also discussed of how participants were informed of the nature of the study, their confidentiality, anonymity, and that they were at liberty to opt out at any time. The following chapter will focus on analysing the data and the findings from the data.

CHAPTER FOUR: DATA PRESENTATION & ANALYSIS

4.1 INTRODUCTION

The previous chapter discussed the whole research methodology of the study. This included the research design used, the study site, and the target population. The data collection methods used to collect data were also discussed. In this chapter the researcher will present, discuss, and interpret the data by using the responses provided by the participants. To begin with, the chapter opens by discussing the response rate from which respondents were able to provide their responses against the actual number of participants that were anticipated.

The data will be interpreted and linked to the theoretical framework, PMBOK, as well as the literature reviewed. The empirical findings will be interpreted and presented according to the four objectives that were initially set.

4.2 RESPONSE RATE

The sample size for this study was 26. The researcher has successfully collected data from 26 only from where inferences were drawn from which makes the response rate 100%.

4.3 DISCUSSION

4.3.1 TOOLS AND TECHNIQUES OF THE CURRENT PROJECT MANAGEMENT SYSTEM IN KWA-ZULU NATAL DEPARTMENT OF PUBLIC WORKS.

The aim of objective one was to investigate the tools and techniques that have been employed within the KZN DPW in ensuring tasks scheduled are accomplished for projects. This objective determines the tools and techniques that assist the department in increasing its productivity, ensuring tasks completion, and deadlines are met. The goal is to identify the effective tools and techniques that have been implemented to help KZN DPW achieve its several key goals such as boosting its overall output or efficiency of the department's operations; ensuring that all tasks assigned to the department and its employees are completed satisfactorily; and also ensuring that all projects or major tasks are completed timeously. All this has the ability to improve operational effectiveness as a result lead to improved performance in terms of reliability in accomplishing tasks, productivity as well as adherence to deadlines and therefore contribute to organisational success.

4.3.1.1 THE TOOLS AND TECHNIQUES EMPLOYED BY THE KWA-ZULU NATAL DEPARTMENT OF PUBLIC WORKS FOR ITS PROJECTS.

In order to establish the current tools and techniques that help increase productivity by providing the necessary structure in managing projects and ensuring that the work moves according to the schedule, participants were requested to narrate the tools and techniques that have been put in place to assist in ensuring projects are delivered at the expected level.

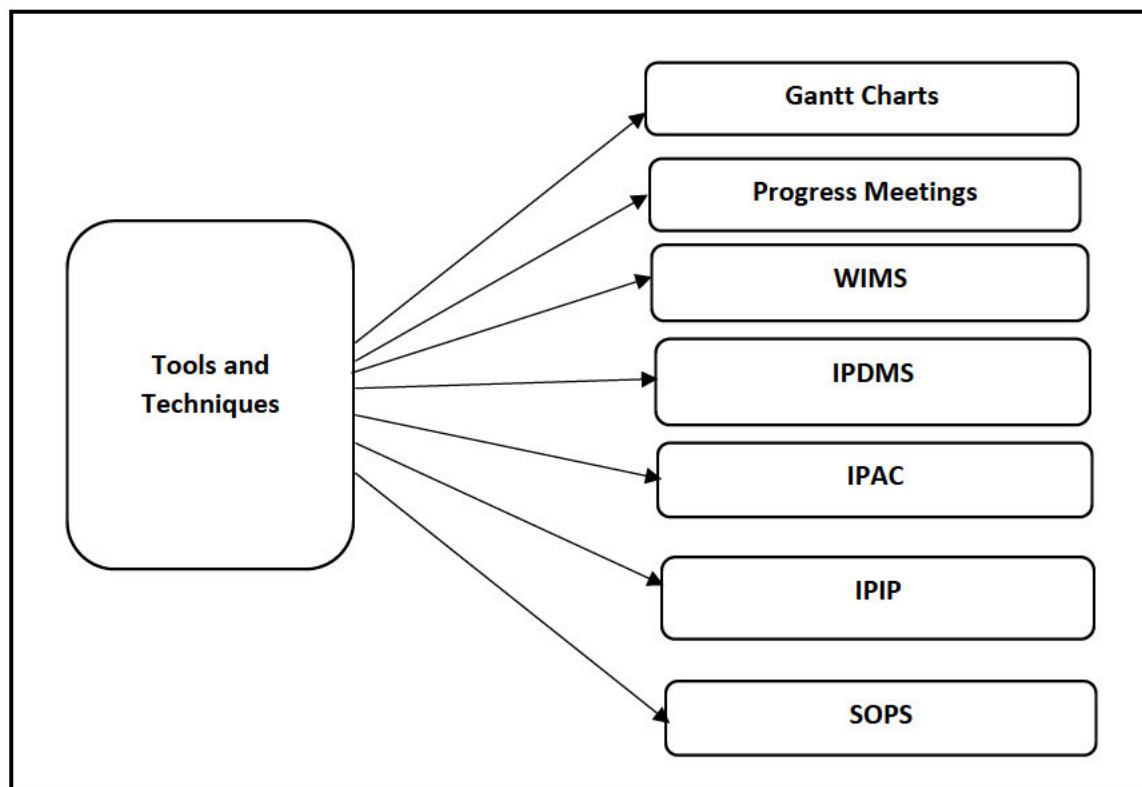


Figure 4.1: Tools and Techniques of the current PMS

Source: Interview data (2024)

Based on the feedback provided by the respondents, it was noted that seven tools and techniques emerged from the responses provided. These tools and techniques were: Gantt Charts; Progress Meetings; Works Information Management System (WIMS); Infrastructure Procurement and Delivery Management System (IPDMS); Infrastructure Projects Approval Committee (IPAC); Infrastructure Project Implementation Plan (IPIP).

4.3.1.1.1 GANTT CHARTS

According to all participants, for both Information Systems (IS) projects and Infrastructure projects, the department uses Gantt charts as a common tool to monitor project progress and delivery. A Gantt chart is a type of bar chart that is used in project management that is useful for organizing, arranging, and keeping track of tasks of a project. It is a horizontal bar graph that is used to visually depict all of the project data. Many participants who are mostly involved in the IS projects implementation mentioned that though this tool is being used, it is still not being understood by most IS project members. They indicated how complex the tool is, making it difficult for them to reach their set timelines, and this then renders the use of the tool pointless as project task timelines are never met or they are delayed. This is in contrast to a study done by Astafeva and Gazizulina (2021) which states that, to help identify critical paths and guarantee timely completion of deliverables, project managers can effectively plan, track, and communicate the timeline, task dependencies, and progress of each activity within a project by using a Gantt chart, which is a visual representation of a project schedule.

Many other participants who are involved in the infrastructure projects indicated that the Gantt chart is used during the pre-award phase, even though during this phase the scope of works has not been sufficiently defined and the project is at the inception stage. However, during the construction stage of the project, when the department has gone out to the market to solicit pricing for works to be executed and a contract is awarded to a service provider, the consultants always forget to update the Gantt chart that has been created on the departmental information system (WIMS) to indicate that the project has moved from the design stage to the construction stage. Meaning that the Gantt chart sits at the inception stage. They indicated that they assume that this is done because the problem with government projects is that from inception until construction stage, which is stage one to four, there is no fixed time period as the project can delay due to lack of funding from the client department. According to some participants, as the projects are multi-year projects, the timeline is monitored through a project plan created for the financial year and through meetings held where the progress of the project gets monitored and reported on. However, since tasks performed during stages five to seven are sometimes not updated by consultants on WIMS that means those tasks performed during those stages are not adequately monitored.

Therefore, the findings concur with Scully-Allison and Isaacs (2021), which state that Gantt charts should display scheduled activities versus time; they are often used in programs,

projects, and portfolios following the identification of activities through the use of a work breakdown structure. With a large team and several stakeholders, a timeline such as the Gantt chart helps keep projects on schedule and within their anticipated time. Gantt charts typically show you the timeline and status, as well as who's responsible for each task in the project, which is why all involved stakeholders should understand the Gantt chart.

When undertaking a project, the department should look into ensuring that the Gantt chart is used from the project planning phase, where they set up project details, to project close-out. The adding of tasks will then follow with the scheduling of the tasks as well as project milestones. The task scheduling will then show when each task will begin and end. Where dependencies are required, they may be added. The Gantt chart should also show when important meetings need to happen, approvals of important documents, and when deadlines need to happen.

Through the implementation of specified activities, their durations, links between the activities, appropriate resources, and potential dangers, it enables the construction and edition of project plans (Krcheva et al. 2023). The application of Gantt charts in project management appears to have encouraged their adoption in other areas, especially those where it is crucial to present scheduling information for an estimated amount of time allotted to complete a project. They offer a quick and simple way to explain the tasks involved in a project (Knott et al. 2022). Through collaborative time management tools and processes, project managers look to get support from their team so the project is collectively able to stay on track (Pillay, 2020).

Some of the research participants reported the following:

“The Gantt chart is used when the actual construction starts and a contract with the service provider is now in place.”

“Gantt chart is mostly used when the project gets to construction stage. When you have locked a contract with a contractor and have a fixed timeline because from inception there is a possibility that the client gave you the wrong scope or they don't have funding. The problem with government projects is that from inception until construction stage there is no fixed time period. Timeline is monitored through a plan during a financial year that's monitored through meetings and reporting as the projects are multi-year projects. You create a plan for the financial year that gets monitored through meetings and reporting. Scope drafting, appointing of consultants, etc.”

“The Gantt chart is used when the actual construction starts and a contract with the service provider is now in place.”

4.3.1.1.2 PROGRESS MEETINGS

Many participants have indicated that progress meetings play a crucial part in being a tool that the department and committees use to check the progress of the project. They indicated that this is where task updates are provided to the committee. It was indicated that ICT’s project management meetings usually happen on Tuesdays and that the whole committee would meet on Thursdays to discuss project progress.

Furthermore, the participants mentioned that the department uses progress meetings to discuss and analyze challenges on current project progress. However, some of these meetings do not take place due to some stakeholders not prioritizing the meetings in the hope that they would delay and buy time to report on tasks not done. It was also revealed that because some business units work in silos and there is no collaboration with ICT and other business units, it becomes difficult to complete tasks that involve other business units for the sake of process automation. According to existing literature, any project must include progress meetings; the success of the project depends on how well they are run, and team members and stakeholders shouldn't view meetings as a time waster and an interruption to their actual job (McDonnell and Lloyd, 2022).

Since some business units work in silos, it becomes difficult to coordinate and collaborate on their work. This is in contrast to some studies which showed that progress meetings are an opportunity to discuss how the project is moving toward its goals, identify any problems or obstacles with the tasks given to business units, and decide on the next course of action to keep the project on schedule during the progress meeting (Maietta et al. 2021).

Some of the research participant’s indicated the following:

“Usually, IT have their Tuesday project management meetings and they would have a meeting with the whole committee on Thursday for the progress.”

“All that I know is that Gantt charts are being used to monitor project timelines and deliverables. We also use progress meetings to report back issues to the team members.”

4.3.1.1.3 WORKS INFORMATION MANAGEMENT SYSTEM

According to some participants, this is the main system that the department uses to manage infrastructure projects. The participants indicated that WIMS is an old online infrastructure management system where projects are created from stage one to seven and some aspects are updated as the project progresses. Further to that, they mentioned that the department is working on replacing the WIMS system with the Archibus system, which will migrate project information and help the department by going paperless and be able to also adopt effectively since it will also allow digital signing. They further indicated that some daily functions are not catered for on WIMS, but the payment function is fully functional, even if it's outdated, and the department can't still find a system that can mimic WIMS.

The participants mentioned that the project stages are captured as your project progresses, and then you've got deliverables for each stage as well that are meant to be captured on WIMS. However, though old, WIMS is a good system, but most consultants do not know how good WIMS is, as they do not update project information after the design stage, and there is no willingness to learn because they think WIMS is an old system that is not user-friendly. In contrast, Van Rooij et al. (2021), notes that enhanced accountability: In a similar vein, team members feel more in control of their given duties when they have a better understanding of how they fit into the larger project thanks to a project management system.

It must be noted that projects can be monitored through WIMS given that all project progress information has been updated, but because there is limited information that's been updated regarding project progress information.

The participants indicated that the only thing that forces consultants to use WIMS is when there is a payment that needs to be made. Then the financial information gets updated, and this is the only information that's always accurate on WIMS. This becomes a problem for PMs at Head Office who monitor projects, as they can't find all the information on the WIMS system, but the information gets updated when there is a payment that needs to be made. Professionals can create a project on WIMS and then go and do the design to completion, and when they need to pay service provider consultants, the system will remind them that they haven't moved the project to design. And only then do they update the information. This, on its own would mean that the Gantt charts sit at inception stage and only moves when payment is about to be made as updates are not being done on WIMS. Progress happens outside of the system manually and

via progress meetings. Morrison et al. (2021) emphasises that, updating projects on information systems increases productivity by helping team managers automate repetitive operations, streamline workflows, and lessen the need for manual processes. Tasks like updating project plans, reminding others, and monitoring progress can be automated by team members.

According to studies done, which say that by monitoring project progress, project managers may remain informed and take appropriate action when things don't go as planned (Ika and Pinto, 2022). Updates on the status of a project are crucial for keeping stakeholders, client departments, and PMs informed so that they are aware of where the project is and if there are any challenges, they can promptly take action. It is essentially a report that informs all parties involved, especially those who might not be as knowledgeable about the project specifics, about what is happening and helps to maintain their interest (El Khatib et al. 2021).

The study contrasts with the study done by Nicholas and Steyn (2020), which says that project management systems are crucial because they guarantee that projects are finished on schedule, within budget, and with the anticipated caliber of work. Additionally, project updates aid in risk identification and mitigation, as information stored will have to go through approval levels to ensure the accuracy and correctness of the information being stored. Furthermore, it ensures efficient resource management and ensures stakeholders are informed and involved at all project phases.

Some of the research participants narrated the following:

“With WIMS, you've got stage one up until stage seven of a project. Where then you have your projects, stages captured as your project progresses.”

“WIMS is the system that's being used but not all functions are being used.”

“I mean with WIMS being an online system, that's where everything is basically being updated once the project has been created, but normally works once the project has been taken to site.”

“We also use WIMS, as much as it's old but there are good aspects of WIMS that can be linked to SOPS and the IDMS process that is still being used today.”

4.3.1.1.4 INFRASTRUCTURE PROCUREMENT AND DELIVERY MANAGEMENT SYSTEM

It emerged that the department follows the IPDMS process, which is a framework used for project management planning, budgeting, procurement, delivery, maintenance, operation, monitoring, and evaluation of infrastructure. It was further indicated by a few participants that the IPDMS principles and guidelines are supposed to improve on all the mistakes that are currently being made and minimize all the challenges that the department faces.

The Deputy Directors for infrastructure at Head Office indicated that the IPDMS is a framework mainly concerned with governance decision-making points, functions to enable good management of the procurement and infrastructure delivery processes, and alignment with the infrastructure information management system (WIMS). With the IPDMS, you've got stage one up to stage seven, where you have stage gates for each stage, and then you've got deliverables for each stage as well. The IPDMS says before a client gives you an instruction, certain steps should have already been taken by the client, such as need identification, scope analysis based on the need, securing land, and knowing who they're targeting.

The IDMS was supposed to be the ultimate standard guide for managing projects; however, it's not monitored that everyone uses the IDMS process to manage projects, as WIMS is not being used appropriately. That it's limited effectiveness because you can start a project without being fixed to looking at what IDMS says, and this is in contrast to studies that state that the best practices, design patterns, and architectural principles are frequently followed by frameworks, which facilitates the management of the implementation support services for infrastructure projects as well as infrastructure operations and maintenance (Maktoubian et al. 2021). In contrast, frameworks standardise processes across an organisation, improving precision in planning and deadline setting. And by clearly defining tasks and required tools, frameworks reduce confusion during project execution (Venegas et al. 2021).

Some of the research participants reported the following:

"I think we have your IPDMS, which is our infrastructure, infrastructure procurement and delivery management system. Right, there is a system that engulfs it. The processes that we use to discharge our duties as project managers. In attempts to deliver projects successfully."

"IDMS as well is another tool that guides how to handle a project in government."

4.3.1.1.5 INFRASTRUCTURE PROJECTS APPROVAL COMMITTEE

Another theme that emerged was the recent use of the IPAC, which was mentioned by many participants. It was reported that this committee has recently been formed, as before there was the DRC (Design Review Committee) and DAC (Design Approval Committee), which have been dissolved to the IPAC, which outlines the latest framework and the latest government framework that is supposed to be implemented throughout the project lifecycle. They further stated that the IPAC was meant to ensure the administration of the department's current infrastructure as well as the design, development, and construction of new infrastructure in order to meet the goals and objectives of the department's programs.

Further to that, members of the IPAC committee are still undergoing training to ensure that they understand their duties with regards to the IPAC Committee. According to the participants, there used to be a DRC that sat once a week and a DAC that sat once a week. This means that projects would get delayed if one committee hasn't had a sitting. However, the formation of the IPAC is anticipated to fast-track all of that with just one sitting.

The findings concur with studies done by Kamal (2019), which state that the most important aspect is the necessity to establish training work in the field of project management to specify how to review and approve various design activities in order to manage projects efficiently and effectively, which will substantially contribute to the projects' success. Project items to be reviewed include design and cost. Further to that, Hopt (2024) indicates that in construction projects, the exercises of design review and approval can be handled concurrently.

Some of the research participants reported the following:

“The department has started following IPAC infrastructure projects approval committees, you know that's basically being the tool that we use. It's implemented to support project managers with regards to the process of implementing our projects on time.”

“The IPAC committee has recently been formed as well for approval.”

4.3.1.1.6 INFRASTRUCTURE PROGRAMME IMPLEMENTATION PLAN

The Infrastructure Programme Implementation Plan (IPIP), which was identified by many participants, was mentioned as a manual Excel system used for budget planning for all infrastructure development projects. The participants mentioned that the IPIP is mostly used

by the internal Quantity Surveyors (QS) for professional fees, closing of final accounts, cash flow management, and issuing of payment certificates for construction projects.

Some participants mentioned that the IPIP is manually operated in an Excel spreadsheet, which gets circulated to everyone once you read it and there's something that needs to be changed. It's either you call the one person who circulated the IPIP, and then they'll have to change whatever needs to change. And then he or she will have to email it back to everyone else. As a result, that's not being an effective way of working because should a QS change something and then forget to send it to everyone, this means everyone will be working on an old version of the IPIP that doesn't have any recent updates. They expressed that they would work better maybe if the IPIP was available online where real-time updates would be available.

The manual use of the budget tool for QS leads to slower and inaccurate data, leading to reduced productivity and efficiency. However, in project management, "real-time updates" refers to the constant flow of reports and information that make sure all stakeholders and team members are aware of the latest developments. This is in contrast to other studies, which state that real-time systems are made to process data in real-time and must react to events swiftly and precisely, whereas online systems enable users to engage with data stored in databases and are accessible from anywhere at any time (Khriji et al. 2022).

Some of the research participants reported the following:

"You know I know of a few that are currently being used but the most important one which I think it's the IPIP you know everyone talks about the Infrastructure Project Implementation Plan (IPIP) within the department. I mean with WIMS being an online system where everything is basically being updated once the project is created, but normally works once the project has been taken to site and then IPIP once the project budget has been approved and that's the one that we basically follow even though that one uses a manual system which is basically excel."

"The manual IPIP system for the issuing of payment certificates for construction projects."

4.3.1.1.7 STANDARD OPERATING PROCEDURES

The Standard Operating Procedures (SOPs) emerged as one of the themes, as this was mentioned by many participants. According to some of the participants, most standard documents are informed by the departments' standard contracts, and the infrastructure PMO is not that involved in the creation of standard documents but has influence in the processes. Standard contracts are used, and standard documents are influenced by SOPs and standard contract templates, e.g., GCC templates. The department captures information in lessons learned and close-out reports and distributes the information through meetings and inter-memos that are going to update the SOPs. However, recent data on projects and regulations is not updated on the SOPs; therefore, project data is outdated and needs to be updated.

The participants indicated that with the professionals not updating the WIMS system, this means that some of the most recent data doesn't get updated on WIMS as well as SOPS documents. This means that the department sometimes works with SOPs that are outdated. Additionally, account has not been taken into consideration with whatever changes that have taken place on the ground, with regulations, and best practices. This is contrary to literature which indicates that, SOPs are a set of step-by-step instructions created by an organization to assist employees in carrying out routine tasks which is why it's important to keep them updated. SOPs are meant to increase productivity, quality output, and performance consistency while decreasing misunderstandings and noncompliance with industry standards (Durdon and Alisher, 2023). It was mentioned by Wasserfall et al. (2022) that SOPs give guidance in terms of required resources and functions for required resources. They also provide a guide on how to handle a project instruction from a client and give teams precise instructions on how to execute project tasks, which keeps the team productive and organized. The SOPS gives the teams precise instructions and the guidance required to carry out a certain task or operation in a reliable and effective manner. They are designed to ensure regulatory compliance, minimize misunderstandings, and promote consistency in implementation by using standard documents.

This is in contrast to studies done by Hollmann et al. (2020), which state that recent and accurate data accessibility is a necessary component of an effective, forward-thinking, and eventually self-correcting project management system that produces reliable results and has grown to be an important aspect of project integrity. However, sharing only yields the expected benefits if the data are reusable and of a consistent quality. For a very long time, organizational operations have used standard operating procedures (SOPs) to ensure efficiency, quality, and consistency in performance. SOPs guarantee that the user follows standard operating

procedures that adhere to best practices. Additionally, using SOPs means that procedures should be routinely reviewed and updated.

Some of the research participants reported the following:

“...in the department we are guided by SOPs with regards to how you should handle an instruction...”

“So, I think that is your collective system, your comprehensive system that we use to deliver our projects here. SOPs are also used.”

“Lessons learned or historical data as part of our tools to execute projects. SOPs guide us as well.”

4.3.1.2 ANALYSIS OF PROJECT MANAGEMENT SYSTEM: CONTRIBUTORS TO EFFECTIVENESS & INEFFECTIVENESS.

Participants were asked to provide their responses in order to establish just how effective the current project management system is that is being used within KZN DPW. Based on the feedback provided by the respondents, it was noted that five theme emerged from the responses provided. These themes were: Not effective, project team not aware of the current PMS, no proper use of the current Gantt chart, no monitoring and control system of project milestones, taking too long to implement frameworks.

Not Effective

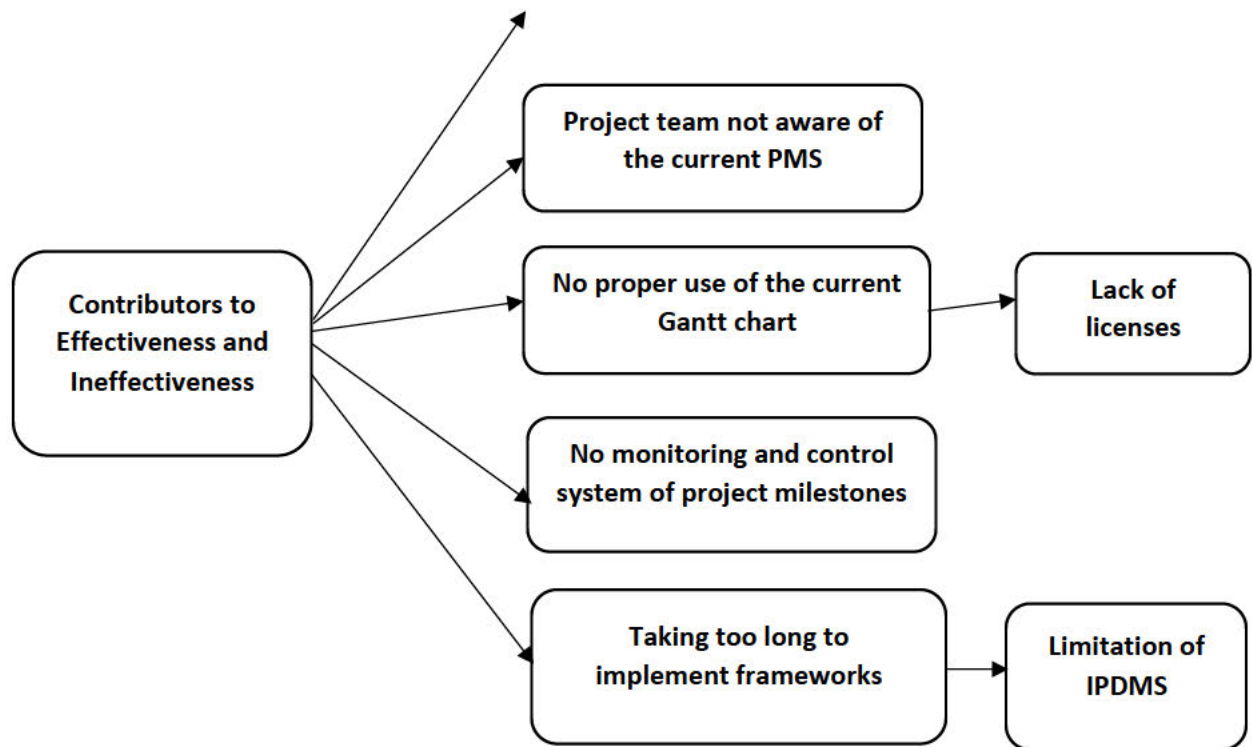


Figure 4.2: Contributors to Effectiveness and Ineffectiveness of the current PMS

Source: Interview data (2024)

4.3.1.2.1 NOT EFFECTIVE

Many participants indicated the current project management system employed by KZN DPW to deliver IS projects is not effective. Effectiveness in project management involves breaking down organizational processes and procedures into actionable project steps that can be adopted over time and that can demonstrate value solutions. It ensures that projects are finished to the required standard of work, on schedule, and within budget. Additionally, it aids in risk identification and mitigation, efficient resource management, and ensuring stakeholders are informed and involved at all stages of the project.

This is based on some of the IS projects that the department has attempted to implement but could not implement. They elaborated that the current IS project that the department is Implementing, which is the Archibus system, commenced back in 2014 and to date has not been implemented. Part of successful project management skills is the skill to ensure effective communication and ensure teamwork. Some of the participants indicated that they haven't been

made aware of the project management system being used to implement IS projects. The way things are done within the department for IS projects is that there is no proper use of the Gantt Chart; it's not up to standard, which means that tasks are not being tracked properly, there is therefore no basis for monitoring and controlling the project milestones, and not everyone has the project management tool installed because of the issue of lack of licenses. In contrast, a study done by Shibuya and Chen (2021) shows that project managers can efficiently monitor progress and spot possible bottlenecks during the implementation process by using a Gantt chart for project implementation deliverables, which is a visual depiction of a project's timeline. Each bar on the chart represents a specific deliverable, along with its start and end dates and any dependencies between them.

It was reported that for infrastructure projects, the department takes longer to implement relevant and current frameworks that have been approved, which makes it hard to collaborate with tools being used. They mentioned that with WIMS being the departments' infrastructure project management system, it is expected that every project progress is updated so that projects can be easily monitored; however, consultants are not updating project progress as expected. Then PMs are forced to update payment information when payments need to be done, as the system does not allow payment without accurate payment information. Further to that, the sudden closure of projects on WIMS without professionals having submitted their fee claims, as they must wait until the final account is approved before they submit their claims, makes it difficult for professionals to pay for fee claims. This then makes the process ineffective, as there needs to be a submission written in order to request that they open for payments, and this causes delays in payments.

It was also mentioned that the late implementation of frameworks makes it difficult for head office project managers to monitor whether the actual frameworks are being followed correctly or not. WIMS as a tool is not used effectively, as updates can only be made by a few people at the regional level and a certain individual at the head office.

The participants also expressed that the IPIP, which is used for budgeting, is too manual as it affects the cash flow, and with each and every payment certificate, the cash flow changes. It was indicated that each and every month you budget on what to spend. Sometimes you spend more, or you spend less. The budget is drawn out for each month for each project, whether you spend less or more, as a result in the subsequent months the budget changes. In addition, the limitation of the IDMS guide is that it was expected to be the ultimate standard guide

for planning, budgeting, procurement, delivery, maintenance, operation, monitoring, and evaluation of infrastructure projects; however, the participants have indicated that the guide is very limiting.

According to many participants, tools employed by the department are just not effective. They mentioned that because of not being effective, they are causing the department's cost overruns and time overruns.

The results show that the tools already implemented within the KZN DPW are not effective enough to deliver projects, or if they deliver, they don't deliver on time. In most cases, processes are not collaborated on well enough to make it easier to use these tools for teamwork. However, Kerzner (2022) states that collaborating with individuals from diverse teams or departments allows team members to gain new insights and broaden their own expertise. He further states that, as a PM, it is essential to establish a collaborative culture among your teams to promote sustainable teamwork, trust, respect, and diversity. This would help in organizing and coordinating tasks, resources, and project timelines to ensure project success. Ajayi (2020) explained that studies of a similar nature have shown that while managing information system projects is supported by a multitude of frameworks, tools, and techniques, many of these are frequently not well executed and embraced and are therefore deemed ineffective.

Some of the research participants reported the following:

"It's not delivering. I don't think it's effective because if it's effective, maybe we would be live as we speak, but we are not live. And yeah, I still look forward to seeing the system go live."

"The current situation is not very effective."

"This becomes a problem for PM's at Head Office who monitor projects as they can't find all information on the WIMS systems but the information gets updated when there is payment that needs to be made. Professionals can create a project they then go and do design to completion and when they need to pay consultants the system will remind them that they haven't moved it to design. Only then they update the information. This on its own would mean that the Gantt charts sits at inception and only moves when the payment is about to be done as updates are not being done on WIMS. However, progress happens outside of the system."

4.3.1.2.2 PROJECT TEAM NOT AWARE OF THE CURRENT PMS

Despite working on the Archibus system for the past 10 years, some respondents have indicated that they have never been made aware of the current PMS being used by the department to implement its IS projects. And they also indicated that they have never been trained on it so that they are aware of it. Understanding and knowing the PMS being used by the department helps in improved teamwork and flexible procedures. Staying on time is made easier when you comprehend the specifics of your job, especially if it's big. Tools such as your Gantt charts allow you to keep track of certain tasks and activities inside your project. They further indicated that they don't know who's managing the milestones; if something is not reached, what then happens as the deadline for most milestones gets missed? This is contrary to literature which says understanding the selected project methodology is essential for a project team to succeed because it guarantees regular communication, teamwork, effective workflow, and a common understanding of project phases, roles, and responsibilities. These factors ultimately result in improved decision-making and higher project success rates (de Castro and García-Peñalvo, 2021).

Due to the above, the project timelines gets missed which has further resulted in timelines being adjusted. Team members cannot monitor the project's progress and prioritize activities by using a timeline as the timeline gets adjusted. Their tasks, responsibilities, and deadlines are hard to keep up with as they lack understanding of the Gantt chart set timeline. They can thereby avoid any hold-ups or obstacles in the project's advancement.

In contrast to the findings, a study done by Salvador et al. (2021) states that working with a team that fully understands a PMS helps project managers reduce risks, avoid duplication of efforts, and ultimately increase the impact of the project. A PMS provides project teams with a set of standards to initiate and manage individual projects, making it easier to reach project milestones. In addition to fostering a sense of understanding, unity, and camaraderie among team members, teamwork is essential for project success because it helps teams cover more ground and complete tasks more quickly. This also plays a role in preventing individualism, which can lead to inefficiencies in the workplace. Further to that, McGrath and Kostalova (2020) indicate that to improve the project team's knowledge and performance, three things are needed: provide duties and responsibilities that are precise and well-defined in the first place; then, make sure the person has the tools and resources necessary to complete the work; and last, provide timely feedback and hold them accountable for the outcome.

Some of the research participants reported the following:

“And this I don't even know what according to their project management system, what deliverable should be there? I only know the part that we get of a Gantt chart that says on such and such a day the service provider is supposed to deliver this, but I can't link it to any project management system.”

“I think we are using PMBoK, but I am not sure as I am not part of the project management office. However, it's not delivering. I don't think it's effective because if it's effective ...”

4.3.1.2.3 NO PROPER USE OF THE GANTT CHART

According to some participants, there is no proper use of the Gantt chart as the milestones are not properly tracked, and many officials cannot effectively use the Gantt chart. Tracking milestones helps in tracking project development and should be specified at the outset of the project; otherwise, the project may spiral out of control. Without project milestone tracking, we are only keeping track of the tasks without pursuing the project's proper course.

Missing a milestone in a project has led to the need for more resources for the project, decreased team morale, project schedule delays as the project has never reached the testing phase, withholding of payments by the department because other milestones haven't been reached, and an increase in task completion. These consequences can jeopardize a project's success, leading to substantial revenue losses or even project cancellation as the project has been in a dispute between the department and the service provider.

Bdair et al. (2023) clearly states that, if properly used, the Gantt chart promotes project management that is mainly concerned with keeping an eye on the timetable or if tasks have been finished on time and what happens if there are delays in meeting the deadline. They assist you in estimating project duration, identifying required resources, and organizing the sequence in which you will finish activities. They're useful for controlling task dependencies as well. Gantt charts can also be used to track a project's development after it has started.

Some respondents mentioned that:

“I don't know who's managing the milestones, if something is not reached what then happens? And like in every other project there are milestones that they reach and there

are those that they don't reach then they would have explanations for why they didn't reach those milestones.”

4.3.1.2.3.1 LACK OF LICENSES TO USE THE GANTT CHART

Lack of licenses for the Microsoft Office Project tool (Gantt chart) is attributed to the department not having prioritized the purchase of additional licenses for the project team. This means that project team members have not been granted permission to use, alter, or distribute the tool, therefore rendering some of the team members ineffective in using the Gantt chart. A license grants you the ability to use a given program for a particular database instance, unless otherwise specified in the product portfolio. Therefore, not having a license would make having access to the tool extremely meaningless. Being able to legally use the Gantt chart for projects within any organization will be very beneficial to the department as the project member. As a result, practice using the tool and obtain an additional skill for future projects.

However, in the case of the KZN DPW, many project members lacked the skill to use and understand Gantt charts due to lack of licenses and not being provided with the proper required training. In contrast to the findings, having licenses for Gantt charts means that the organization has one tool for project management that is useful for organizing, scheduling, and tracking tasks. Planning and scheduling, remote work collaboration, resource allocation, and task delegation can all be enhanced by using a Gantt chart. A horizontal bar graph in a Gantt chart provides a visual representation of all the data (Li et al. 2022).

Other participants mentioned that:

“Not all officials have access to the tool, due to licence implications.”

“From those who have access, many do not have the capability to utilise the tool effectively.”

4.3.1.2.4 NO MONITORING AND CONTROL SYSTEM OF PROJECT MILESTONES

Participants indicated that the department does not have a monitoring and control system in place for project milestones. This makes it hard to track if the project is on track or not. This is a function that’s meant to be performed by the PMO; however, since the department does not have a PMO for IS projects, monitoring is inadequately done by the IT section. Non-monitoring of project milestones exposes the project to various risks such as scope creep, missed project

schedule, cost overrun, and dissatisfied stakeholders. Not tracking project milestones and changes requested may result in misunderstandings about responsibilities. Delays could result from team members working with out-of-date material. Neglecting crucial aspects could jeopardize the quality of the project. In general, it can be difficult to maintain project momentum when changes and milestones are not tracked.

The identified cause of ineffectiveness can cause the need for the requirement for additional resources, a decline in team morale, delays in project schedules, customer payment withholding, and an increase in workloads. These effects can put a project's success in jeopardy and result in significant revenue losses or even project termination. As this is evident with the current Archibus system that the department is working on. According to the participants, the project was originally awarded to LDM Consulting back in 2014. When LDM failed to deliver on the project milestones within the project time, after having been paid for some of the tasks performed, the department was pushed to a corner and entered into a dispute resolution process and the contract had to be terminated. The department then changed the service provider and went on an RFQ where a consortium was appointed as the new service provider to continue with the project. According to the participants, changing project resources or service providers has not assisted in project delivery as the consortium has not been able to successfully deliver the project.

In contrast, a study done by Zubler et al. (2022) states that in order to deliver projects successfully, you need to follow the following steps: determine your project's objectives clearly. Your project plan must be divided into tasks and phases. Search for milestones at critical junctures in the transition. Track down and monitor extra milestones at approval and review points. Overlay your milestones on your project plan so they can be easily monitored and timelines can be controlled.

Some participants indicated that:

“I don't know who's managing the milestones, if something is not reached what then happens?”

4.3.1.2.5 TAKING LONG TO IMPLEMENT FRAMEWORKS

The late finalization of approval of current frameworks in the department causes challenges during project implementation, as current tools and guidelines set for project tasks are not implemented for improvement. Delays in framework implementation are inevitable when

dealing with decision-making issues. Numerous departments encounter regulatory delays, which must be considered while making decisions in the face of uncertainty or project implementation. A decision will only be implemented, for example, for regulatory purposes, once a specific period of time has passed. In contrast, Woodward et al. (2021) says, by providing a defined set of procedures, tools, and best practices to manage complex tasks, mitigate risks, and ensure timely delivery of project goals across various teams and projects within an organization, project management frameworks should be implemented early in the project to offer an organized approach to project execution, encouraging efficiency, consistency, improved collaboration, and an increased likelihood of project success. In essence, they serve as a roadmap for project managers to overcome obstacles and accomplish desired results.

A policy framework is a set of guidelines or procedures that can be used to inform negotiations or decision-making processes in order to direct the creation of more specific policies or the continuing upkeep of existing ones inside the department. They offer leadership, direction, uniformity, oversight, risk mitigation, and worker empowerment. Executives and managers can accomplish their goals more quickly and successfully by putting in place a well-thought-out policy framework. However, if there is no framework in place, or the framework is implemented late, the opposite happens.

The construction industry is one of the world's fastest-growing industries because it supports numerous other businesses both directly and indirectly. It has been noted that construction projects suffer when key parties take their time making decisions. As a result, this affects project performance in a number of ways.

Other participants explained that:

“The delay of in framework implementation costs us a lot as we get left behind in project implementation current rules.”

“The department has recently implemented the IPAC which outlines the latest framework then latest government framework that is supposed to be implemented throughout, so public works has just been so far behind in that implementation, if I'm not mistaken, that was approved back in 2019 and we only started working on that and for the process of how we should follow the implementation of project that's on its own. Again, it just becomes so ineffective. And again, another challenge that we are facing, hence you find with the sum of the project had they followed this framework, we won't

be having the challenges that we are currently having currently on sites or even towards close outs of those projects. But I mean, for some reason we know the department tends to know listen to what those systems say, and if it's not in their favour, they tend to take a U turn and just maybe look for another route to proceed. And again, you find would see once that particular document comes to our offices and then it's stuck again, you know. So hence the same issue keeps delaying and affecting project delivery, yeah."

4.3.1.2.5.1 LIMITATION OF IPDMS

The IPDMS was meant to oversee the supply of operations and maintenance support services for the government's infrastructure projects, as well as implementation support services. The department implemented WIMS as the ultimate infrastructure project management system meant to be updated according to the IPDMS framework. WIMS is a good system, but most people don't know how good WIMS is, and as a result, WIMS is not used to its full capacity because they think WIMS is an old system that is not user-friendly. Projects can be monitored through WIMS, and because there isn't much information that's been updated, you find that there is limited project information. The only thing that forces people to use WIMS is when there is a payment that needs to be made. Then the financial information is the one that's always accurate on WIMS. This becomes a problem for PMs at Head Office who monitor projects, as they can't find all the information on the WIMS systems, but the information gets updated when there is a payment that needs to be made.

Professionals can create a project, then go and do the design to completion, and when they need to pay consultants, the system will remind them that they haven't moved it to design. Only then do they update the information. This on its own means that the Gantt chart sits at inception and only moves when the payment is about to be done, as updates are not being done on WIMS. Progress happens outside of the system.

However, the IPDMS requires that the information management system must show all stages in the form of project management processes of the project on the system, whereby stage 1 up to stage 7 must be shown together with their stage gates and stage reports. With WIMS allowing project team members to not fully update the system, it limits the IPDMS framework implementation, and some tasks cannot be fully completed. In contrast, Dhillon et al. (2021) states that a fully updated information system centralizes all project data, such as tasks, schedules, budgets, resource allocation, communication, and documents, facilitating effective

team cooperation and real-time updates. This facilitates effective project planning, monitoring, and control.

Some participants mentioned that:

“The IDMS was supposed to be the ultimate standard guide for managing projects, but it’s not monitored that everyone uses IDMS process to manage projects. That’s its limited effectiveness because you can start a project without being fixed to looking at what IDMS says.”

“The system does not allow appointed consultants to be able to update project information such as updating of site minutes which will work better if the system has a live template for populating and updating to allow flexibility and accuracy of information.”

4.3.1.2.6 MANUAL IPIP

The participants also mentioned that the manual IPIP is also a challenge, as it's just difficult to follow through, and it's not as effective as it's actually supposed to be, in the sense that one QS can open the IPIP that was emailed to them 3 weeks ago or a month ago and see that the dates are indicating the targets with the old dates. The manual IPIP does not automatically update itself if one person made changes and forgot to email everyone with the current changes. The manual IPIP cannot be trusted as the data is sometimes outdated due to the data integration process not being an automated real-time process. The impact of outdated data on daily operations is huge and is something that cannot be ignored. The manual system also increases the risk of human error in manual entry, especially where complex financial datasets are involved; the risk of human error multiplies as the volume of financial data grows.

For example, each and every month QS’s budget on what to spend during a project. Sometimes they spend more or spend less. If PM’s budget is that they will spend approximately R 1 500 000.00 for the next six months, they verify if that budget is on the IPIP and if there is R 1 500 000.00 available for spending; if the budget is there, then it’s fine; the payment certificate can be processed. And if for some reason that cash flow has changed, the QS should be able to go back to the IPIP and update it and then circulate it to everyone as an updated version. However, there is a challenge of working with outdated data; should one forget to email the updated version to everyone, as a result, you find that some of the infrastructure personnel within the department are not up to speed with the IPIP. This then affects the time of the project

objectives. With each and every payment certificate, the cash flow changes, and this can affect the IPIP. Once a payment certificate from ABC comes to the department. It needs to be verified against the IPIP if the budget for that project is available before it can be processed. Once it has been processed, the cash flow changes, and the IPIP needs to be updated. Senior officials will then be able to take critical decisions by working on up-to-date tools.

This contrasts with studies conducted by Kirilchuk et al. (2022), which state that automated information systems (AIS) automate the administration of operations and information processing by utilizing input from a variety of resources. They further stated that automating your organization's information management system can boost compliance, lower expenses and stress, increase security and scalability, and improve organizational performance. The first step to achieving maximum potential is by investing in the appropriate automation system. The results are valuable outputs that can assist an organization in making strategic decisions.

Other participants indicated that:

“...the main challenge with the IPIP it's too manual.”

*“...personally to me that's just not effective.
So I think that tool being too manual, it becomes a challenge.”*

“IPIP reports are manually done, which mostly distorts the financial expenditure because it always has to be sourced elsewhere.”

4.3.1.2.7 SUDDEN CLOSURE OF PROJECTS ON WIMS

The sudden closure of projects on WIMS creates a challenge as it delays invoice payments. When a project comes to an end, before closing it on WIMS, a proper process must be followed where a QS assists in the preparation of the final account. Once a final account has been prepared, it then gets sent to the professionals, who then send the final account to the contractor for signing. When the contractor's signature has been obtained, the regional director then signs, and after approval, professionals are then able to submit their fee claims. The project can then be closed once this process has been followed.

However, within the department, head office personnel just close the project without the proper process being followed, and then professionals aren't able to make their fee claims because once the project has been closed, you cannot process any other payments. Hence, the project

cannot be closed on IPIP because professionals haven't fully claimed their fees. This leads to the invoices being stuck and cannot be processed because WIMS is locked.

Project managers then have to write submissions in order to request that they open the project on WIMS for payments. This process of requesting the opening of the project on WIMS can take a month due to certain approvals. So this is another delay in terms of the project management systems, where it should be an easy system but proves to be ineffective in terms of time management as invoices need to be paid within 30 days.

In contrast to literature, Tummalapudi et al. (2022) states that it's important to make sure all deliverables are completed after every project completion, get official client approval for the work done, send thorough invoices with clear project details, and follow up to ensure prompt payment. Document all correspondence and approvals to prevent disagreements about project completion and terms of payment.

Some participants indicated that:

“The Department has tried many times to train our personnel’s with regards to how WIMS operates. However, the challenge now with WIMS, it can only be altered by a particular person at head office, a few at regional level, but in most changes which needs to be made, it's usually at head office. Then you find once some of those changes have been made, you can't change it anymore. Once WIMS has been closed you cannot process any other payments thereafter. You'll find that they would see if the project has reached its final account stage and it's been basically successfully closed in terms of the infrastructure parts. Someone with WIMS access will quickly close the project without professionals having submitted their fee claims. Because professionals have to wait until the final account is approved before they submit your claims. Now once a claim has been submitted, you find that it's difficult to request a payment because on WIMS, that project has been closed. I mean, I've had numerous occasions where we've had to support, I mean assist other project managers to write submissions in order to request that they open. Hence, a project cannot be closed on our IPIP because our professionals haven't fully claimed their fees. This leads to the invoices being stuck you know they are sitting at the office we can't process them; we can't pay them because WIMS is locked now that's another process.”

4.3.1.3 CHALLENGES WITH TOOLS & TECHNIQUES IN THE CURRENT PMS

In order to establish challenges associated with the tools and techniques in the current PMS, the respondents were asked about the challenges they have faced with the tools and techniques employed by PMS used by KZN DPW.

In response to this question four themes emerged when the participants were asked to name the challenges faced with the current tools and techniques employed by the KZN DPW.

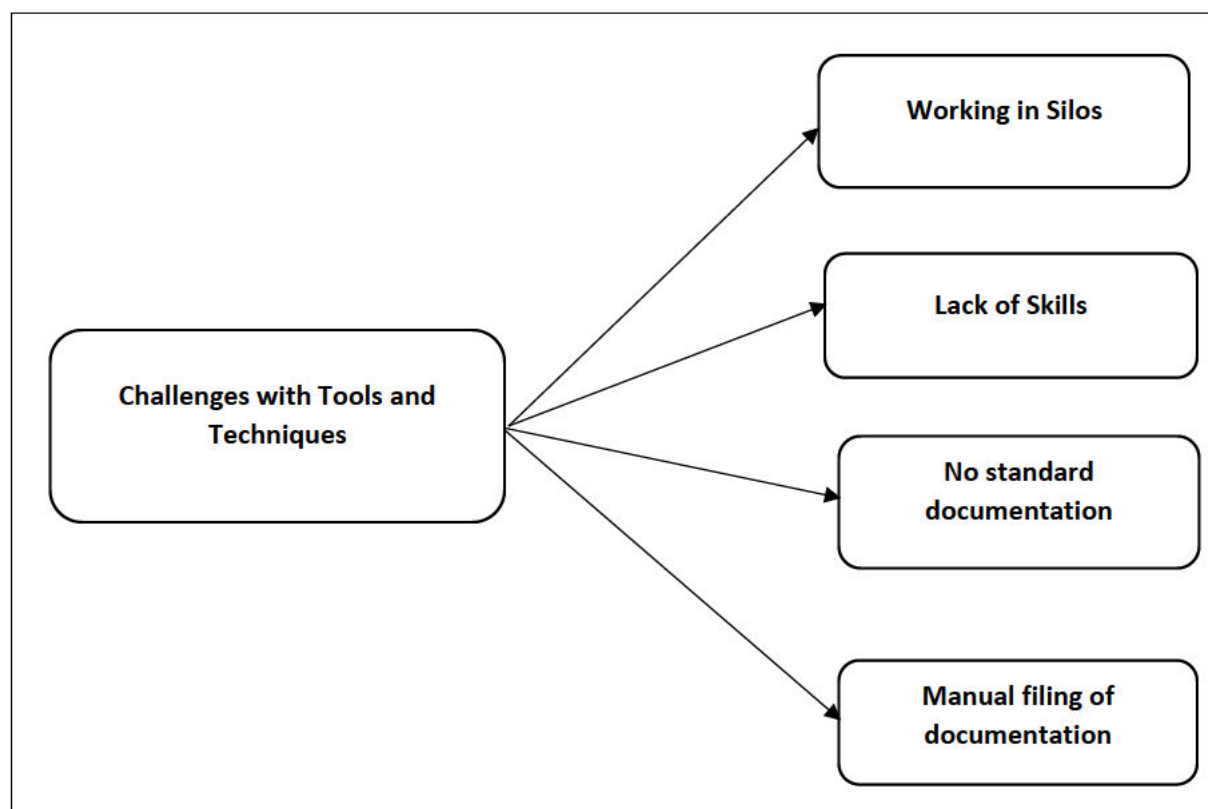


Figure 4.3: Challenges with Tools and Techniques

Source: Interview data (2024)

4.3.1.3.1 WORKING IN SILOS

Most of the participants mentioned that the department sections that are meant to collaborate during the implementation of the integrated system, usually work in silos. This builds up distrust, causes conflict amongst team members, doing repetitive tasks or not doing tasks at all, objectives become disjointed, and decreases team cohesion. When team members within the same organization deliberately withhold important information from other team members, this

is known as silo mentality. This silo mentality undermines the department's cohesive vision and prevents long-term objectives from being reached and this becomes evident as it has far-reaching negative effects on the project outcomes. Each team member continues doing their work without collaborating with other team members resulting in inefficiencies and duplication of work.

The findings indicate a lack of teamwork in the department, which further indicates that staff members don't think their colleagues contribute fairly in projects. This frequently encourages competitiveness rather than cooperation. In contrast, a study done by Shaukat et al. (2022) organizations should approach sustainable project management holistically, embracing and integrating important sustainability elements throughout different project life-cycle phases to ensure teamwork. To this end, project managers must not only encourage teamwork and stakeholder engagement but also examine all significant project decisions through a sustainability lens in order to further improve sustainable project management outcomes and develop a valuable value proposition for each stakeholder group. Accounting for what is becoming a recognized critical issue for project success.

Some of the research participants reported the following:

“There are issues and the fact that we are working in silos adds all other challenges. Stakeholders not being available to provide information.” “Working in silos, and due to meetings and the department's busyness some of the stakeholders become unavailable.”

The finding stated by participants that stakeholders are sometimes not available could mean that projects are not tracked properly for any changes made. Ignoring project modifications may result in misunderstandings about responsibilities. Delays could result from team members working with out-of-date material. Neglecting crucial aspects could jeopardize the quality of the project. In general, it can be difficult to maintain project momentum when changes are not tracked (Zografos and Robbins, 2020).

4.3.1.3.2 LACK OF SKILLS

The theme that emerged was that of lack of skills such as time management and planning skills which can be interpreted as lack of understanding of the project tools and techniques used. Skills requires that an employee gets trained to do a particular task well. The lack of willingness to learn WIMS amongst professionals even though the need to upskill them has been identified.

The consultants aren't able to capture site information on WIMS, and project information is, in most times, not updated which causes delay in contractor payments. The participants mentioned that most of the consultants can't update WIMS and this makes it difficult to monitor project progress and that they are hoping that the new solution that the department has been trying to implement will eliminate the inefficiencies currently in the department which leads to the manual filing of documents. The manual filing is time consuming and risky as project documents easily get lost.

A response from one respondent was a clear indication that ongoing training and upskilling is indeed pivotal for all team members, not only for tools but also for the project management system and its strategies. A study done by Olson et al. (2020) states that understanding what is happening brings clarity and direction of the project. It clears obstacles and instils motivation and vision among team members to work in collaboration to reach the objectives. The team members may be motivated to produce their best work as a result and will have an easier time following the project plan to success.

The PMO must play a significant role in ensuring that team members receive the necessary training. The results show that there is huge gap for lack of time management and planning skills that needs to be closed. Xie et al. (2021) states that regardless of the level of responsibility, every employee in a business needs to receive training. Continuous education and training improves employees' present skills, fills in skill gaps, increases employee happiness, helps retain current staff, and gives them useful information and abilities to support their everyday jobs and responsibilities. More significantly, training at various organizational levels establishes a strategic direction for the company and increases the efficacy of a given program, policy, or practice.

Some of the research participants reported the following:

"... I understand it's sort of like a control measure but I feel like if you appointed professionals you have people who are willing to take critical decisions and explain themselves but because we find ourselves we would see some of the professionals are incompetent and they're not skilled enough. We find ourselves having to follow all these critical processes and as a result we are delaying all the implementation of all these projects, so yeah."

"Basically, the crucial one is the lack of skills. It's important in a project life cycle or if you don't understand why as you say, why that particular item has to be signed off

and then you trying to implement something just a massive gap that will come and bite you later on in the project. And by the time it comes back, someone, in most cases the contractor will be delayed because that one particular item is missing and we're not being able to process the project because this one particular phase we basically didn't attend to."

"WIMS is good, but most people are unaware of its benefits, and there is no willingness to learn, they believe WIMS is an outdated and inefficient system. However, projects can be tracked by WIMS, but because there isn't much information that has been updated, there is limited project information."

4.3.1.3.3 NO STANDARD DOCUMENTATION

Under challenges, it emerged that the department infrastructure PMO does not have standard documentation that are being used by all four regions instead the documents being used are documents that each regions amends standard documents according to their issues and challenges encountered during project implementation. Standard documents are documents that have been approved by a department and contains specifications for projects, related processes, and implementation procedures that are meant to be used frequently.

Since the PMO happens at 2 different levels within the department, head office and regional office level. The establishment of standard documentation is usually influenced by multiple projects. Each region looks at their issues and challenges encountered during project implementation and write a memo that is suited for their region according to their own challenges. They will write a policy that will suit them and monitor that policy accordingly.

The study found that Project Managers within regions account to Regional Programme Management and Regional Programme Management is coordinated by Head Office Programme Management. The memos from each region are then sent to head office. Head Office will then make it a standard instruction based on the memos sent to head office for that particular region.

This is in contrasts to studies done by Hariyati et al. (2020) which state that a project management office oversees the execution of the projects within its purview and provides guidance and important metrics in addition to maintaining project documentation. With projects, programs, and portfolios, the PMO provides businesses with direction that helps them create value to their stakeholders and earn a return on their investment. They further state that

determining your organization's unique documentation requirements is the first step in developing standardized documentation templates. This entails being aware of the kinds of papers that need to be standardized and getting feedback from different stakeholders.

Research participants responded that:

“Most standard documents are informed by standard contracts and the PMO is not that involved in the creation of standard documents but influence in the processes. The establishment of standard documentations is usually influenced by multiple projects.”

“So that there's no deviation. When we see a gap in the standard document because of a certain project, then we update the document.”

4.3.1.3.4 MANUAL FILING OF DOCUMENTATION

The theme that also emerged from the respondents is that challenges with the current PMS are that all documents are manually filed, which means information easily gets lost. One type of record-keeping is filing. Filed documents are arranged according to their potential availability. The exact reason for keeping records is to utilize them as data in the future. Filing is a means for service providers and project managers to keep track of project transaction details. The WIMS system is unable to capture site information, including technical and site meeting minutes and reports. They indicated that projects weekly and monthly reports are manually filed, which doesn't help management to effectively monitor the progress of projects. Project reports are done manually, which mostly distorts the financial expenditure because it always has to be sourced elsewhere.

These findings are in contrast as a study conducted by Sambetbayeva et al. (2022) show that a document automation system is primarily used to expedite the creation of documents by automating labour-intensive, time-consuming manual operations involved in the drafting and creation of common documents and reports. Beyond time and money saving, a document automation system has numerous additional significant advantages such readily available accurate information, scalability, and accessibility and secured data (Koko and Okogun, 2020). Further to that document automation system is a powerful tool that can help organizations reach new levels of quality and productivity, not only increase efficiency. Organizations can gain a wealth of benefits by automating the complex processes involved in document creation, management, and distribution. These benefits go well beyond time savings, improved

workflow efficiency, higher profitability, decreased risk of errors, and technology integration (Kassen, 2022).

Some respondents mentioned that:

“Challenges with the current PMS is that all documents are manually filed. Information gets lost, the system is unable to capture site information including technical and site meetings minutes.”

“Reports are manually done, which mostly distorts the financial expenditure because it always has to be sourced elsewhere.”

“Weekly and monthly reports are manually done reports and management is unable to effectively monitor progress of projects.”

4.3.1.4 MEASURES AND PRINCIPLES OF PMS CURRENTLY EMPLOYED BY KZN DPW

In order to establish the measures/principles that are currently employed by the Department. The fundamental principles that must be adhered to in order for projects to be managed successfully, as well as the essential measures that enable project managers to assess project performance. A competent project manager should constantly monitor the progress of their team and direct them to focus on high-priority tasks, projects, and initiatives. The main themes that emerged from the interviews will be presented and interpreted thoroughly. From the analysis of the results two themes emerged.

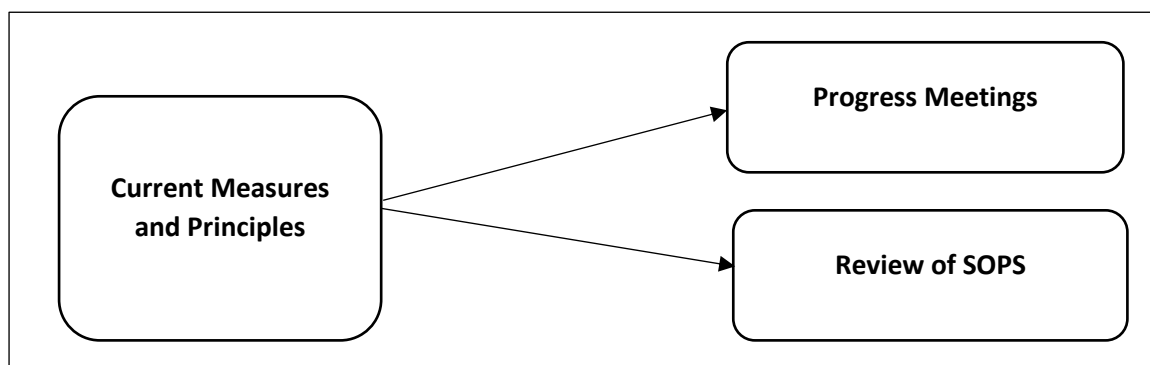


Figure 4.4: Current Measures and Principles of the PMS

Source: Interview data (2024)

4.3.1.4.1 PROGRESS MEETINGS

Most participants mentioned progress meetings as one of the measures that the department employed to discuss the project's goals, identify any challenges or obstacles, and decide on the next course of action to keep the project on track while providing the project manager with an update on the project's present state. It was noted that for ICT projects, there is usually a Tuesday project management meeting where the ICT team holds a meeting to update each other about the tasks that have been completed and tasks that need intervention. Thereafter, a meeting with the whole committee on Thursday for the progress of the projects and follow-up on tasks that haven't been completed. In this meeting, this is where performance goals are discussed and progress on outstanding tasks is discussed. Business units that require assistance in performing certain tasks then request assistance or clarity on certain information required. It was noted that some of the participants claim that the weekly, monthly, and quarterly meetings have been the measure that seems to have been working in terms of improvement and ensuring that the project is tracked. They have added that there's continuous engagement with stakeholders and clients, which helps in monitoring and moving projects forward.

However, other participants indicated that sometimes meetings do not take place when the meeting does not make a quorum, and this leads to delay as the service providers are there to gather all the information that they require, but the meeting never takes place. And this is contrary to a study done by Nelson et al. (2022), which states that conducting progress meetings is an essential part of effective project management. In these meetings, stakeholders come together to assess the status of a project, discuss challenges, and establish strategies to move forward to ensure that the project stays on track.

Some of the research participants reported the following:

"They have weekly progress meetings, they have; I think Quarterly's strategic Steercom meetings. They have Bi-monthly or no, I think once in two months Operational Steercom meetings and then they provide IT with the monthly Monday. I think it's Monday or Tuesday progress meetings. Yeah, Project management meeting."

"Engaging in meetings to clarify issues and making follow-ups on outstanding items."

4.3.1.4.2 REVIEW OF SOPS

Based on the responses received, it has been noted that several measures have been put in place in order to remedy these challenges. The theme that also emerged is that the department has appointed professionals to update the Standard Operating Procedures (SOPs) according to the industry standard and current regulations. As part of handling an instruction from a client department, the IPMDS and SOPS guide project managers on how to handle a project. Some, not all, project information gets updated onto WIMS. Information on past projects is captured in lessons learned and close-out reports, and head office deputy directors distribute the information through meetings and inter-memos that are going to update the SOPs.

However, documentation is still a problem, and referencing back the information is also a problem, as some of the recent data is not updated on the SOPS, and over time SOPS become outdated, especially with industry-related and current regulations information. Most standard documents are informed by standard contracts and the infrastructure projects. PMO is not that involved in the creation of standard documents but has influence in the processes. Standard contracts are used to implement projects. Standard documents are influenced by SOPs and standard contract templates, e.g., GCC templates.

Other studies have shown that at least once a year, the director, head office deputy directors, and all stakeholders should review the SOPS, this includes regional stakeholders. Staff recommendations for process modifications should also always be taken into account. However, the inconvenience of not updating SOPS is greatly outweighed by the penalties of not having them in excellent operating order. In addition, the risk of making costly errors is quite high (Maung et al. 2022).

Some of the research participants mentioned the following:

“The department has appointed professionals to try and update SOPS according to the industry.”

“Standard Operations Procedures give guide in terms of required resources and functions for required resource and the effectiveness gets to be verified during project audits by the Auditor General (AG) where accountability is the main key including signing off to the required documents.”

4.3.2 PROJECT MANAGEMENT SYSTEM CHALLENGES

Research objective two was formulated to identify the challenges that are hindering KZN DPW from achieving some of its projects, meeting client expectations, and meeting timelines that turn into unrealistic deadlines. To investigate the degree of control of the PMO in ensuring projects achieve their goals. To investigate the position at which the PMO positions itself over control of compliance to project governance. For a department whose main objective is to develop and enforce rules and regulations for the built environment and build sustainable infrastructure, it is important to regulate its projects and ensure they are executed in accordance with the organization's policies and processes.

4.3.2.1 CHALLENGES FACED BY THE DEPARTMENT

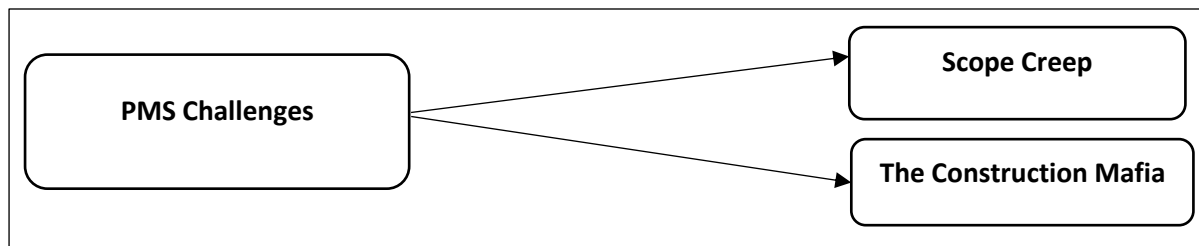


Figure 4.5: PMS Challenges faced by the Department

Source: Interview data (2024)

4.3.2.1.1 SCOPE CREEP

A theme that emerged from most participants was that of scope creep, which, according to some participants, happens quite a lot as the service provider sometimes does not really understand what is required by the department. In project management, scope creep refers to the ongoing, unchecked expansion of a project's scope that typically occurs after the project starts. When a project's scope is improperly specified, recorded, or managed, scope creep can happen. It is typically regarded as detrimental as it can lead to project overruns, missed deadlines, and a significant increase in resources.

The service provider ends up missing some of the most important requirements, such as building amenities or a system functionality. It also happens quite a lot when the department realizes that there is a certain system functionality they missed to mention at the conception of the project and the scope was never properly defined, documented, and controlled. The

department ends up with a lot of change requests from business units, which delays the work and deadlines are missed and consequently has an effect on the project budget, and the anticipated time to finish the project is pushed back.

Some of the participants from infrastructure projects indicated that change of scope by client departments is a challenge, as the client departments often change the scope of the project just to accommodate their budget. They indicated that the most important elements of a project are usually cut out, and in the process, the scope is compromised, as they always chop out the most important requirements and then realize later that the elements cut out are the most important elements.

However, it must be noted that scope creep is not done deliberately, as it is usually influenced by the department's budget on a particular project, and the effects are always dire on the project timeline, as it causes work to be delayed and, at times, deadlines to be missed. When a project commences, the client estimates the available funding. This is due to the fact that the client's scope is usually not aligned with the actual cost of the project. Sometimes the client changes the scope to suit the available budget. Only to find that when you get to the construction stage, the client realizes that all the requirements they have removed are actually needed the most. This then creates unnecessary variation orders that cannot be justified.

In contrast, Adafin et al. (2021) states that, in order to ensure that the project's goals can be met without going over budget, it is important to carefully evaluate each aspect of the scope and make any necessary adjustments to fit the available financial resources. This includes processes like detailed cost estimation, prioritizing features, and clearly communicating with stakeholders to manage expectations. This ensures that the project's deliverables and tasks are clearly defined within the constraints of the allocated funds.

Funding during planning up to construction stage is not done. However, budget is done for when you have locked a contract with a contractor and have a fixed timeline because from inception there is a possibility that the client gave you the wrong scope or they don't have funding for the project. The participants indicated that the problem with government projects is that from inception until construction stage there is no fixed period because from inception there is a possibility that the client gave you the wrong scope or they don't have funding. Therefore, this period can take months depending on the availability of the budget to commence with the project. Once the contractor starts working on site, sometimes the client then comes

with new instructions which are modifying the initial scope. As a project manager you must write and request for additional funding and a variation order.

These findings show that there are various factors that influence scope creep within the department and that this challenge cannot be easily controlled. According to Abdilahi et al. (2020) a change management plan must always be in place and be managed alongside the original scope. They further indicate that one must ensure that the change management plan explains the changes' justifications in detail. Next, ascertain who the change will effect and what it will influence (such as organizational structure, policies, and procedures). Fashina et al. (2020) also add that change management plan depends on the project scope's management effectiveness. This is one of the reasons scope management makes guarantee the scope of a project is accurately defined and specified, enabling the project managers to fairly allocate the work and costs needed to finish any project.

Some of the research participants mentioned the following:

“In most cases our scope gets chopped and changed for the purposes of fulfilling the department and not taking into consideration other factors that get affected by this, especially the issue of budget.”

“When a project commences, the client estimates the available funding. This is due to the fact that the client's scope is usually not aligned with the actual cost of the project. Sometimes the client changes the scope to suit the available budget. Only to find that when you get to construction the client realizes that all the requirements, they have removed they actually need them. This then creates unnecessary variation orders that cannot be justified.”

“Funding is usually allocated during planning up to construction stage. Once the contractor starts working on site, the client then comes with new instructions which are modifying the scope. Contingencies funds is funding that can be used when there is a problem on site but education of adding to the scope and requesting that the department must take from contingencies.”

“In most cases our scope gets chopped and changed for the purposes of fulfilling the department and not taking into consideration other factors that get affected by this, especially the issue of budget.”

4.3.2.1.2 THE CONSTRUCTION MAFIA

It was established that one of the challenges faced by the department is that during the construction stage, the construction mafia appears, which is a group of tender mafias that usually aim to coerce local contractors and construction businesses into paying protection fees by interrupting construction projects, or they may extort a share of the project's cost. These construction mafias frequently pose as "business forums" in order to control access to the departments' procurement opportunities through the use of violence and other unlawful tactics to scare the contractors.

Further to that, some participants indicated that during the construction stage, the issue of the construction mafia is a national problem that has been escalated to higher levels and is being monitored per project until there is a national solution. However, the department has engaged community leaders to try and speak to these mafias, as this is interrupting the community's progress.

The effects of issues with the construction mafia are quite broad, as the construction mafia causes construction projects to take longer than expected to finish, some are being abandoned, costing the contractor money, and causing loss of income for the construction workers. And when there is a delay caused by the construction mafia on site, project managers need to settle with the contractor that's been on site for a very long time; they must write and request additional funding for a variation order. Delays in decision-making also attract additional costs; the approval of the variation order takes about 2 months, but the contractor on site requires the project manager to conclude the variation order within a week.

However, according to Nyangiwe et al. (2023) there aren't many ways for the victims to stop or deal with the construction mafia. There is only law to rely on. One strategy for preventing crime is the situational crime prevention method. Due to its role in the nation's capital and social and economic growth, the construction industry is essential. Therefore, National DPW together with the law authorities should devise a plan on how to deal with the 'business forums' as these networks use violence and other criminal methods to control access to public sector procurement opportunities making the industry deal with declining profit margins, cost overruns, and inefficiencies.

Some of the research participants reported the following:

“The construction mafia challenge comes through during the construction stage. They delay continuation of projects, and some end up not continuing at all.”

“The only challenge we have is that we get approval to proceed with stage three and in the middle of stage five we get corresponding to put the project on hold but that you can't blame on project management system. It is just where the business forums are disturbing a project so it's not that narrow to project management but it's broad because we get political influences. You get your business forums now that affects a project.”

“And when there is a delay caused by the construction mafia on site and you need PnG to settle the contractor that's been on site for that long, now you must write and request for additional funding and variation order. Delays in decision making attract cost, the approval of the variation takes about 2 months but the contract on site says you must conclude your variation within a week. Some projects have completed but haven't been closed due to the fact that, maybe, there was a variation order that happened on site without approval and a project cannot be closed off without completed documentation (Outstanding information), missing documentation then you can't complete the projects.”

4.3.2.2 CONTROL OF PROJECT MANAGEMENT OFFICE

This objective was formulated to establish the degree of control associated with the PMO in ensuring the projects achieve their objectives within the KZN DPW. Two themes were identified.

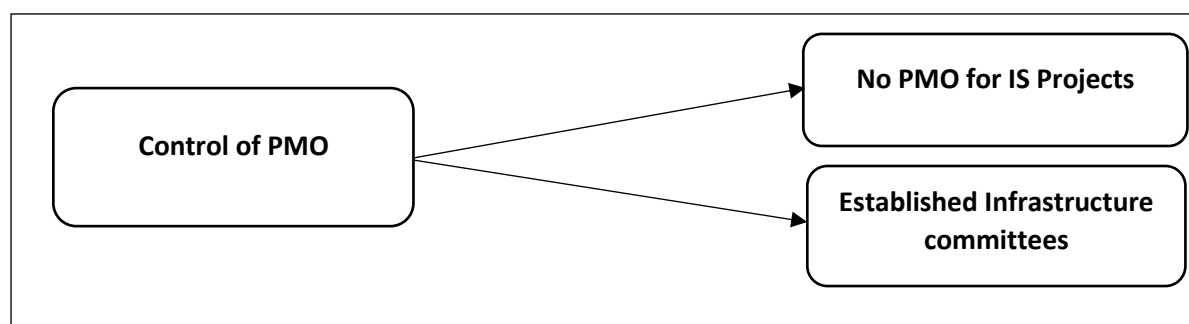


Figure 4.6: Control of Project Management Office

Source: Interview data (2024)

4.3.2.2.1 NO PMO FOR INFORMATION SYSTEM PROJECTS

The non-existent PMO for the IS projects is reported to be a challenge as most respondents stated that they do not know the degree of control of the PMO office for the IS projects. The respondents do not know if there is a PMO or not for IS projects within KZN DPW, however, it was mentioned that controlling and monitoring is done by the IT business unit. Most of them are unaware of whether a PMO exists or not and some do understand that the office does not exist. This means that there is no office within KZN DPW that establishes project governance structures for the departments IS projects, and there is no proper resource capacity planning, no efficient scheduling of resources as well as providing of governance and standards. This is alarming because it shows that KZN DPW does not have any clear vision nor direction for their IS projects. Having no project manager within the department means there is no set strategy in place for the projects, leading to confusion and misalignment of project goals for all stakeholders involved. Further to that, it means priority by stakeholders is not given to the project as there is no clear efficient role/resource allocation.

In contrast, studies have shown that the establishment of a well-organized PMO with clearly defined lines of authority, a full furnished PMO with resource managers qualified to offer advice on appropriate project resource deployment, and other factors contribute to the project delivery's effective implementation, strong collaboration between business units and the PMO to provide project governance and accountability for the application of project methodologies and framework processes (Barbalho et al. 2022).

According to PMBoK, a well-established PMO should be a structure that standardizes the governance of project processes and facilitates the collaboration of resources across the organisation, develop a project management methodology for the organisation, implement best practices and standards, and implement tools and techniques. It further requires that the PMO coaches and mentors' other stakeholders on the methodology being used, tools and techniques, practices and standards. It acts as an oversight provider throughout project implementation. Setting up a PMO requires aligning and integrating the PMO within the organization and must have the required levels of responsibility, authority, empowerment, and governance, and best practices as part of its working mechanics (Martinez Sanz and Ortiz-Marcos, 2020).

Some of the research participants reported the following:

“I don’t know whether the project management office exists, or it doesn't exist. Controlling and monitoring project progress would be the responsibility of our IT department.”

“There is no PMO in DPW.”

4.3.2.2.2 ESTABLISHED INFRASTRUCTURE COMMITTEES

The department has developed a PMO for infrastructure projects. The PMO has ensured that it appoints relevant consultants and professionals to deliver the projects and to update the departments SOPS. The PMO has appointed an IPAC which, prior to project inception, ensures that there is funding for the project before project approval. The IPAC's goal is to encourage the development of construction projects in a way that is safe, practical, and aesthetically pleasing in relation to the surrounding land uses. It guarantees that new construction blends in with the site's natural surroundings and the neighbourhood's aesthetic identity. It serves as the body that makes decisions about the design of new construction projects and the majority of exterior building amendments. Additionally, in situations when a land use decision is involved, it serves as an advisory body to the project managers. According to the participants this is one of the degrees of control that are currently in place.

For clear scopes, the department's project managers have started engaging with client department for clear scope statements and reporting. In addition, the department is dependent on reports and meeting engagements to ensure they monitor that the instructions from client's progress and they get to be closed. The department has put in place a Bid Evaluation Committee (BEC) that thoroughly reviews procurement documents that have been sent in response to the public invitation for bids before project approval. This committee sits down every Thursday of the week to evaluate all offers made by service providers within the quotation threshold. A risk assessment of the service provider is also looked at. The bid document is evaluated in accordance with the specification and evaluation criteria.

The IPAC never approve a project without getting confirmation of project funding. They have improved in terms of what they require to see for projects to proceed and they also do not just rely on consultants in terms of saying if these are professionals, they must produce professional work, which is free of discrepancies. The committee goes through the designs, they go through the procurement documentation tender documents, and they vigorously review it. They have

got thorough review of processes. They thoroughly review the approval processes and they've got professionals who review professional teams work to ensure that projects are delivered.

According to El-Sayegh et al. (2020) the results prove that stakeholder committees, senior management, project working teams, and project oversight committees are other names for project steering committees. They review projects from inception to completion and offer direction and assistance at every stage of the project's lifespan. Their roles and responsibilities overlap as they oversee construction projects, manage budget control, manage project schedule adherence, and project compliance.

Some of the research participants reported the following:

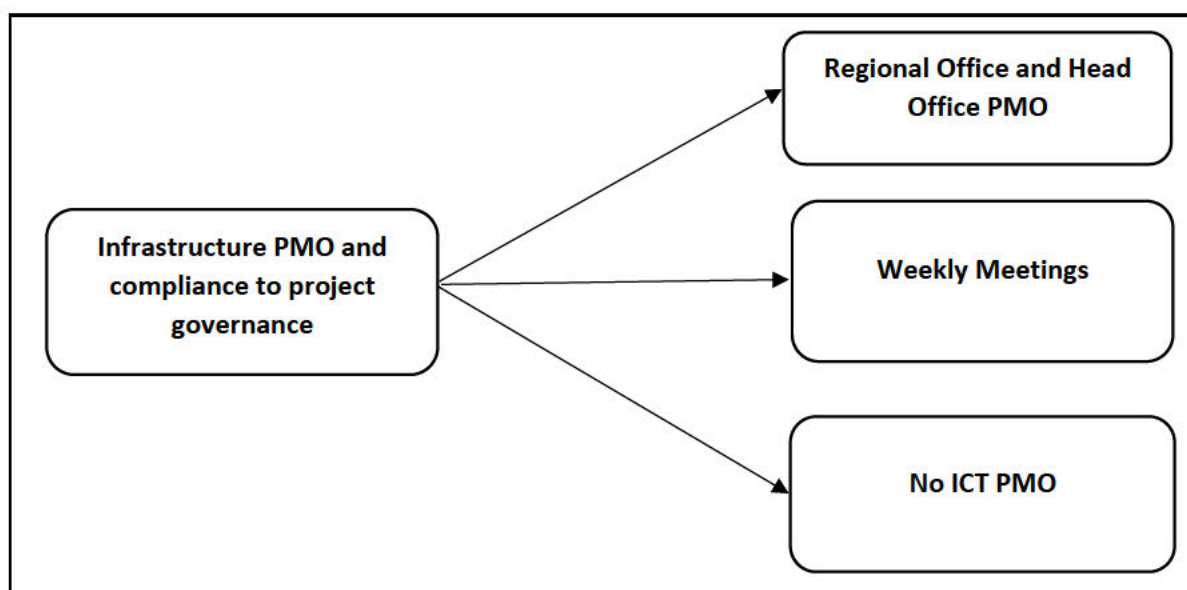
“The first one is we ensure that we appoint a relevant consultant in relation to the project that needs to be delivered, because that is very important. That means from the beginning, from initiation to concept to design your scope will be well crafted as required for the project's requirement. And then those reports concept reports, designs or procurement documentation they undergo vigorous review within the department that I can say with pride because that assists a lot in terms of ensuring that the project is well crafted in terms of scope, well budgeted for because some of the Committees, the IPAC committees, they never approve a project without getting confirmation that there is funding for the project.”

“...the IPAC committees, they never approve a project without getting confirmation that there is funding for the project. For instance, they want to see confirmation from the clients saying there's the money for this project before they can even approve the project to go forward.”

“The department recently updated the infrastructure Projects Approval Committee for the rules of engagement.”

4.3.2.3 INFRASTRUCTURE PMO & COMPLIANCE TO PROJECT GOVERNANCE

To investigate how PMO enforces compliance with standards and regulation requirements which projects must meet within KZN DPW.



4.3.2.3.1 REGIONAL OFFICE AND HEAD OFFICE INFRASTRUCTURE PMO

For compliance purposes, in respect of the PMO for infrastructure projects, there are two levels of the PMO within the department. Project Managers within regional offices account to Regional Programme Management and Regional Programme Management is coordinated by Head Office Programme Management. The PMO happens at two different levels, Head Office and regional level. Each region looks at their issues and writes a memo that is suited for their region which is usually influenced by multiple projects and the issues identified during project implementation, they write a mini policy that will suit their region and monitor its implementation accordingly.

These memos are then sent to Head Office. Head Office then make it a standard instruction for each region based on the memos sent to Head Office. However, this process makes it difficult for Head Office PMO to align all these memos with the departmental strategy as each region writes their own memo based on their challenges. However, Head office Programme Management ends up having multiple memos from different regions with their own challenges and with the assistance from professional services they appoint consultants to assist in updating the SOPS and other standard documents with the current frameworks and prescripts.

Head Office PMO appoints consultants who use guidelines that are entailed in the Framework for Infrastructure Development and Procurement Management (FIDPM) which clearly help to define each stage including the signing off in terms of evidence for each delivery stage. Also, the Project Management guidelines and all related prescripts, regulations and Standard

Operating Procedures (SOPS) are a pillar in terms of Infrastructure Delivery and definitions of what is expected for each end of stage deliverable and required human resources.

From the responses it was indicated that the infrastructure Head Office PMO is not that effective in their involvement in ensuring project implementation compliance. However, at regional level they ensure compliance by monitoring projects on a daily basis, and head office will be able to pick up that the way the project manager does things is not according to the audit finding as PM account to Regional Programme Management and Regional Programme Management is coordinated by head office Programme Management. At head office the matter comes after an audit finding and a problem has already happened. Functions of the Head Office PMO is to coordinate, plan, coordinate the execution, monitor progress, influence the implementation, and provide necessary training.

From these results it can be confirmed that the department uses different standard documents for all regional offices. And that compliance is enforced by each regional office having their own standard document based on the issues encountered within the regional office. According to Teslia et al. (2022), in project management (PM), quality standards refer to the written documents that outline the conditions, policies, and procedures for providing a constant level of quality throughout the project lifecycle, from inception to completion. Bhandari (2022) explains that the functions of the PMO is to coordinate planning, coordinate the execution, monitor progress, influence the implementation, provide necessary training, and create standard documents to support cross-functional collaboration and reduce chaos. The PMO is guided by guidelines and has created SOPS which are followed. The PMO implements project management prescripts. Both the regional and Head Office PMO should join forces and work coherently in coordinating and monitoring projects and regional PMO should always report to head office PMO. Head office Programme Management (PMO) coordinates multiple projects from all four regions.

In contrary, Rabechini Jr et al. (2022) states that to ensure uniformity and control over project changes throughout the whole organization, all changes to any project must be properly filed, examined, and approved by a single central department known as the Project Management Office (PMO). The PMO coordinates planning, coordinates the execution of projects, monitor progress, influence the implementation, and if there is any gap identified, they organize and provide the necessary training based on the skills gap identified.

Some of the research participants reported the following:

“At regional level they can influence compliance by monitoring projects on daily basis and they will be able to pick up that the way the project manager does things is not according to the audit finding. At Head Office the matter comes after an audit finding and a problem has already happened. However, different individuals have different understandings of the PMO.”

“...committees for approval and stage gates. There's a clear framework on how things should be governed in this system and the process is clearer, so you have your expected documentation in terms of stage one, you have all the deliverables which are clearly outlined and now you have those because remember, we are an audited department.”

“...where then you have your project stages which are captured as your project progresses and then also with our IDMS you've got stage one up until stage 7 where you have stage gates for each stage and then you've got deliverables for each stage as well.”

“And we told them no, we can't sign it because there's so many things that are missing because there's a checklist, the checklist asks you, is this there? And if it's not there we can't sign. So, if it's not there then you cannot close the project.”

“There are your weekly meetings. There's a clear framework on how things should be governed in this system.”

4.3.2.3.2 WEEKLY MEETINGS

In ensuring that the committees formed by the department are effective there are weekly meetings that are held for committees for approvals and compliance check on how projects should be managed and overseen so that they are compliant with the department's strategic goals, culture, and ethics. Weekly meetings are a structured gathering convened by the department to discuss and address matters related to regulatory compliance, risk management, and ethical standards (Khriji et al. 2022).

The respondents indicated that there are weekly meetings for committees that have been formed which thoroughly check all documentation for project approval and once project has commenced, there are stage gates for the project as it progresses and a checklist for each stage

deliverables. Regional Programme Management coordinates multiple projects and reports to Head Office. The department has a clear IPDMS framework on how projects should be governed. The process is also very clear, there are expected documentation in terms of stage one, all the deliverables are clearly outlined because the department is audited. So, when it comes to auditing, whatever is outlined in stage one as a deliverable, as per your IPDMS framework, the committee would expect to see that during the weekly meetings held. This is a way for project governance and compliance.

During the weekly meetings everything must be in order. If there's supposed to be a project charter for that particular stage, you must have a project charter. If there's supposed to be an implementation plan, you must have that projects implementation plan presented. So, in terms of the required documents, the committees that sit during the weekly meetings ensures that those things are there so that the project can comply with the IPDMS and ultimately ensure that everything is in order in terms of Audit purposes.

According to some participants:

“There are your weekly meetings, committees for approval and stage gates.

There's a clear framework on how things should be governed in this system”

4.3.2.4.3 NO ICT PMO

The participants reported that the ICT business unit does not create the standard documents; instead, the service providers provide the department with standard documentation for projects. However, in preparation for a new project, the department creates a business case whenever there is a need for process automation, and then the business case gets presented to the executive for approval. Once the business case has been approved, then the SCM process begins, and then an RFQ goes out for tender proposals. The service provider gets awarded the tender, and a project brief is created to kick-start the project. The respondents indicated that the rest of the project documentation comes from the service provider, which makes it hard to monitor the project as they don't know which methodology is being used.

In contrast, Marion and Fixson (2021) states that a project team's comprehension of the selected methodology is essential since it offers a shared framework for organizing, carrying out, and overseeing the project. This improves teamwork, boosts productivity, lowers risks, and, in the

end, increases the likelihood of project success by guaranteeing that everyone is in agreement with procedures, roles, and decision-making throughout the project lifecycle.

Some of the research participants reported the following:

“I don’t know. Because I don’t want to assume. This is what they supposed to do, because I honestly haven’t read the Prince2 in almost nine years. So, I don’t even know what needs to be there and what doesn’t need to be there.”

“Not very involved as the documents are established by the service provider.”

“I feel like the PMO is not really effectively implementing or playing their role in this implementation process.”

4.3.3 TO INVESTIGATE CURRENT STRATEGIES

Research objective three was formulated to identify the different strategies currently implemented in providing a clear plan in managing projects within the KZN DPW and to further mitigate the known challenges within the organisation. The objective will help identify strategies to ensure there is project direction.

4.3.3.1 CHALLENGES FACING PRACTICES

To investigate challenges facing the project management practices within the KZN DPW that hinder successful delivery of project outcomes to meet project goals.

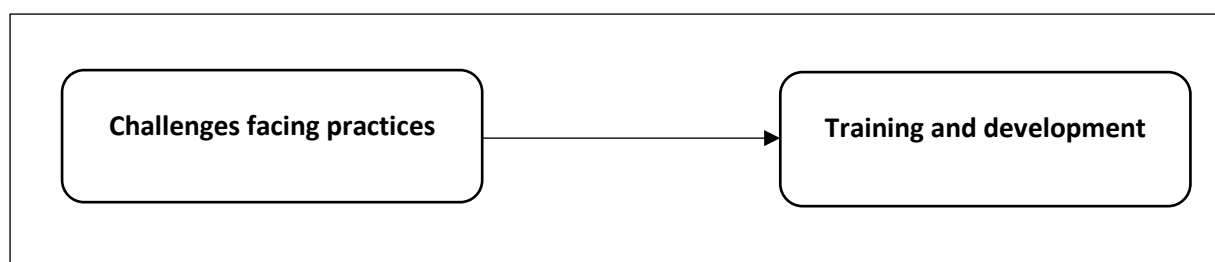


Figure 4.7: Challenges facing PMS practices

Source: Interview data (2024)

4.3.3.1.1 LACK OF TRAINING AND DEVELOPMENT

The respondents indicated that there is a lack of support from stakeholders/business owners, which causes mundane issues such as project delay. When there is information being requested from a business unit by the service provider, providing the information required takes longer than the stipulated time, which then causes project delays and the creation of variation orders (VO). This is particularly for the IS projects; this sometimes results in missed deadlines, reduced productivity, and even causing internal conflicts. Some of the respondents mentioned that they were not made aware of the current project management system being used to implement IS projects within the KZN DPW, which makes it difficult for them to follow the direction of the project.

Furthermore, some participants indicated that the mere fact that, for infrastructure projects, the department sometimes uses candidate construction PMs at the regional level to run with projects without being supervised by a registered and skilled professional PM is a red flag that screams lack of professional skills within the department, thus resulting in poor contractor performance monitoring causing project overruns. Some projects that are completed late or sometimes that come to a halt cause projects to incur unexpected additional costs that are translated to VOs, affecting the initial project budget. They indicated that lack of professional skills from some of the PMs is one of the biggest challenges facing the PM practices within KZN DPW.

Contrary to the findings, employee performance is enhanced by training materials since they raise employee awareness of best practices and procedures (Alvarenga et al. 2020). Further to that, the need for engineers to receive immediate on-work training is critical in order to prepare them for the project management workforce and to assist in carrying out construction projects correctly, particularly in light of the possibility that the reconstruction phase may occur soon. Over the past few years, project management training has shown to be a valuable tool for any project. It allows project team members to better integrate work into their projects and introduce sound models and documentation more quickly and efficiently at every stage of the project (Salami and Alothman, 2022). Furthermore, regular and extensive training and development can help close any gaps in a project team's strength, allowing certain members to stop depending so much on one another to do simple tasks (Sablé-Meyer et al. 2021).

Some of the research participants reported the following:

“Now, outside of what is being said, passage talk is that IT don't get support from the business. It is one of those where information is requested but not received on time.”

“You may occasionally experience cost overruns as a result of those time overruns. There is only the issue that the project's turnaround time for matters handled is really lengthy, and as you are working on one project topic, another one that you haven't closed comes up.”

“Incompetent project managers are a problem. I wish the department can find a program that will ensure that the department works with professional project managers rather than candidate project managers. You know, after 3-4 years you must register as a professional. I feel like we need to find a way of ensuring that our project managers within the department are registered and failing to do so. I know the impact of receiving information from the candidates it's misleading. So, I feel like we need to find a way when the project managers that we are working with are competent and are up to the standard that's required within the construction industry.”

“It's great training and experience with the candidate but a professional should lead them, and they mustn't fully run with a project. So, I think it goes on again to capacitating the department with those who are part of the implementation process of projects.”

“It's great training and experience with the candidate but a professional should lead them, and they mustn't fully run with a project. So, I think it goes on again to capacitating the department with those who are part of the implementation process of projects.”

4.3.3.2 STRATEGIES TO MITIGATE CHALLENGES

To investigate strategies that can be implemented by KZN DPW to mitigate challenges affecting the project management practices within the KZN DPW. Project management strategies help teams overcome challenges, increase productivity, and achieve specific goals. A project management strategy provides the framework for more effective teams and more efficiently operated projects. Respondents were asked to name a few strategies that they feel would assist in mitigating the current challenges.

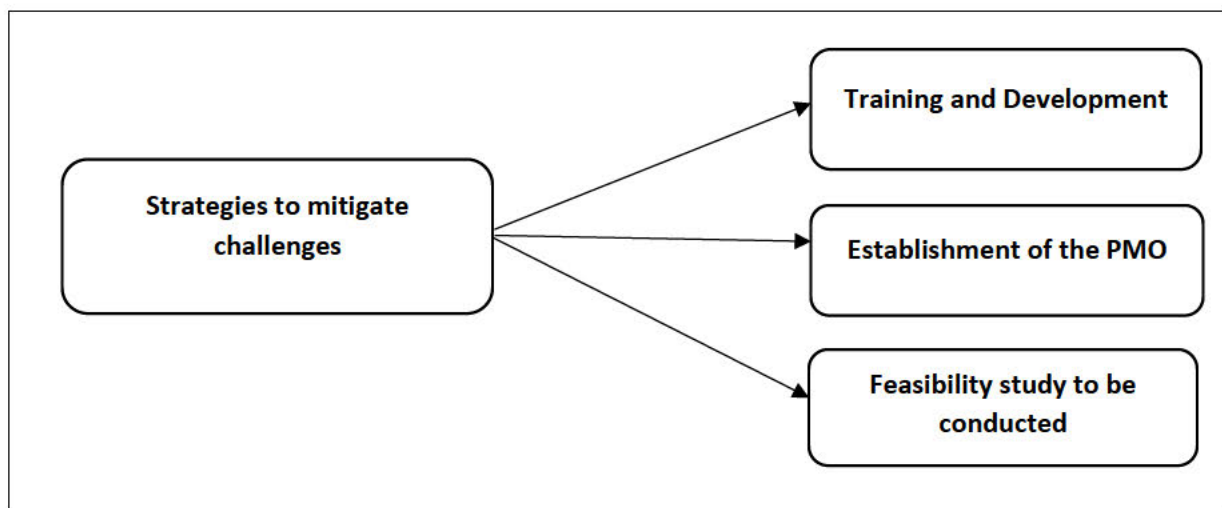


Figure 4.8: Strategies to mitigate challenges

Source: Interview data (2024)

4.3.3.2.1 TRAINING AND DEVELOPMENT

The respondents indicated that as part of governance, they would like to see mechanisms and procedures in place that will guarantee the training materials are in line with the goals and standards of the organization. They felt implementing training and development for both the IS project management system and construction project managers can play a crucial role in improving the project management practices and mitigating the challenges faced by the department in their practices.

One respondent identified training as a major requirement in using Gantt Charts; they indicated that this is an important tool that would ensure that those leading the project within the department understand the project goals and objectives and other specifics. These findings further show that there are quite a few challenges with the tools and techniques implemented in the current PMS at KZN DPW. The respondents mentioned that the system does not allow appointed consultants to be able to update project information, such as updating site minutes, which will work better if the system has a live template for populating and updating to allow flexibility and accuracy. Contractors should also be given certain access to populate the contractors report and progress during the construction stage, and that would move the Gantt chart from sitting at inception to other project stages.

However, for IS projects, they further indicated that this will not be possible if there isn't any budget for training and development, therefore; an injection on the budget to ensure that enough licences are bought for the MS tool (Gantt chart) for all team members to be able to train and use the tools as well as the resources and expenses, both direct and indirect, incurred by the department during employee training. Most participants pointed out that more budget is needed in terms of training and development for more tools. The budget should cover book and material prices, courses, and more educational and training resources.

The team working on the IS projects would get training on how to use the Gantt chart and the process of the project management system being used. Most participants suggested that the department should only work with professional PMs to manage and oversee the construction projects. However, in order to upskill Candidate Construction PMs training and monitoring should be done by professional PMs. The training and mentorship of the Candidate Construction PMs should also be done by professional project managers so that they can register as professionals in 3 to 4 years as well. This means that the department should employ more professional project managers who will assist in the training and mentorship program and will help candidate construction PMs to gain extensive experience in quality management, particularly in large-scale construction projects.

In contrast, Palombarini and Martínez (2022) state that understanding how to use the Gantt chart means that project timelines would be defined and reached. The suggestion for budget injection is an indication that in government there is a strong correlation between budgetary constraints and cost-cutting measures that government implements every now and then during times of financial distress for the department (Ertaş et al. 2021). The candidates should gain experience in developing and carrying out project work plans, which they may then modify as necessary to accommodate evolving demands. The department should also provide IPAC and IDMS training to most staff members working under program management for budget purposes and framework implementation.

Some of the research participants reported the following:

“The strategy would be to educate people who are involved in the projects, and that's or the practices that they use. As I also don't understand the PM practices so that we understand how the project will be managed.”

“More budget for project management tools should be allocated. More training on the utilisation of project management tools should be undertaken.”

“The IPAC and the IDMS training. That’s a very good strategy. I’ve read the document I followed up on the document and it’s honestly promising. I think the only challenge will be how we basically implement it.”

“Find a program that will ensure that the department works with professional project managers rather than candidate project managers. You know, after 3-4 years you have to register as a professional. I feel like we need to find a way of ensuring that our project managers within the department are registered and failing to do so, I know the impact of receiving information from the candidates it’s misleading. So I feel like we need to find a way when the project managers that we are working with are competent and are up to the standard that’s required within the construction industry.”

4.3.3.2.2 ESTABLISHMENT OF THE PMO

Another theme that emerged was for the establishment of the PMO for IS projects. According to the findings the department does not have a PMO for IS projects. The participants indicated that all IS projects that the department implements are coordinated by IT, most participants indicated that they are not even aware of the project management system that the department uses in implementing the IS projects. Participants stated that the establishment of the PMO would assist immensely in ensuring some challenges are avoided as this would mean that there’s a central hub within the department for IS project governance, oversight, and support, making sure that IS projects are completed successfully and in line with departmental objectives. They indicated that establishing a PMO will be a valuable investment for the department that wants to enhance project management procedures.

They further indicated that having an internal PMO would mean that the department will have its own standardized documentation as they currently do not have any. The development of standard documentation would be for whichever methodology will be used within the department for IS projects.

In contrary Ojha et al. (2020) states that having a central point where projects are being controlled ensures that there is clear communication, reliable, and consistent results. Projects will be managed consistently and all project stakeholders will have consistent experiences if everyone adheres to the organization's project management guidelines and criteria.

In addition Barbalho et al. (2022) indicates that a project manager's most difficult task is lowering project costs, which calls for efforts from all project participants. These efforts

include maintaining constant control over project costs, allocating precisely the right resources to tasks, managing potential risks, and enhancing project estimation. If a project manager is not proficient in facilitation, they cannot be genuinely exceptional. The process of assisting a group of individuals to collaborate more successfully is known as facilitation. It's about fostering an atmosphere where individuals can converse openly and freely and reach decisions as a group.

The PMO would use coaching and mentoring. Throughout all project management phases, the project manager's knowledge and application of competence are intended to be validated and supported by the project management coaching approach (Garvey et al. 2021). While the PMO can focus on the enterprise-wide project governance, portfolio management, and the development of frameworks, there can be a project manager for each project who focuses on the implementation of each project.

There is a strong need to establish a PMO for IS projects within the department, the participants know how difficult it is implementing a system without having an in-house PMO for guidance, which belongs to the department. They indicated that during the implementation of the Archibus system there was wasteful expenditure. They mentioned that all payments processed with regard to this project were ratified by the Department's Project Leader by verifying that all work was done to specification and that the system functionality is available on the Departments ICT environment only to discover when it was go-live that the functionality was not there.

This project commenced in the 2013/2014 financial year and to date, 10 years later, it has not been implemented. Management has taken the decision that the system will only be implemented in its entirety once all relevant modules have been completed and thoroughly tested. Due to the integrated nature of each of the modules, management also took a decision not to use the system until the system and modules are fully integrated and address all the identified future requirements. According to some participants the Department had envisaged that the system will be fully implemented by the end of the 2021/2022 financial year. However, to date no system nor modules have been implemented. Lastly, an independent project management team has been appointed to assist in ensuring all milestones and deliverables are monitored to ensure all project timelines are met and that the budgetary limitations are met.

The recommended strategy agrees with other studies which say that the PMO plays an essential role is ensuring smooth workflow management throughout the project lifecycle. This entails creating uniform processes and procedures for requesting and allocating resources as well as

putting in place standard templates, tools, and technologies to expedite project execution (Behnke et al. 2021).

Some participants indicated that:

“The first one would be to finalize the project details before a project actually begins and get the requirements and the need why you need the project before you embark on it, because one of the biggest things that I've noticed is we say, “I want a project management system”, but the why is never answered until we have done the procurement and then what is it that we require of the project management system will then be something that's being collected. Finalizing the project details, getting the full user requirements before we go out on tender so that it becomes a pack even when we go out on tender; and we don't say we want a system and when the service provider has been appointed, we start saying we want a system that will do A, B, and C and it's already too late to be gathering requirements. When the system is being implemented. Set deliverables that you want to achieve. This is what we would want to be delivered. The actual deadlines must be set and do an investigation on deadline if it's feasible.”

“A PMO can be established to ensure effective coordination across all portfolios.”

“The department should look more into establishing a PMO for guidance and management of IS projects.”

“If a PMO were to be established, we would be in a better position to understand what is happening and the work would be well coordinated.”

“Having standard documentation that comes with clear timeframes. Separate activities from start to finish. The department needs to update their standard documentation.”

“...our project management, we need to capacitate department with competent project managers. Matter of fact, let me not just say project managers but the whole division. Training on the roles we play. Like for example project managers, you need to understand what goes into a tender document. So, if we can get more training with regards to that, I think that will make a lot of things easier to process.”

4.3.3.2.3 FEASIBILITY STUDY TO BE CONDUCTED

Based on the strategies suggested by participants, some indicated that a feasibility study must be conducted after the department has received an instruction from a client department. They indicated that this will ensure that the need for the project is identified. They further elaborated that in order to avoid unnecessary projects that have been promised by politicians to communities, a feasibility study on the need of the project needs to be conducted. The need of the project vs the solution. If the need and proposed solution does not address the need then there is no need to continue with the project.

They further indicated that this will ensure that the functionality criteria that forms part of the approved procurement strategy gets to be implemented effectively and managed vigorously if the need for the project is there. Furthermore, they stated that if the need for the project is there, the department should implement the functionality criteria. This would eliminate awarding service providers who do not have adequate experience to undertake the projects. This would eliminate project time overruns and cost overruns. On top of that service providers who underperform must be penalised in line to their conditions of appointment and that the department must ensure that their request for waiving the conditions is not approved.

Contrary to the above, the studies conducted show that conducting a feasibility study right after receiving an instruction from the client department would assist in eliminating duplication of instruction that are pushed because of political pressures. This further shows that over planning of projects would be eliminated. Irawan and Hartoyo (2022) states that in order to help decision-makers decide whether or not to proceed with a project, a comprehensive analysis is carried out prior to project initiation to ascertain whether the proposed project is feasible and likely to succeed. This analysis takes into account various factors, including market demand, technical viability, financial costs, legal requirements, and organizational capacity.

Some participants contributed by indicating the following:

“Public Works then take instructions and do a feasibility study on the need of the project. The need of the project vs the solution. If the need and proposed solution does not address the need then there is no need to continue with the project.”

4.3.3.2.4 TECHNICAL ADVISORS MUST BE INCLUDED

Further to that, as part of the feasibility study the inclusion of technical advisors during the feasibility study. They stated that National Treasury implemented technical advisors for infrastructure, the intention was to ensure that the process is studied and used within the whole province. The technical advisors monitor the information that the department puts in the Infrastructure Reporting Model (IRM) system. Further to that, the technical advisors are well coordinated and they understand all infrastructure departments, because every department when they plan projects, they get entered into the IRM system. The IRM system reports to provincial and national treasury so these technical advisors can see all the projects for all client departments that have been entered on to the system. Each department is assigned their technical advisor. The participants indicated that what is not being is checking with the Technical advisors if the proposed project is not a planned project by another client department. They indicated that the technical advisors can filter all projects within a district to see if they are not clashing, duplicating and affecting each other.

Furthermore, the technical advisors can see every department's budget as it's informed by the IRM system because every year every department must do their B5 reporting which has their baseline budget. They can monitor the budget and advise if the project is feasible or not. This would eliminate departments having too many instructions that do not align with their budget. This would also assist if there is a political instruction then the department can pull out a plan that was submitted to National Treasury to show the list of commitments for the budget.

According to Baum et al. (2021) a crucial first step when starting a new project is doing a feasibility study and budgeting accordingly. It is a comprehensive evaluation of the likelihood of a proposed business venture's success. The objective of a feasibility study is to collect information so that business owners can make well-informed decisions on their proposed project based on the need and available budget. The analysis further helps to consider the costs and activities required to accomplish the project.

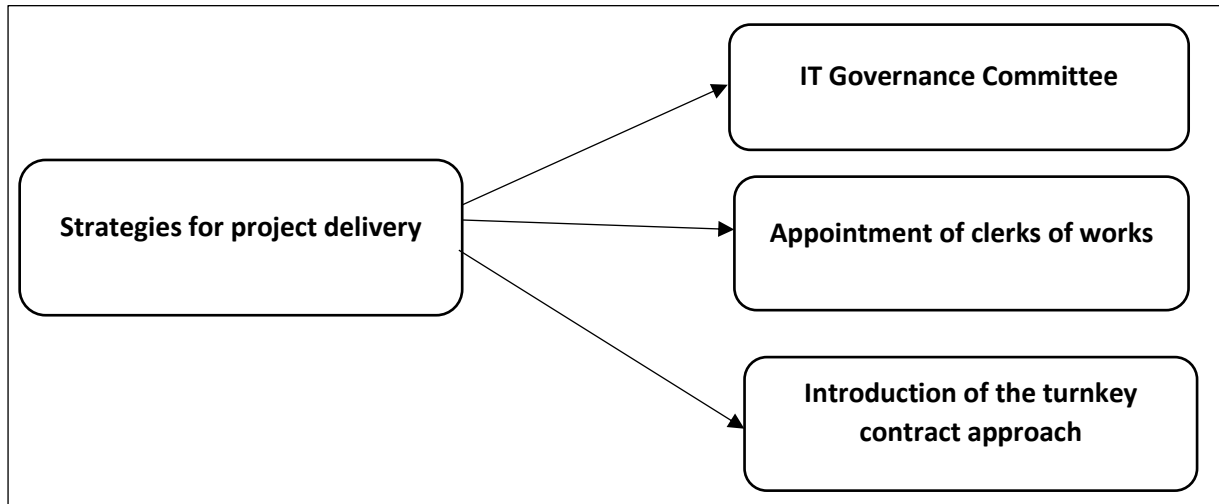
Some participants contributed by indicating the following:

“By ensuring that Functionality criteria that forms part of the approved procurement strategy gets to be implemented effectively and managed vigorously.”

“Appointing a contractor on a stipulated time project who have the skills you know. As a result, this would not affect your IPPI that much.”

4.3.3.3 STRATEGIES FOR PROJECT DELIVERY

To establish the strategies that have been put in place by KZN DPW to enhance project delivery within the KZN DPW. Respondents were asked to share their views according to the strategies that have been used to try to improve project delivery.



4.3.3.3.1 IT GOVERNANCE COMMITTEE

Most respondents mentioned the IT Governance Committee that monitors all IS projects' progress. Along with the IT Governance Committee the department has also put in place Tuesday and Thursday project progress meetings. The goal of project status meetings is to ascertain the project's status, identify challenges, and so on. As such, project team members must provide feedback in the meetings on tasks that were assigned to them and be ready to respond to questions that will arise from the meetings.

Further to that, they stated that the Steercom meetings play their role in setting the direction of the department's IT project initiatives and ensures they're aligned to the goals and objectives of the department. The Steercom ensures that the creation of a business case for an IS project initiative is aligned to the department's strategy and goals. Setting project priorities according to available budget, resource availability, and guaranteeing that the project adheres to the department's objectives.

However, if there hasn't been any Tuesday and Thursday progress meetings, it becomes very difficult to hold an IT Governance Committee meeting as most updates and challenges faced by team members haven't been addressed in the progress meetings.

The findings concur with studies done by (Hashed and Almaqtari, 2021) which state that the IT governance committee is significant in its function that it aims to guarantee the viability and seriousness of investments in IT projects, as well as to help balance the objectives of the organisation today and in the future. The studies further state that IT governance committee's other responsibilities include questioning the necessity and effectiveness of IT projects suggested by executive management, evaluating the projects' implementation outcomes and their impact on business advancement, and investigating the adoption of projects that might not be advantageous to the organisation's objectives or could lead to wasteful expenditure.

Some of the research participants reported the following:

“I don't know but mostly special Steercom meetings are called to get inputs from all stakeholders.”

“From an ICT perspective, steering committees have been established, progress meetings are held and the project progress is monitored by the ICT Governance Committee.”

4.3.3.3.2 APPOINTMENT OF CLERKS OF WORKS

Most respondents mentioned the appointment of the clerks of works who monitor the progress of the projects to ensure projects are completed correctly, ensure that there is progress, and ensure construction site safety. A clerk of works duties, on construction sites, is to oversee the safety, quality, and workmanship of the job and reports back to clients and Construction Project Managers. Their duties include performing routine site inspections, safety of work on construction sites, and ensuring that construction plans are being adhered to appropriately. Their main responsibility is to advocate the client department's interests when ensuring that the materials and workmanship quality corresponds to the design specifications.

However, a study done by Symons (2021) show that the roles and responsibilities of clerk of works and site managers can be misunderstood as site managers coordinate the building of the project. But the clerk of works becomes part of the construction team and reports to the department at any time without waiting for the site manager to submit a progress report. The clerks of works keep an overall perspective on the project while valuing the specifics of each task. All paperwork related to the job site, including timesheets, delivery dockets, and health

and safety certificates, are handled by the site clerk. They also answer all questions on site pertaining to the project.

Some of the research participants reported the following:

“Appointment of Clerk of Works to ensure effective management including construction methodologies for construction activities and which in turn allows for effective delivery of the project especially for most complex projects.”

4.3.3.3 INTRODUCTION OF THE TURNKEY CONTRACT APPROACH

The participants indicated that the department introduced the turnkey contract approach where a contractor is appointed from stage one to plan, design, and build an infrastructure facility in order to make it functional. This is in contrast to how the department is currently managing its projects, where in stage one the client has identified a need, planning then commences by the department where an assessment report is done. Stage two concept reports are produced based on the geo-tech and survey information provided from stage one. During stage three concept and integration of designs is done by the department and on stage four final documentation is produced which includes everything from stage one to three. This documentation from stage four is then sent for adjudication with the BAC before a contractor is appointed who is going to do the construction of the project.

Most participants felt that implementing the turnkey approach would assist the department. They indicated that a turnkey contract is usually a construction contract in which a contractor is appointed to plan, design, and build a project or infrastructure project and do any other necessary development to make it functional or 'ready to use' at a fixed price and by a fixed date. Turnkey projects are designed to allow the building contractor to finish a project that the client can use immediately.

They further mentioned that with the turnkey contract approach a contractor is appointed from stage one where the contractor will then appoint their own professional consultants to do assessments, conceptual reports and designs and then the contractor then goes straight to construction. They indicated that this approach should assist in reducing project time as consultants come with more skills to perform tasks. The contractor also comes with their professionally trained construction project managers who will work with the department's candidate project managers in the planning as well closing the skills gap within the department.

According to some participants, as it stands, the department receives an instruction from a client department, then planning is done by KZN DPW, who then sends the plan back to the client department. The planning is done considering current industry rules, and IDMS says before a client gives KZN DPW an instruction, certain steps should have already been taken by the client, such as need identification, scope analysis based on the need, securing land, and the client department must also know who they're targeting. Once the plan has been approved by the client department, then KZN DPW can start with the design phase, where professionals need to come in and do designs. And when designs have been approved, the procurement stage can begin and be concluded for the appointment of a service provider who will do construction. This is the stage where the service provider can easily fall behind and run over budget.

In contrast, the turnkey contract approach is new and should improve the turnaround time (Chaudhry et al. 2023). According to one participant, the turnkey contract approach is projects that are delivered by a contractor who collaborates with the project owner, in this case the department, under a single contract to complete all project phases, from detailed engineering to construction at a fixed time and price. The contractor appoints their own consultant on the side to deliver designs while the contractor's work will be to go straight into construction. This approach provides the department's professionals more time to go refine the scopes with the client department. The risk of VOs and documentation will be transferred to the contractor, and the approach will help eliminate most of the department's issues. According to a study done by Omran (2021), the turnkey approach can expedite the delivery of projects without incurring more risk due to the overlap of development, design, and construction processes. Comparing turnkey design and construction to standard design-bid construction delivery can result in consolidated risk management, reduced change orders, and schedule reductions of 20% or more, which are typical (Frederic Antoine Champain et al. 2021). Similarly, a study done by Guha (2020) states that a turnkey contract means that the contractor handles the entire project, including the facility's construction and design. The basic tenet of a turnkey contract is that the contractor has to produce the final product by the deadline and at the agreed-upon cost.

Some of the research participants reported the following:

“A Turnkey contract is typically a construction contract under which a contractor is employed to plan, design and build a project or an infrastructure and do any other necessary development to make it functional or 'ready to use' at an agreed price and by a fixed date. The department's professionals will now have more time to go to other

departments to monitor integration and refine scopes better. More resources will be relieved.”

“The turnkey approach might improve project implementation practices, which means from the onset you appoint the contractor to go through the designs and construction stage. The contractor will appoint their own consultants to do designs and then the contractor will then go straight to construction. This should improve the turnaround time.”

4.3.4 TO INVESTIGATE WHAT COULD BE THE EFFECTIVE METHODOLOGY TO ENSURE IMPLEMENTATION

Research objective four was formulated to help devise a methodology that would best suit managing projects within the KZN DPW with the help of the participants. By analysing the results, the researcher has identified a framework that would best accommodate projects within KZN DPW. Taken from what the participants have provided, the objective analysed Prince2 as a proposed and suited methodology for the IS projects within KZN DPW. In order to provide a more precise answer for this question, two questions were formulated for this objective.

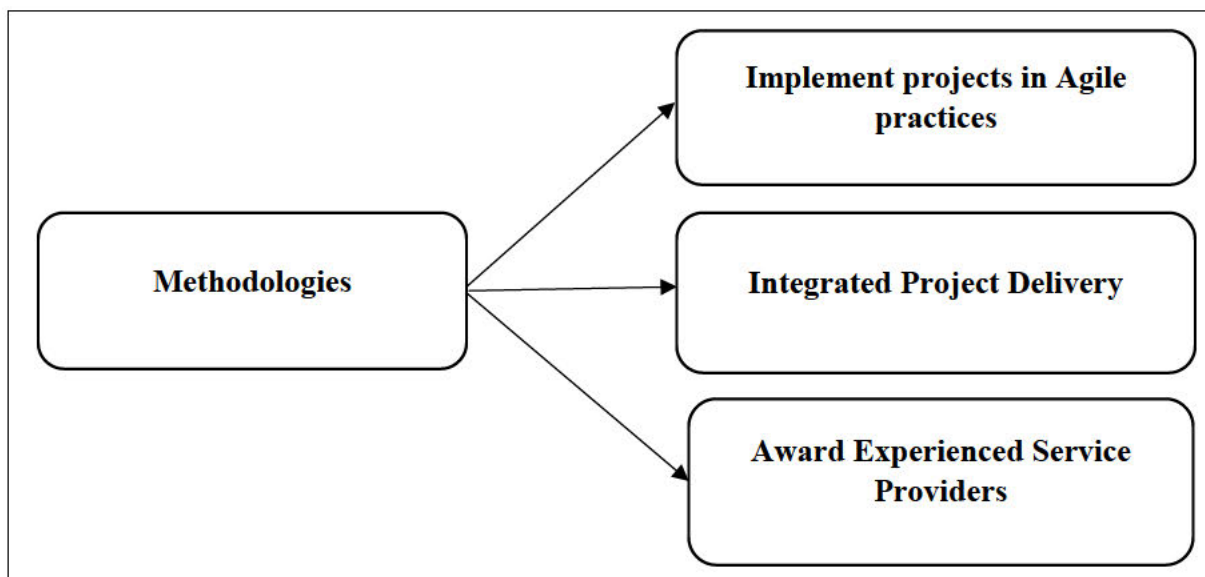


Figure 4.9: Possible Effective Methodologies

Source: Interview data (2024)

4.3.4.1 Implement projects in Agile practices

Based on the responses from participants, most participants mentioned implementing projects in Agile Project Management (APM). Most participants have an understanding that APM would be the best methodology to handle the department's construction projects on an individual basis by adapting the projects. They indicated that the APM methodology is a flexible, iterative methodology that enables teams to adjust to changing circumstances of the project and still provide value to their clients. This was mentioned because at most times the client departments change their scope in order to accommodate their available budget. Agile breaks work into smaller, manageable projects and can easily be adapted to project change requirements, and it also requires collaboration in achieving a common goal, which eliminates working in silos. They further indicated that the department can create dynamic and skillful teams that can confidently and resiliently navigate the complexity of modern business by adopting the agile principles. The APM prioritizes adaptability, teamwork, and ongoing enhancement within the construction sector. It entails dividing complex projects into smaller, more manageable tasks and setting priorities for each one in accordance with input from clients.

According to Ozorhon et al. (2022), one of the many benefits of using agile methodology in construction projects is that it ensures contractor involvement through collaboration with the department. The use of agile in project management is a key component in reducing implementation process expenses. Managers should follow the well-defined processes in Agile. Additionally, the rules help to avoid mistakes that could increase the cost of a project. As a result, the many stages of agile management, including designing, are crucial in assisting in the mitigation of potential unforeseen problems that could lead to excessive project expenditures. The application of agile methodology contributes significantly to improving the final product's quality. But, because Agile delivers in increments, looking across stages is necessary for PMs to track project progress (Sadeghi et al. 2022).

In contrast to PMOs not having standard documents, a study done by Guerrero-Ulloa et al. (2023) shows that Agile documentation has various advantages in project developments. It supports groups in remaining committed to providing value: Agile documentation is not exhaustive and extensive; instead, it is brief and concentrated on what is necessary.

Some of the research participants reported the following:

“You see what I have just mentioned which is mainly dealing with a project as an individual. That is a character of agile project management. And so, I think they're already doing that. They are basically making the project management flexible because that is what agile is all about. You know accommodating each project according to its needs and according to its objectives. And so basically that is what I would implement, I would make sure, we see the methodology to agile, I would implement it and then deal with the project as it comes, we would say OK the project team, this is how we deal with this one. When this one comes, this is how I will deal with this one.”

4.3.4.2 Implementing the Integrated Project Delivery

Most participants suggested implementing the Integrated Project Delivery (IPD) method that integrates all stakeholders and systems to work collaboratively from the design to the construction stage to optimize project results. Currently the department works from stage one to four, where they gather the scope, do designs, do budgeting, and only involve the contractor during stages five to seven. During these last stages, that's where the contractor starts working on-site to do construction and monitoring before project close-out. They indicated that service providers are not involved during the scoping of the project, as this is done by project managers in liaison with client departments. During the design stage, they are also not involved, as designing is done by professionals who work within professional services in the department. Further to that, costing is also done within the department by quantity surveyors who estimate costs, material quantities, and project timelines.

Contrary to current processes, the IPD involves using a team-based strategy to bring various disciplines in a construction project together; this includes service providers, as it aims to harmonize interests, objectives, and practices, resulting in shorter turnaround times and reduced costs (Elghaish et al. 2021). Most participants mentioned that the IPD can be best used with the Archibus system, as it is anticipated to also cover the information system for the construction projects module and the FIDPM. They mentioned that the Archibus system is anticipated to eliminate the problems that they are facing with WIMS and that it's anticipated that it will cover all project stages from one to seven.

Based on a study done by Khouja et al. (2021), project-based organizations can specify the logic of a delivery mechanism in a variety of ways based on the contractual arrangement, operational system, and project organization structure. Based on how project participants are

monitored, managed, and integrated into this project network, that configuration will define a distinct interorganizational project network that impacts the project's overall delivery success (Kujala et al. 2021).

Some of the research participants reported the following:

“And there's an approach, this one they're not trying to implement this approach it's called Integrated Project delivery. I would employ that to the department. This approach is versatile, yes, but it talks about involving all stakeholders. So just to give you a very high level, no, not high level, a very generic explanation of integrated project delivery, IPD. Integrated project delivery. For me it's one of the most useful Strategies of project management. Why? Because what we are trying to do here is integration. You involve all projects stakeholder from stakeholders, from the initiation, from the start, from the beginning of the project, you have stakeholders involved.”

“The use of Archibus system as well as applying the use of Framework for Infrastructure Development and Procurement Management will improve and enhance the project delivery and eliminate project overruns and termination of contractors.”

4.3.4.3 Award experienced service providers

Most participants suggested that the department should aim at getting experienced service providers rather than inexperienced service providers. According to some participants, when the Archibus project was first implemented back in the 2014/2015 financial year, the department had appointed a service provider that specializes in quantity surveying and construction projects to implement an IS project. According to the participants, the service provider couldn't interpret the scope properly, and they missed some of the work that needed to be done in order to deliver the required system capability. As a result, this had a negative effect on the project schedule and budget.

This is in contrast to literature, which showed that working with service providers on projects should be a great way to leverage the department's expertise, save time and funds, and achieve departmental goals. Appointing service providers that have adequate experience in a required skill means that the department can implement projects with greater ingenuity and sophistication, helping them to stay ahead of the competition in a cutthroat market (Herold et al. 2021). Literature further shows that successful implementation revolves

around the subject of coordinating, scope writing and interpretation, executing, supervising, controlling, and completing project tasks accordingly (Pham and Unaldi, 2022).

Zamani et al. (2021) mentioned that the functioning of service providers and the reasons behind their crucial role in guaranteeing an effective implementation of a project lie in the understanding of the client's needs. The service provider must have a complex understanding of the intricate project they are handling, as this will determine the difference between success and failure of a project. Failure to understand what's required will result in additional project costs and time.

In addition to appointing experienced service providers, other participants indicate that the department should appoint service providers that are financially stable in order to handle starting and finishing projects even if payment delays occur within the department. And for construction projects, some participants suggested that the department should use regulatory bodies to check for the correctness of the service providers regulatory certificates. If the department gets regulatory bodies like your QS bodies, your architects' bodies, and your engineers' bodies involved to ensure that the performance that is basically being offered by consultants is up to par, because if it's not up to par, it will affect project implementation negatively. They further indicated that as it stands, there are consultants that do copy and paste.

Furthermore, participants indicated that SCM should include stricter clauses on to their bid documentation to ensure that the right contractors submit their quotations. Once service providers have submitted their quotations and bid evaluation has taken place, just before appointing a service provider there should be vetting of contractors and consultants within the department.

Even in the public sector's projects implementation, research has shown that working together with seasoned service providers creates synergistic partnerships that provide department's access to more resources, knowledge, and industry insights (Mergel, 2021). These partnerships progress from transactional relationships to long-term partnerships based on mutual trust and common objectives (Ball and Gibson, 2022).

Some of the research participants reported the following:

"To ensure that inexperienced service providers are not considered for the projects."

"Ensuring that Service Providers appointed are financially stable and that they are sustain projects even when there are delays with payments."

“So I feel like the one thing which we can do is basically involve our regulatory bodies like your QS bodies, your architects bodies, your engineers bodies to ensure that if there's something I'm not really comfortable with the department can request assistance from, for example, the Council of Quantity surveyors, to check with the performance that is basically being offered by ABC consultant if it's up to par? Because if it's not up to par, it will affect our project implementation negatively. Because there are consultants that do copy and paste. I think monitor our consultants with regards to performance and then maybe involve accountability in a way from their side just to eliminate mistakes.”

4.4 CHAPTER SUMMARY

The data analysis demonstrated in this chapter through in-depth findings showed the tools and strategies of the current project management systems being used by the department for both their IS and infrastructure projects. It was further investigated just how effective they are in terms of project delivery. The current challenges being faced by the project team were also looked at, and the measures/principles employed to mitigate the identified challenges.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The previous chapter presented and discussed findings of the analysis of the twenty-six semi-structured in-depth interviews. The participants consisted of 20 infrastructure personnel and 6 IS personnel that work for the KZN DPW. NVIVO content and thematic analysis were used to find, examine, and interpret themes and patterns in the participant data.

In this chapter the researcher will summarize findings and will align them to the research questions and objectives of the study. This chapter will make recommendations and conclusions will take into consideration the experiences of all study participants and their involvement in the implementation of projects within KZN DPW. The 4 research objectives were as follows:

- To investigate the tools and techniques of the current Project Management System in Kwa-Zulu Natal Department of Public works
- To investigate the challenges facing the Project Management System in the Kwa-Zulu Natal Department of Public works.
- To investigate the strategies that have been implemented to mitigate the challenges affecting the Project Management System in the Kwa-Zulu Natal Department of Public works.
- To establish a methodology that would be effective in implementing the Kwa-Zulu Natal Department of Public Works projects.

5.2 DISCUSSION OF THE RESEARCH FINDINGS

The scope and character of the research that was conducted were determined by the research objectives that were established at the beginning of this study. The goals were accomplished and further elaborated upon as follows:

5.2.1 PROJECT MANAGEMENT TOOLS & TECHNIQUES

The respondents revealed that for all projects the department uses the following tools and techniques: Gantt charts, progress meetings, WIMS, IPDMS, IPAC, IPIP, lessons learned, and SOPs. However, the Gantt chart is mostly used on WIMS when the project gets to the

construction stage; that is, when the department has locked a contract with a contractor and there's a fixed timeline for the project. According to the construction PMs, from inception there is a possibility that the client might have given the department the wrong scope or they don't have funding, and the project might be delayed or stopped, so the Gantt chart is used during the construction stage. They indicated that the problem with government projects is that from inception until the construction stage, there is no fixed time period, so they don't use the Gantt chart until they lock a contract and a service provider starts working on the construction. This is in contrast with project management literature, which advocates for the use of the Gantt chart from the planning phase up to the completion phase of the project. The Gantt chart should define the graphical representation of all activities against the project timeline and should make it easier for PMs to monitor project progress.

The respondents indicated that, for IS projects, they mostly use Gantt charts to monitor project timelines and deliverables. They further indicated that the PMS employed by the department is not that effective in terms of project delivery, and the contributors to this ineffectiveness are that some of the team members were not made aware of the current PMS, the tool used for tracking project milestones is not used properly as some team members do not understand it, and there are limited licenses.

Further to that, the findings reveal that there are no monitoring and control systems in place to track if project milestones are being reached or not, and this leads to payments being done without stage/phase sign-offs being achieved. The late implementation of frameworks, which clearly lay out tasks and tools to be used to achieve project success, is also another contributing factor.

Project team members also face challenges with the current tools and techniques employed by the department. They find that they also lack adequate skills; the department also doesn't have any standard documents for the project implementation for both IS and infrastructure projects. It was revealed that there is a manual filing system of documents, which makes it difficult to retrieve required information. The empirical findings revealed that the department has implemented progress meetings held on a weekly, monthly, and quarterly basis and the review of current SOPs in order to mitigate the challenges.

Further to that, the empirical findings revealed that, for infrastructure projects, WIMS is the tool that they mostly use for managing infrastructure projects and IPDMS is the framework, which is used by the government for planning, budgeting, acquiring, delivering, maintaining,

operating, monitoring, and evaluating infrastructure. It was also revealed that the IPDMS Framework is made up of a number of connected or interacting components that create mechanisms that convert inputs into outputs. Furthermore, they use lessons learned as part of their historical data for infrastructure projects as valuable insights and knowledge gained from previous projects, and they use the IPAC for approvals and IPIP for budget purposes.

Further to that, the department uses progress meetings to monitor project progress and to get the current status of the tasks assigned to project members. These progress meetings are meant to take place regularly on a specific time period in order to bring about constructive discussions that will provide project progress and provide solutions to any challenges faced by team members and align the next steps to be followed. This study has contributed to the existing literature that the department does play a significant role in monitoring progress. The study showed that some team members do not adhere to the department's governance function to attend project progress meetings for status updates and challenges. The meetings then get cancelled due to lack of quorum formation. This is in contrast to the M&E process, which involves tracking the progress of projects.

The construction PMs also indicated that the department uses the IPDMS framework in relation to any construction procurement and implementation of construction projects. This framework is crucial to government since it outlines the management system for infrastructure project planning, budgeting, procurement, construction, maintenance, monitoring, and assessment.

The study showed that the department does not monitor that everyone follows the IPDMS guide, as not all project stages are being shown/updated on WIMS. According to IPDMS, a project has 7 stages, and all these stages must follow certain steps in relation to the IPDMS framework. When the department receives an instruction, planning takes place, and stage one begins, where an assessment report is done and stage gate approval is obtained via approval to move to stage 2, where conceptual reports will be conducted and produced, and just before moving to stage 3, stage gate approval needs to be obtained, and this carries on until stage 4.

According to the IPDMS, all the project stage activities must be shown in a government information management system (WIMS) in relation to IPDMS. However, the project information entered on WIMS is very limited, and the only thing that forces people to enter information is when payments need to be made. This is why it's only payment information that's mostly accurate on the system. The results show how the department does not monitor compliance in terms of project information on WIMS. Not adequately monitoring accurate

project information can lead to manipulation of project reports. The department formed the IPAC committee, which is anticipated to assist PMs in implementing construction projects on time using IPDMS. The IPAC will outline the guidelines, measures, or principles that are actually there on IPDMS to assist the department in construction project implementation. The study showed that implementing the IPAC will assist in addressing many challenges faced by the department, which will in turn reduce the risk of facing those challenges, and the ineffectiveness of WIMS will be addressed.

Further to that, the department uses the IPIP on Excel for budget purposes. It was found that the IPIP is manual, which makes it difficult to manage when new changes have been made by either a PM or a QS. This contributes to the literature, which indicates how important project planning is and how expenses must be managed throughout the project. This is in accordance with the Project Cost Management knowledge area, which is the fourth of 10 knowledge areas within PMBOK.

During the financial year, the timeline is monitored through meetings and reporting as the projects are multi-year projects. You create a plan for the financial year that gets monitored through meetings for reporting, scope drafting, appointing consultants, etc.

KZN DPW is responsible for carrying out the activities of building construction-related facilities for activities carried out by the government for the benefit of the citizens. And to manage the department's operations, the department also has the responsibility to implement effective information management systems that can help the department process its important data from inputs by employees, which can help the department generate important and more accurate information.

The findings revealed that, in implementing the knowledge areas and PM Project Groups of the PMBOK framework, the ICT section plays a significant role in ensuring information systems are implemented within the department and that PMs who work at regional offices and at head office within the Programme Management section facilitate and manage the whole process of the implementation of construction projects.

5.2.1.1 CONTRIBUTORS TO EFFECTIVENESS & INEFFECTIVENESS

The Department has faced quite a number of challenges with the PMS that is currently being used to implement both IS and construction projects that lead to ineffectiveness. The challenges vary from the IS project team not understanding the current PMS being used to implement IS

projects, there is no proper use of the Gantt chart for both IS and construction projects, there aren't enough licences to allow all project teams to use the Gantt chart, the Department does not have a proper monitoring and control system that tracks project milestones, the Department takes long in implementing current and relevant frameworks which limits proper implementation of the IPDMS framework in construction projects, the manual IPIP is also another challenge, and the sudden closure of projects on WIMS.

The identified challenges can cause project ineffectiveness as the risk outcome of these challenges is never anticipated by the Department. These challenges have proven that the Department's PMS has shortcomings and should be improved. The fact that project team members are unaware of the PMS being utilized to implement IS projects is one of the biggest problems facing the PMS. As a result, team members find it challenging to collaborate efficiently and advance the project's tasks.

The findings revealed that there is no proper use of the Gantt chart and that there aren't enough licences to use this tool. The Department lack of budget to purchase more licences and get team members the required training has been identified as the cause for this challenge. Another challenge revealed by the findings was that the Department does not do proper monitoring and control systems in place to monitor project timelines. Due to lack of understanding of proper use of the Gantt chart, the ICT business unit does not properly keep track of the project milestones and this leads to the project being moved to the following stage without ensuring that all milestones for the current stage have been reached. This is evident as there is no degree of control shown by the ICT PMO which then deems the current PMS used for IS projects ineffective but it was mentioned that monitoring is done by the IT business unit. The Department also takes long in implementing current and relevant frameworks for construction projects and this limits proper implementation of the IPDMS framework in construction projects on WIMS. Some of the respondents stated that the manual IPIP on excel is also another challenge that affects project estimates due to inaccurate data. And the sudden closure of projects on WIMS which affects the payment of professional fees.

The overall analysis of the information shows that these challenges faced with the current PMS consequently affect the project timelines, budget, as well as the project scope changes. In most cases, there is a clash between what the Department requires and what the service provider understands by what is required by the Department. The participants indicated that this is how the Department gets to have a lot of change requests for changes required by different business

units. As a result the IS project team has found itself having to sought for new project contracts due to non-delivery and the service provider has had to be changed after not understanding the department's requirements which deems the current PMS ineffective.

For construction projects timelines and budget end up being extended due to scope creep leading to client department adding additions and running the risk of having VO's over time. In most cases, for infrastructure projects, the scope gets chopped and changed for the purposes of fulfilling the client Department's budget and not taking into consideration other factors that get affected by this, especially the issue of budget followed by project time. The findings also revealed that the current PM system being used is not effective. For infrastructure projects, the Departments takes longer to implement relevant and current frameworks that have been approved which makes it hard to collaborate with tools being used by the Department. This becomes ineffective as project members are not trained on the new framework.

5.2.1.2 CURRENT MEASURES

In an attempt to successfully implement projects successfully, the Department, for both IS and infrastructure projects has implemented progress meetings in order to address challenges during project implementation and to provide updates on tasks. They also review SOPS with the assistance from professionals to align infrastructure SOPs with the current and relevant frameworks such as IPDMS. Even though the implementation of this framework is still showing gaps as the Department's information system (WIMS) does not fully accommodate this framework.

To guarantee that issues are discussed and resolved, progress meetings serve as a forum for project managers, relevant stakeholders, team members, and service providers to talk about project progress, resolve issues, and outline the management's next course of action.

5.2.2 CHALLENGES AFFECTING THE PMS

The data analysis revealed that scope creep and the construction mafia are some of the major challenges that hinder the effectiveness of the PMS within KZN DPW. The respondents indicated that scope creep plays a huge role, happens quite a lot, as the service provider sometimes does not really understand what is required by the department, which leads to the scope of the project expanding over time and the frequent changing of scope by the client, which affects the planned budget and adds to the creation of variation orders. They further

indicated that the construction mafia, which is a group of networks that invade construction sites demanding a certain percentage. They revealed that the changing of scope, the construction mafia leading to the variation orders, and projects being put on hold due to lack of funding are part of the challenges affecting the project management system.

The findings revealed that the promises made by politicians without a feasibility study being conducted by the department in order to ascertain if there is a need for the facility or not is another challenge for the department, as this has a negative effect on the budget. They indicated that the project's information is entered into the IRM system at the National Treasury together with the budget for these projects. The IRM system reports to the provincial and national treasury so these technical advisors can see all these projects. Every year every department must do their B5, which has their baseline budget for projects, so when politicians make promises to the community, they are messing up the budget that has already been set on the IRM system.

Further to that, the findings revealed that there is no PMO for IS projects; however, controlling and monitoring is done by the IT business unit. For infrastructure projects, the department has implemented a few committees to ensure project control. Further to that, project compliance for infrastructure projects is handled by the regional office PMO, which reports to the Head Office PMO. Committees use the weekly meetings as an additional means of obtaining permissions and checking that projects are managed and monitored in accordance with the department's ethics, culture, and strategic goals. The department does not have a PMO for IS projects, but the ICT business unit oversees compliance for IS projects.

The PMS implemented by the Department for both IS and infrastructure projects showed challenges in how they are being implemented within the Department. Some of the challenges identified are that for IS projects, the stakeholders work in silos, which makes it difficult to integrate requirements for different business units when requirements are being solicited, and some requirements are not provided in a timely manner, causing a delay for the service provider. This showed that there is no collaboration or teamwork within the department. Another issue is the department's lack of expertise, particularly with regard to infrastructure projects. The department uses mostly candidate PMs instead of professional construction PMs. Ideally, candidate PMs should be working under professional construction PMs so that they can get the required experience in implementing projects. In addition to the lack of skills, there is no proper utilization and understanding of the Gantt chart, which leads to project tasks not

being followed in the order of when tasks should be completed. There is also no proper training for most employees who do not understand the PMS being used within the department, be it for the IS projects.

Standard Documentation

It was also identified that the Department does not have any standard documentation for both IS and infrastructure projects. For IS, service providers provide documents to the department when an IS project is being implemented. This leads to projects becoming easily disorganised and tasks miscommunication as at times, the documents are

Despite not having standard documentation that are being used throughout the Department for infrastructure projects, they allow regional offices to amend documents according to their own challenges that they face during project implementation and those changes become standard for each region as part of their lessons learned. Further to that, having two levels of infrastructure PMO's which work concurrently together to update SOPS by looking at memos provided by regions. This makes it difficult for Head Office to track projects for each region. The Department also uses a manual filing system for project documents which results in disorganization and loss of important documents.

Scope creep

Due to budget issues, the client sometimes leaves out some of the most important requirements when scoping for a project. This is done to fit the project within the available budget but during project implementation they will then add the important features because they realise that they are important. This now changes the scope as well as the project budget which pushes the project timeline further as PM's need to follow a proper process of getting VO's approved. When a project exceeds its budget, it becomes difficult for all parties involved because funding is limited and requesting for more is a lengthy task which pushes the project timeframe further. The VO approval can take up to a month, depending on the availability of the relevant signatories and this can sometimes cause project failure.

Construction Mafia

The delays caused by the construction mafia causes major delays on the project. They put construction workers at risk as the construction mafia uses tactics of violence and intimidation on site demanding for 30% of the contract amount. When the construction mafia puts the project on hold, the project schedule is affected resulting in project shift and resource

reallocation at times. A delayed project timeline results in the extension of task completion and this also impacts the project budget.

5.2.2.1 PMO COMPLIANCE

The compliance role that should be played by the PMO is not up to standard. The department does not have a PMO for IS projects, which means that project management processes, standards, regulatory requirements, and best practices are not enforced properly. The study showed that team members are not aware of the PMS being used, and this is due to the fact that there is no proper PMO that has been established for the IS projects, as part of its roles would be to ensure that resources are used optimally during implementation for the purposes of reaching departmental objectives. Further to that, the study showed that service providers provide the department with project standard documentation, as there is no standard documentation developed by the department for IS projects. The studies showed that even though the IT business unit oversees and monitors the IS projects, it does not enforce delivery approaches to improve project performance, and each project phase milestone is not properly tracked during the project life cycle to measure the project progress. This is in contrast with PMO compliance literature, which advocates for a structure that standardizes portfolio, program, and project-related governance processes.

To add, even though the department does a PMO for infrastructure projects at the head office, which coordinates planning of projects, coordinates the execution of projects, monitors progress, influences the implementation of projects, and provides necessary training for resources. The study revealed that PMO actually happens at two different levels, that is, head office and regional offices. Therefore, the establishment of standard documents is influenced by multiple projects, where regions amend documents according to their current challenges faced during project implementation, and these are then sent to Head Office. In a nutshell, this means that the department's head office PMO ends up with different documents for the four regions showing different issues and should take careful attention not to mix the documents from the four regions. This is in contrast to the literature, which states that organizations should establish one primary PMO that will consolidate all core project management standards, methodologies, processes, and tools under a single primary PMO first.

Further to the infrastructure PMO, the department has established infrastructure committees such as IPAC, whose main goal is to ensure the development of infrastructure projects is safe, practical, and aesthetically pleasing in relation to the surrounding land uses. This committee concerns itself mostly with how land is used and if it's used according to the appropriate zoning regulations and controls the type of building developed on that land. The implementation of weekly meetings has also been for the purposes of complying and ensuring that the IPAC committee has control of all projects being implemented and that any compliance risk is analyzed for mitigation. This contributed to the literature, which advocates for progress on policies that control and restrict the usage of land through zoning measures, lot site regulations, urban growth boundaries, and floor area ratio restrictions. These are some of the reasons why the department implemented this IPAC committee, a compliance finding that this study has proven.

5.2.3 STRATEGIES CURRENTLY IMPLEMENTED

The data analysis revealed that it's the incompetence of the project managers that is basically giving the department a challenge, which shows that there is a shortage of skills in using and understanding the tools that have been put in place by the department in order to ensure that the workforce has the knowledge required to push project progress. They further explained that when you are a candidate construction PM, you don't really have the necessary skills and resources to take critical decisions; it's basically the lack of skills and experience that affects the department mainly. To curb the lack of skills among PMs, they suggested that the department should implement a strategy to train and develop. The need for training project members in order to get equipped is quite high.

Further to that, the analysis revealed that in order to mitigate challenges affecting the project management techniques for IS projects, the department should implement a PMO for IS projects in order to ensure that there is control and compliance for IS projects. It was also revealed that a feasibility study must be conducted after the department has received an instruction from a client department.

To ensure service delivery, an IT governance committee has been established to monitor all IS projects' progress. Clerks of Works have also been appointed to monitor the progress of the projects to ensure the work is being done correctly, ensure that there is progress, and ensure construction site safety. In order to ensure collaboration and time-saving, the department has

implemented the turnkey contract approach, where a contractor is appointed from stage one to plan, design, and build an infrastructure facility in order to make it functional.

In order to align the PMS's in place with the project objectives and improve project planning, the Department has implemented the following strategies.

IT Governance Committee

In order to curb the many challenges that the department has with IS projects, the department has implemented the IT Governance Committee, which operates strategically at an executive level to monitor and identify any potential risks with the project. This committee was implemented to control and manage conflicts between the service provider and the department. It aims to find ways to overcome organizational obstacles that stand in the way of efficiently delivering IT projects. It further enhances the process of IT governance, and the committee has been implemented along with the IS project progress meetings that take place on Tuesdays and Thursdays, which are for providing an update on the progress of the project.

The tasks that are still outstanding and challenges faced are reported in the progress meetings in preparation for the IT Governance Meeting, where high-level reporting is done for decision-makers as the committee needs to ensure that the project aligns with the department's main objectives. However, this only provides updates that do not eliminate any challenges, as challenges still exist, such as those that cause project ineffectiveness; however, this intervention does strengthen decision-making.

Appointment of Clerks

The appointment of clerks of works helps ensure the day-to-day on-site responsibilities are well handled. They help ensure the construction site is safe for the workers by inspecting and overseeing the construction works. Clerks of works assist in lowering hazards by offering advice on issues related to health and safety. They are knowledgeable about the specifics of construction inspection procedures, especially those pertaining to material and workmanship inspections. On construction sites, a clerk of works keeps an eye on the job's quality, safety, and workmanship and reports back to the department and project manager. They check that building plans are being followed accurately and conduct frequent site inspections.

Additionally, they plan, organize, and oversee everyone's work to guarantee that the project is finished on schedule. They supervise and arrange for the completion of every task. Make sure

the work complies with project specifications and industry standards by conducting inspections and quality control procedures.

They are the representatives of the PMs on site who ensure they uphold quality standards throughout the construction process. Their role is vital as the department uses candidate PMs for some projects who lack the required experience, and this is a challenge that this strategy, as implemented by the department, does not eliminate the issue of lack of skill within the department.

The Turnkey Contract Approach

The Turnkey Contract Approach has also been implemented as a strategy to include the contract from stage one until stage seven. This streamlined approach requires that the department interact with the service provider during the whole construction process for efficiency. Turnkey projects frequently result in cost savings by combining duties under one contractor. Fixed-price agreements guarantee budget stability, averting overspending and enabling clients to distribute funds more effectively. Because the department won't have to handle several contractors or project management, the project risk is decreased, and the project completion is sped up as the contractor handles all stages of the project; turnkey contracts can be finished more quickly than typical contracts.

From the respondents, this approach has just been introduced, so not much can be deduced from it. However, its primary focus is on inclusion and eliminating challenges such as scope creep and involving the service provider during the design stage for inputs and possible recommendations.

5.2.3.1 STRATEGIES THAT CAN BE IMPLANTED TO MITIGATE CHALLENGES AFFECTING THE PMS

Despite the already existing strategies, the participants still felt the Department can implement the next three strategies that can eliminate the current challenges.

Training and Development

The department has IS project team members who are not aware of the PMS that is being used within the department to implement IS projects, and most of them have indicated that they have

not been trained to use the project management tool, Gantt chart. In addition to that, for some infrastructure projects, the department uses candidate PMs who have not gained enough work experience to be running with projects and who do not have the necessary skills and resources to take critical decisions, and this affects the department. Candidate PMs need to go under a mentor in order to gain the necessary experience. The mentorship involves being trained by a professional PM, where a logbook will be signed as part of the assessment criteria as well as required deliverables. Once the mentorship period has come to an end, the logbook can be submitted to the SACPCMP council for registration within the built environment. Such a training program should be mandatory within the department in order to qualify as a construction PM and be allowed to run projects on your own. Training for all IS team members should also be offered by the department to ensure project team members are aware of and have more insight on the PMS being used to ensure the well management and delivery of tasks.

Standard Documents

There are no standard, up-to-date, well-structured documents for IS projects that are every IS project's backbone that guide the department from initiation to closure. These documents can help set clear goals, define scopes, and ensure all teams and stakeholders are aligned so that they don't work in silos.

Using a predesigned, editable standard document, project managers can create and standardize project processes, reporting, communication, and other activities related to project and portfolio management. Conformance with the standard papers is not required; they are for common and repeated use, regulations, guidelines, or characteristics for products or related processes and manufacturing methods.

This recommended strategy will ensure that the Department has a central hub that oversees the provision of project management for all business units within the Department for successfully delivering projects on a timely manner. The ICT PMO would provide reports for the ICT Governance Committee on project performance as well as project progress. This strategy would help strengthen project delivery on time and within budget.

Feasibility Study

The department currently receives instructions from client departments for projects that have been promised by politicians to the community. The study showed that these projects are sometimes just mere projects to spend government funds because at most times there is no need for the project. Therefore, one technique for assessing the possibility of a project plan's success is the feasibility study. To ascertain whether the department can move on with the project or not, the feasibility study can evaluate the project plan's viability.

As part of the feasibility evaluation, project managers must determine whether they have sufficient funds, resources, and technology. The study must also determine the return on investment and take into account the societal benefit rather than a financial gain. To determine whether the project's return on investment justifies it, a risk assessment must also be finished.

Therefore, the recommended strategy to do a feasibility study should be standard, and this assessment should be done once an instruction has been received; it will help ascertain if there is a need for the proposed solution. This is vital, as this will assist in ensuring that all aspects of the proposed solution, including technical, economic, and environmental, have been taken into account for the proposed solution.

Award experienced service providers

Certain time and cost management abilities are necessary to produce project documentation and oversee the project process efficiently. With time and expertise, these time and expense management abilities develop. For all of its projects, the department should strive to reduce the number of obstacles and omissions in order to generate precise project cost estimates and an efficient execution timeline. If proper managerial and project management techniques are used, together with routine checks and project reviews, project failures can be avoided.

Getting service providers that have experience in IS or construction means that it comes with valuable knowledge and skills. Through their firsthand encounters with challenges, they gain practical understanding of how to run with projects and maneuver challenging times. Over time they develop problem-solving abilities and redefine their decision-making processes by focusing on delivering exceptional projects.

5.2.4 METHODOLOGY FOR EFFECTIVE IMPLEMENTATION OF PM SYSTEM

The data analysis revealed that to help devise a methodology that would best suit managing projects within the KZN DPW. According to the majority of the respondents, implementing the Agile PM would best suit construction projects for its flexibility and would allow teams to adapt to the changing circumstances of the project. Using the Agile methodology in construction means projects are divided into smaller, more doable stages, or sprints, enabling more regular input and modifications. This strategy can reduce delays and increase workflow effectiveness during the building process.

A suggestion from some participants to implement projects using the IPD approach, which ensures that all stakeholders are integrated and systems work collaboratively from the design to the construction stage. In order to mitigate the risk of having incomplete projects, the participants suggested that the department should start awarding experienced service providers to better manage and implement projects, as the department sometimes appoints inexperienced service providers to implement construction projects.

The department has a number of challenges regarding the PMS currently being used. Some of the tools and techniques used have had a negative impact, causing challenges that create bottlenecks that hinder project success and, other times, cause delays in the delivery of projects. In order to improve the PMS used by the KZN DPW for its project implementation and enhance the use of tools and techniques as well as the whole project execution, the following methods were suggested by the respondents: establishment of the IS PMO, implementation of Agile Project Management, and awarding experienced service providers.

Establishment of the IS PMO

The respondents revealed that the respondents are aware that the department does not have a PMO for IS projects, and therefore the majority suggested the establishment of the ICT PMO, which would assist in the coordination of tasks for IS projects, and it would provide project guidance for all project members. The ICT PMO would be responsible for the establishment of standard documents that can be used for all IS projects as the department uses standard documents from service providers. Ensuring that the department has its own standard documents would ensure that risks are easily identified by keeping a risk management plan where an assessment is done prior to project implementation and risk mitigation would take place. The PMO would also ensure effective and interactive communication with the business

units where collaboration would be advised, and this will eliminate having business units working in silos without any collaboration with other business units. The collaboration would ensure that business unit leaders prioritize projects and ensure projects are aligned to the department's strategic objectives. The PMO would ensure that there is resource planning for each project, as they would be contact persons and would therefore need to be upskilled if there is a lack of any skills for the tools being used or any lack of understanding of the PMS used.

The IS PMO will be a central hub for project governance, and project milestones will be tracked and monitored for project delivery as guidelines and processes will be well established for project-related activities. Currently, ICT monitors the project's implementation, and little attention is paid to the tracking of milestones within each project stage. Any change that takes place will be monitored and addressed accordingly. This will make it easy to provide a meaningful report update at the IT Governance Meeting for strategic decisions.

Another primary function of the PMO is managing a multi-project environment, which requires experts who offer strategic advice on project governance and process improvement. To guarantee that project team members receive the training they need to adhere to project management standards, the PMO would need to capacitate resources.

Agile Project Management

The respondents revealed that Agile Project Management would be suitable in ensuring the effectiveness of infrastructure projects. This suggestion was brought about because of its flexibility and collaboration. The Integrated Project Delivery was also suggested for its collaboration in implementing projects since service providers are only involved from the construction stage.

They further indicated that Agile would be preferred as it enforces collaboration; this would mean that head office personnel would not just close the projects without following the proper process and consulting with professionals so that they can make their fee claims because once a project has been closed, you cannot process any payments. This will enable proper closing of the project on IPIP because professional fees will also be fully paid, and no invoices will be stuck and cannot be processed on WIMS.

Experienced Service Providers

Further to that, the respondents suggested that the department should learn to award experienced service providers for both IS and infrastructure projects. Experienced service providers free up time for departments to concentrate on their core competencies by streamlining operations and processes. As a result, productivity and efficiency rise up. They have practical experience and frequently possess particular expertise and abilities that they bring to the table. The first-hand experience of service providers brings knowledge and expertise that assist in ensuring project success.

Additionally, in nature, construction projects carry some level of risk; risk identification and management involve expertise, meticulous preparation, and fast decision-making. When risks materialize, they can have a significant effect on the project's budget, timeline, and performance, which could cause delays and disagreements later on and might negatively impact your project's ability to be completed successfully when they materialize. Effective risk management can lead to more income, stronger client relationships, and the ability to expand and expand your business. Nonetheless, with careful planning and effective project management, these risks can be controlled and reduced.

Additionally, numerous obstacles face IS projects, which may result in their complete or partial project failure. Literature has shown that many IS projects are either delivered with critical features missing, some systems are prone to errors, labor-intensive, and as a result, some processes are performed manually. Some causes of these failures range from poor testing resulting from a lack of negative testing, insufficient test cases, and poor testing tools. Inadequate requirement engineering, design, and project planning are also part of the causes. The project will undoubtedly fail if the service provider lacks project management experience in using knowledge, skills, tools, and strategies to manage the project activities in line with project objectives and goals.

5.3 RECOMMENDATIONS

The data analysis led to the following recommendations. These recommendations provide specific guidance for decision-makers as they are based on the lived experiences of the four DDs situated at Head Office, 4 RDDs from the only 4 regional offices within the Department, 12 Project Leaders whose role is to act as the construction project managers and implementers

at a regional level, and the 6 participants who are working for the ICT section as that controls and monitors all IS projects for the Department. These participants are the DD for ICT, DD for WIMS, AD for ICT, AD for WIMS, System Administrator for Premis, and the IT Specialist who deals with ICT Governance. These recommendations are based on the challenges they face with the current project management system within the department and the strategies implemented to mitigate these challenges. The following measures are therefore recommended:

1. Training and development is an integral part of every government department. This function is usually coordinated by Human Resources Development (HRD) for the whole department. An annual training plan is developed and submitted for approval by the Head of Department (HoD) for that particular department. The ICT and Programme Management directorates should submit their comprehensive annual training plans for that particular financial year to HRD and ensure that the budget is included for these training plans. This will ensure that for every project they embark on, they send the project team members for training so that they can gain the required skills. According to the respondents, the department uses the Gantt chart to monitor IS project progress. However, this is not effective because most team members do not know how to use the tool. The ICT section can identify gaps from their projects lessons learned, and once all resources have been allocated for a particular project, they must send all project team members for training on how to properly use this tool and all other tools pertaining to IS project implementation, including the methodology. This will ensure that team members understand what is required from them. Also, candidates PMs don't have the necessary skills and resources to take critical decisions. They basically lack the necessary skills and experience, which ends up affecting the project's success, and the department has to train personnel on the proper use of WIMS. The strategy to train all team members prior to project commencement can assist other departments by following the same strategy when dealing with projects.
2. The department should ensure that invoices are paid within 30 days of being received. This has been legislated under the scope of the Public Finance Management Act, 199 (PFMA). Which clearly states in section 38(1) that all contractual obligations should be paid within the prescribed period of 30 days. According to some participants, the challenge with WIMS is that it can only be altered by a particular person at head office, a few at regional level, but in most changes that need to be made, it's usually at head

office. Then once some of those changes have been made, the system cannot be changed anymore. Once the WIMS system has been closed, you cannot process any other payments thereafter. If someone sees that the project has reached the final account stage and it's been basically successfully closed in terms of the infrastructure parts. They then quickly close the project without professionals being consulted and being requested to submit their fee claims. Because professionals have to wait until the final account is approved before they submit their claims. Once they submit their fee claims, you find that you know it's difficult to request a payment because on WIMS, that project has been closed. This leads to invoices being stuck at the office and cannot be processed and cannot be paid because WIMS is locked. Should invoices not be paid on time, a penalty should be instituted towards the department by the service provider.

3. Based on the feedback received from participants, currently there are issues with the PMS being used by the department to manage infrastructure projects. The system is not being updated until payment needs to be done. The PMs create a project and its stages from 1 to 7, but the PMs at Head Office who monitor projects can't find all information on the WIMS system as the projects sit at the inception stage without being updated, and the information gets updated when there is payment that needs to be made. The KZN DPW should consider implementing the Archibus system as anticipated and align it to IPDMS framework activities in relation to the construction industry. These activities involve planning, budgeting, procurement, delivery, maintenance, operation, monitoring, and evaluation of infrastructure projects. In addition to the above, they must ensure that the Archibus system does not process payments without having the project information updated first. System validations must be put in place for a complete and accurate PMS, and all PMs, consultants, and project leaders must receive prior training for this system. Systems that align to the relevant frameworks must be created with control measures by the relevant departments.
4. The KZN DPW should start updating and keeping their SOPs up to date with the current infrastructure information and align them to any current framework by the construction industry. Regular updates to SOPs are required for official guidance for all departments. They are, nevertheless, always being updated to verify the data you are sending to the department for future use. Departments should further capacitate PMs to update SOPs according to the industry-specific guidelines, standards documents, and standard

contract templates, aligning them to the current frameworks being used, as SOPs are also influenced by multiple projects and the issues identified during project implementation, not just the current frameworks and prescripts. Departments could save costs by avoiding appointing professionals to update the SOPs for the departments and the regions having their own unique documentation. All regions would have the same SOPs and documentation to ensure they are aware of lessons learned and how to navigate challenges.

5. Departments should ensure that when a project commences, all project members must sign performance agreements, which will bind them for the duration of the project. This agreement should stipulate the level of accountability for each project member. The agreement should clearly state the project goals and clarify work that is expected from the project team members, and also state their compulsory requirement to attend progress meetings or, if they are absent, nominate a representative to provide progress on pertinent issues. By doing this, departments will ensure that every team member is accountable for meeting deadlines, performing tasks to a high degree, and taking ownership of the outcomes. They will be held accountable for the caliber of their work and making a positive impact on the team as a whole.
6. Departments should set strong foundations for PMO offices for their projects. These strong foundations should be for clear communication structures, alignment, and commitment to the visions. All PMOs should have a maturity model, which assesses the effectiveness of the PMO in project delivery. Once a strong foundation for a PMO has been established, how a PMO implements its projects will then follow. To ensure the project stays focused on delivering agreed-upon deliverables, PMOs should lay a strong foundation when starting up a project. They must set clear and measurable objectives so that scope creep can be avoided or the variance should be minimal, and in return this will ensure that VOs are avoided during project implementation. They must always ensure that a project kick-off meeting is held to clearly communicate the goals and purpose of the project. The goals and objectives of the project must be clearly communicated. By ensuring that project analysis is done and all relevant stakeholders are present in the project kick-off meeting. It becomes much easier to identify and manage scope creep if you set a strong project foundation where goals and objectives are well communicated.

7. Since the construction mafia also known as ‘Amadela ngokubona’ is a national issue National Public Works together with National Treasury should devise a plan on how to deal with the construction mafia by all provincial Departments. Employing private security on site to ensure that only authorized and legitimate employees are allowed to go on site, and this should assist in combating the scourge. The communities as well where construction projects are taking place should be made aware and taught how to fight and not allow these construction mafia’s to interfere with the projects as this hinders their own community development.
8. The Department must develop an IS PMO with a strong foundation for IS projects. This means goals and objectives must be clear. Executive buy-in must be obtained with a solid plan on how the PMO intends on improving the Department’s existing project management capabilities and advance the Department’s strategy. The PMO should have a basic PMO Charter which will have clear mission and vision statements, as well as the PMO’s KPI’s. The scope of the PMO should be indicated as well as its portfolio management. This will ensure the position of the PMO and its degree of control. Developing a PMO for IS projects within the KZN DPW will mean that their multi-project environment will be well managed, resources will be carefully planned, trained/coached, and allocated accordingly which will foster strong collaboration between business units. Further to that, methods, processes, and tools will be standardized. The PMO will also be involved in identifying risks for IS projects, and offer strategic support.
9. When the Department establishes the IS PMO, this PMO should ensure that there are inputs from stakeholders. They must use tools and techniques to relay the project objectives, and outputs from the service provider that speak to the inputs provided by the stakeholders. This will minimise the communication breakdown. The breakdown that happens between the IT section, stakeholders, and the service provider. As a result, this communication breakdown has ripple effects on the project outcome. The PMO will ensure that the proper processes are followed to ensure timely and appropriate collection of required information for the purposes of the project. Effective communication will be undertaken and followed by the project manager within the IS PMO to fit the project objectives.

10. Before politicians makes promises to communities, there must be proper consultation needs to take place first within the Department with the PMs so that they can then embark on a feasibility study to see if the project is viable. A proper needs analysis should also be conducted to determine the long term goals for the project, identify the desired outcomes, performance effort, and establish the appropriate solution. Once the feasibility study has been conducted and a needs analysis has been done, the PM can then consult with the technical advisors who work for Treasury to advise further as they have access to the IRM system where all Department construction projects are entered and they can see all the proposed projects. They can filter all projects within a district if the projects are not clashing, duplicating, and affecting each other. They will then have to look at the each Department's budget on the B5 which is the baseline budget to see if there is adequate funding to undertake the project. Once all these processes have been completed within a stipulated time then the information can be presented to politicians to allow them to make their promises to the communities for the purposes of gaining voter confidence.
11. Every financial year, each Department must do their baseline budget on B5 which informs the IRM system which seats at National Treasury. An infrastructure plan is set by all Departments and submitted to National/Provincial Treasury for that financial year and in addition each Department's budget is monitored by the Technical Advisors (TAs). However, when Departments send their instructions to KZN DPW they don't go back to the TAs to check if a certain project does not clash with an infrastructure plan for another Department and they don't check if their budget aligns with their scope. Instead of avoiding doing projects without properly checking for available budget it's advisable that client Departments first check with the TA assigned to their Department for available budget and if project does not clash or duplicate with other projects from other Departments. The integration of Departments by TAs would assist in avoiding variation orders as the scope would be aligned to available budget and nothing would be chopped off by client Departments to suit the scope. There would be no putting a project on hold because of lack of budget and political influence as a feasibility study would be conducted thoroughly. The same goes for projects made as promises by politicians.

12. The Department should look into adding more budget for their training and development plan. They should liaise with their HRD to ensure that budget for training for project members is always available at the beginning of each financial year. Risk of shortage of skills is a necessary and intrinsic part of carrying out a project. It frequently has a negative effect on the project or even causes the project to fail. Risk protection, which lowers risk loss, and risk prevention, which lowers shortage of skills risk likelihood, should both be taken into account to guarantee the successful completion of the project. Project managers should be able to allocate the budget between these two strategies in a reasonable manner, taking into account the disparities in the costs and outcomes of each strategy as well as the restricted project budget.
13. The KZN DPW should add the Monitoring & Evaluation (M&E) strategy to their PMOs which can work as a powerful tool to improve project delivery and impact continuously. As much as the Department invests in implementing IS Projects due to a need within the Department, project managers within the PMO should continually assess, review and evaluate if progress is being made using indicators in achieving expected results for each stage, prior to getting sign-offs for each stage. This should assist in identifying bottlenecks in the implementation process and highlight whether there are any unintended effects from the initial project plan.
14. The Department should get the TA involved as this would play a significant role in the budget and the management of instructions sent by clients. Since TAs have been appointed by National Treasury to manage and monitor construction projects for all client Departments. When a client submits their instructions, the Department should undertake a feasibility study upon receiving the instruction to ascertain the need of the project vs the solution and then send the instructions to the TA assigned to the client Department to check if the instruction does not clash with a project from another Department in a certain region. This would minimise the risk of duplicating projects and spending the budget unnecessarily. There is no reason to proceed with the project if the need is not addressed by the offered solution.
15. The department and other departments should implement the turnkey contract approach strategy that would work in eliminating time overruns for projects, the service provider appointed would plan, design, and build a project to make it ready for use without

tampering with the budget and at a fixed time. This means that the service provider would be involved from stage 1 up until project close out stage.

16. Implementing the Prince2 methodology would work best for the IS projects for a number of reasons, one of them being that it's structured process based so following a project would be much easier. Its main goal is focusing on the organisation that the project is being implemented for and having control over a project. Prince2 can be used as a framework and is flexible to any project. Paired with the right tool when team members have been trained on how to use it, Prince2 makes it easier to use the tool for tasks with clear dates and task owners. By using Prince2 organizations can develop an improved project organization and control through its structured approach.
17. The Department should implement the functionality criteria to appoint service providers that have the right and required experience for both IS and infrastructure projects. By using the functionality criteria to only appoint service providers who have the experience, who are qualified, and have a good record of excellent work performance, departments stand a good chance of receiving quality of work. This strategy would help eliminate project time and cost overruns as experienced service providers plan against time and cost overruns prior to commencing a project. A thorough plan of costs and unexpected costs would not exceed the planned budget for the project. An experienced service provider would also come with their experienced PM who would manage communication and monitor project constraints such as risk, cost, time, quality, and scope. Ensuring the appointment of a skilled and experienced service provider would also assist the Department in managing the IPIP very well without making too many changes due to VO's, spending on contingencies, and exceeding project budget.
18. The department and other client departments should implement the Agile Project Management (APM) for more efficient project management system for infrastructure projects. The APM enforces flexibility to adapting to each project. Meaning each project will be approached on an individual basis. Ensuring that the needs and objectives of each project are managed accordingly. This method involves breaking down large projects into manageable parts by ensuring collaboration and continuous

improvement. Daily or weekly meetings must be held to discuss project achievements and challenges that require addressing.

19. The department should implement the IPD, which involves all stakeholders, from architects to surveyors to service providers, etc., from initiation to project closeout. This project delivery method is distinguished by early project participant involvement, risk and reward sharing, a buy-out stage that takes the place of traditional bidding in lieu of the tender stage, and a delay in payment of profits until all project works are finished. As a result, IPD needs a unique approach to financial management in addition to a platform for collaboration, which ensures that all stakeholders are involved in all stages of the project. These stakeholders are joined into a single agreement to ensure project delivery.

20. When using IPD and the functionality criteria, the department should be strict on ensuring that regulatory bodies are involved to ensure uniformity in how construction projects are understood, handled, and implemented. By involving regulatory bodies, the regulatory bodies will assist departments in ensuring that their performance and standard are of high quality. And whenever the department's professionals do not understand something, the department can always liaise with regulatory bodies for assistance and regulation.

5.4 STUDY IMPLICATIONS AND CONTRIBUTION TO THE BODY OF KNOWLEDGE

Although studies have been done on the project management systems in government on a global context, there still remains a gap in studies on South African project management system being used by departments to help identify challenges that hinder effective project delivery. According to Gemino et al. (2021), inadequate planning, poor communication, a lack of risk management, and an inability to adequately monitor progress and address issues as they arise are often the causes of poorly managed projects, which can result in problems like missed deadlines, budget overruns, low-quality deliverables, and an overall failure to successfully complete the project on time and within specifications.

This study has provided an overview of project implementation within the KZN DPW and how poor implementation of tools and strategies can lead to ineffective project delivery. The study

showed that strengthening the implementation of effective tools, strategies and frameworks is important for effective project delivery. Over and above that, in South Africa little research has been done on project tools and strategies and the experience of project team members.

The findings and recommendations of this study identified challenges with the current project management system used within the KZN DPW IS and construction projects that are the main cause of ineffective project delivery. The findings further revealed strategies that the participants deemed would assist in strengthening the project management system and lessen the challenges faced within the department. The strategies suggested by the participants are evidence based. The study further showed that early implementation of frameworks during project implementation can assist in creating a clear project structure, encouraging improved teamwork, spotting possible risks early, optimizing workflows, and guaranteeing uniformity throughout the project lifetime by offering a predetermined set of procedures and best practices to adhere to from the start.

In addition, training and development has been mentioned broadly but little research has been done to show its importance in building team members to ensure they have the necessary knowledge and skills to successfully implement projects. Lack of training showed that there is an interconnection between lack of training and lack of budget as having budget which will enable proper training for team members and which would allow the department to employ qualified construction project managers to ensure that the skills knowledge is strengthened within the department.

The results also showed that there is no systematic approach in addressing challenges as the department has 2 PMOs for construction projects, one at the regional level and the other at the head office, which provides challenges when coordinating projects and amending important documents, as regions usually update their issues and challenges encountered during project implementation. They also write a memo that is suited for their region according to their own challenges. In addition, when politicians go out to the community and make promises of projects without a feasibility study being conducted by the client department and KZN DPW is also another challenge that prohibits project managers from effectively performing their duties. In addition, the study also showed that trying to meet client expectations and timelines that turn into unrealistic deadlines also hinder the KZN DPW PMS from achieving some of its projects. As a result, late delivery or missed deadlines have an effect on the project cost as a

whole and may require additional resources. Literature has found that these challenges indicate that this is not only a KZN DPW challenge but a global challenge facing organisations implementing similar projects.

The results also revealed that the environment at KZN DPW provides many challenges which prohibits both the IS project team members and the construction team members from effectively delivering projects. The team members are faced with challenges within the environment such a lack of budget that prevent them from getting proper training, thereby compromising their capabilities.

Proper project management training and a systematic approach is required for both IS and infrastructure projects. This will help strengthen the use of tools and strategies that are already employed by the department. The study findings contributed to the body of knowledge by adding that if the project time is disturbed, then the project budget and quality gets altered as this golden triangle relationship is directly proportional to each other. The findings of the research help provide clear suggestions for the effective project management systems for IS and infrastructure projects within DPW. This will benefit the project management body of knowledge of South Africa. This study further adds to the body of knowledge on the PMBOK theoretical framework as studies have shown that issues related to ineffective and inefficient project management undoubtedly results in wasted resources, project time and project cost.

5.5 RECOMMENDATIONS FOR FUTURE STUDIES

The study focused on exploring the KZN DPW PMS used to implement both its IS and infrastructure projects. Challenges and limitations were identified. The KZN DPW, other departments and the private sector stands to gain from the recommendations suggested as these are believed will help improve how projects are implemented using the current tools and techniques.

The recommendations for future studies are as follows:

1. The study was done in the KZN department of Public Works. A comparative study must be conducted between the provincial department and another provincial department to establish the tools and strategies being used to implement their projects. And to establish how the department deals with arising challenges to ensure effective project delivery.

2. A comparative study must be conducted between two Provincial Departments of Public Works on the tools and strategies used to implement their projects.
3. After a fair period of time has lapsed, it is recommended that the same study be conducted to establish if there is any improvement within the KZN DPW in its projects delivery.

5.6 LIMITATIONS

According to Akanle et al. (2020) The study's scope and limitations are crucial components of quality social research, and they need to be carefully considered. The study consisted of all participants that were anticipated to participate. However, the study limitations were as follows:

- Dates of the scheduled interviews had to be rescheduled as some participants were either busy with AG matters or had project matters to deal with on the scheduled dates. This was mostly infrastructure regional PM's who had very tight schedules. At most, 2 participants were interviewed per day. This was a problem because the researcher resides in Pietermaritzburg where head office is located and some of the participants are in the far KZN North Coast, where the North Coast Regional office is based and some in Ladysmith where the Midlands Regional office is based.
- The scope and sampling approach used limited me to only selecting participants within the KZN DPW department. The IS and infrastructure projects involve other client departments and other business units and also service providers. Had the scope allowed me to involve other clients and service providers, a broader population would have been selected. However, this did not in any way compromise the value and reliability of the study.

However, this limitation did not, in any way, devalue the information provided by the chosen sample.

5.7 CONCLUSION

The study findings showed the perspective of the participants who work for both IS and construction projects and showed the challenges faced by the PMS of the Department that should not be ignored as they have a negative effect on project delivery. The majority of the respondents understand the challenges that the Department faces with its project management

tools and techniques. Some of these challenges are due to lack of understanding of the PMS being used, which forces them to work in silos and skip project progress meetings where they are supposed to provide updates on the tasks assigned to them. But because they lack understanding of how to carry out those tasks, skipping progress meetings becomes their escape gate. Consequently, these challenges result in project delays such as invoice payments, project delivery, etc. Lack of training and development within the IS and construction projects implementations has a negative effect on the project implementation as a whole.

The study findings showed a couple of tools and techniques that are being used by the Department to achieve their key goals and objectives for their projects. The findings also revealed the challenges faced by the Department during the use of the tools when they're implementing their projects. Further to that, the implementation of IS projects can be improved, with strategies such as providing training in order to get the project members developed, the establishment of the PMO where projects can be easily managed and standard documents for the Department can be created, and the formulation of the IT Governance Committee and Steercom which operates strategically in an executive level to monitor and identify any potential risks.

The study also indicated that some of the challenges faced by the KZN DPW PMS include the construction mafia, scope creep, non-existent of the IS PMO, working in silos, lack of skills, no standard documents, and manual filing of documentation. Scope creep usually takes place at the inception of the project. As a result, this has cost implications as budget planned for the project usually gets amended to accommodate additional requirements that were left behind from inception. The study showed that scope creep is detrimental to a project since it can result in missed deadlines, overspending, and subpar project output. It goes without saying that more time and/or money will be needed as the quantity of work that has to be completed grows.

The study further provided perceived strategies that can be further implemented to lessen the identified challenges. It also showed how these challenges are connected to the entire PMS cycle and that the environment does not allow for efficient project management implementation, for both IS and construction projects, given that there is no proper IS PMO and that the infrastructure PMO happens at two levels. The KZN DPW will benefit from this research as it can assist manoeuvre current project challenges that have caused delay or have led to project being put on hold due to no progress.

The study findings also showed how the implementation for infrastructure projects can be improved. Strategies such as conducting a feasibility study after receiving an instruction from the client Department, appointing clerks of works, and the introduction of the turnkey approach where contractors are involved from the beginning of the project until project close-out all have a significant role to play in mitigating the identified challenges.

All these strategies for IS and infrastructure project teams which are evidence-based can help improve the PMS within KZN DPW and further recommendations were made to assist the Department in eliminating the challenges.

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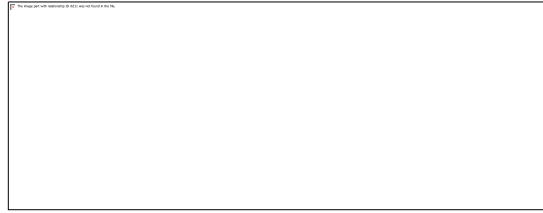
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Appendix 1



INTERVIEW GUIDE

OBJECTIVE 1: To investigate the tools and techniques of the current Project Management System in Kwa-Zulu Natal Department of Public Works.

- What are the tools and techniques employed by the Kwa-Zulu Natal Department of Public Works for its projects?

- How effective is the current Project Management System in the Kwa-Zulu Natal Department of Public Works?

- What are the challenges with the tools and techniques implemented in the current PMS?

- What are the current measures/ principles that are employed within the Kwa-Zulu Natal Department of Public Works?

OBJECTIVE 2: To investigate the challenges facing the Project Management System in the Kwa-Zulu Natal Department of Public works.

1. What are the challenges facing the current Project Management System in the Kwa-Zulu Natal Department of Public works?

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2. What is the degree of control of the Project Management Office (PMO) in ensuring the projects achieve their objectives?

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3. To what degree does the PMO ensure compliance to project governance?

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4. To what extent is the PMO involved in ensuring establishment of standard documents and ensuring appropriate compliance to project implementation?
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-
-

OBJECTIVE 3: To investigate the strategies that have been implemented to mitigate the challenges affecting the Project Management System in the Kwa-Zulu Natal Department of Public works.

1. What are the challenges facing the project management practices within the Kwa-Zulu Natal Department of Public works?

2. What strategies can be implemented to mitigate the challenges affecting the Project Management practices in the Kwa-Zulu Natal Department of Public Works?

3. What project management strategies have been implemented to improve project delivery?

OBJECTIVE 4: To establish a methodology that would be affective in implementing the Kwa-Zulu Natal Department of Public Works projects.

1. What tools and strategies would be affective in implementing the Kwa-Zulu Natal Department of Public Works projects?

2. What strategies can be implemented to improve project implementation practices in the Kwa-Zulu Natal Department of Public Works?

UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)

APPLICATION FOR ETHICS APPROVAL For research with human participants

Information Sheet and Consent to Participate in Research

Date:

Greetings,

My name is Nkosingiphile Zelda Mbeje from The Department of Public Works, [REDACTED],
[REDACTED] I am conducting this study as a requirement to fulfill my
master's full research in Management under University of KwaZulu Natal

You are invited to participate in a study titled "Exploring the Effectiveness of the Project Management System: A Case Study of the KwaZulu Natal Department of Public Works". The aim of this research is to investigate the effectiveness of the methodologies being used within the Department of Public Works regarding project delivery. The study is expected to include 26 participants: 10 from the Head Office and 16 from Regional Offices. It will involve the following procedures: in-depth interviews and analysis of existing documents and archives. All interviews will be audio recorded in English, after obtaining permission from the participants. This allows the interviewer to concentrate on asking questions and engaging in a purposive conversation with the participants. The duration of your participation, should you choose to participate and remain in the study, is expected to be 1 year. The study is privately funded by the researcher.

There are no hidden risks or hidden agendas, as participants will not be implicated in any way due to the research conducted. The researcher will ensure anonymity is observed at all times; no information in the responses, reports, or any published work will reveal or indicate the identities of the study participants

We hope that the findings of the study will assist in making the necessary changes to improve the methodologies being used to implement the projects within the department of Public Works and its programmes operations. There is no direct risk to this study, therefore no compensation exists.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number HSSREC/00006403/2023).

In the event of any problems or concerns/questions you may contact the researcher at [REDACTED] 0 or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban 4000 KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557- Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Your participation in the study is voluntary and by participating, you are granting the researcher permission to use your responses. You may refuse to participate or withdraw from the study at any time with no negative consequence. There will be no monetary gain from participating in the study. Your anonymity will be maintained by the researcher and the School of Management, I.T. & Governance and your responses will not be used for any purposes outside of this study.

All data, both electronic and hard copy, will be securely stored during the study and archived for 5 years. After this period, all data will be destroyed.

If you have any questions or concerns about participating in the study, please contact me or my research supervisor at the numbers listed above.

Sincerely

Nkosingiphile Mbeje

(Researcher name and signature)

CONSENT TO PARTICIPATE

I (**Name**) have been informed about the study entitled “Exploring the Effectiveness of the Project Management System: A Case Study of the KwaZulu Natal Department of Public Works” this study aims to investigate what causes the ineffectiveness of the current Project Management Systems (PMS) in KZN DPW by Nkosingiphile Zelda Mbeje.

I understand the purpose and procedures of the study.
I have been given an opportunity to ask questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.
I have been informed about any available compensation or medical treatment if injury occurs to me as a result of study-related procedures.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher at [REDACTED].

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban

4000

KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557 - Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview / focus group discussion	YES / NO
Video-record my interview / focus group discussion	YES / NO
Use of my photographs for research purposes	YES / NO

Signature of Participant

Date

Signature of Witness
(Where applicable)

Date

Signature of Translator

Date

UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)

APPLICATION FOR ETHICS APPROVAL For research with human participants

Information Sheet and Consent to Participate in Research

Date:

Greetings,

My name is Nkosingiphile Zelda Mbeje from The Department of Public Works, [REDACTED]
[REDACTED] am conducting this study as a requirement to fulfil my
full research in Management under University of KwaZulu Natal

You are invited to participate in a study titled "Exploring the Effectiveness of the Project Management System: A Case Study of the KwaZulu Natal Department of Public Works". The aim of this research is to investigate the effectiveness of the methodologies being used within the Department of Public Works regarding project delivery. The study is expected to include 26 participants: 10 from the Head Office and 16 from Regional Offices. It will involve the following procedures: in-depth interviews and analysis of existing documents and archives. All interviews will be audio recorded in English, after obtaining permission from the participants. This allows the interviewer to concentrate on asking questions and engaging in a purposive conversation with the participants. The duration of your participation, should you choose to participate and remain in the study, is expected to be 1 year. The study is privately funded by the researcher.

There are no hidden risks or hidden agendas, as participants will not be implicated in any way due to the research conducted. The researcher will ensure anonymity is observed at all times; no information in the responses, reports, or any published work will reveal or indicate the identities of the study participants

We hope that the findings of the study will assist in making the necessary changes to improve the methodologies being used to implement the projects within the department of Public Works and its programmes operations. There is no direct risk to this study, therefore no compensation exists.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number HSSREC/00006403/2023).

CONSENT TO PARTICIPATE

I (Owethu M. Krexe) have been informed about the study entitled "Exploring the Effectiveness of the Project Management System: A Case Study of the KwaZulu Natal Department of Public Works" this study aims to investigate what causes the ineffectiveness of the current Project Management Systems (PMS) in KZN DPW by Nkosingiphile Zelda Mbeje.

I understand the purpose and procedures of the study.

I have been given an opportunity to ask questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

I have been informed about any available compensation or medical treatment if injury occurs to me as a result of study-related procedures.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher at [REDACTED]

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557 - Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview / focus group discussion	YES / NO
Video-record my interview / focus group discussion	YES / NO
Use of my photographs for research purposes	YES / NO

[REDACTED]	13/03/2024
Signature of Participant	Date

[REDACTED]	13/03/2024
Signature of Witness (Where applicable)	Date

_____ Signature of Translator (Where applicable)	_____ Date
--	---------------

Appendix 4



KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Directorate: Information and Communications
Technology
Private Bag 89041
PIETERMARITZBURG
3200
Tel: 033 260 3745
Fax: 033 260 3743
Enquiries: Mr N.Z. Majoje
Email: Nkosi.Majoje@kzwworks.gov.za
Ref:

To whom it may concern

Ms. Nkosinophile Z. Majoje, student number 218971321 is a Master of Commerce (Management) candidate at the University of KwaZulu-Natal- Westville campus. We at the KZN Department of Public Works acknowledge and understand that her research project will contribute towards her Master's thesis project titled: **An investigation on the Project Management System effectiveness: A case study of the Kwa-Zulu Natal Department of Public Works**

The KZN Department of Public Works is aware that the study will take place during office hours for which she will be collecting data by means of interviewing key person(s) in the KZN Department of Public Works when she deems necessary to achieve the objectives of this research

The KZN Department of Public Works supports and understands that this project involves accessing personal views and information from the selected sample size from KZN Department of Public Works. Such data will be provided to the researcher with all personally identifying information; however during the data presentation in the form of the final thesis e.g., names shall be removed so that the data cannot be traced to any individual.

I support and grant permission to conduct this research at KZN Department of Public Works

Mr S.P. Majola

KZN Department of Public Works

Appendix 5



07 March 2024

Nkosingiphile Zelda Mbeje (218071331)
School of Management, IT & Governance
Westville Campus

Dear NZ Mbeje,

Protocol reference number: HSSREC/00006403/2023

Project title: Exploring the effectiveness of the project management system: A case study of the KwaZulu-Natal
Department of Public Works

Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 08 November 2023 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

Incidents of adverse events and serious adverse events (AEs and SAEs) should be reported in writing to HSSREC, the study sponsors, and any regulatory authority (where appropriate), within 7 working days of the occurrence for local sites and 14 days for all other South African sites.

This approval is valid until 07 March 2025.

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

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Yours sincerely,



Professor Dipane Hlalele (Chair)
/ms

Humanities and Social Sciences Research Ethics Committee

Postal Address: Private Bag X54001, Durban, 4000, South Africa

Telephone: +27 (0)31 260 8350/1557/3587 Email: hssrec@ukzn.ac.za Website: <http://research.ukzn.ac.za/Research-Ethics>

Founding Campuses:  Edgewood  Howard College  Medical School  Pietermaritzburg  Westville

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