ORGANIZATIONAL LEARNING AND KNOWLEDGE MANAGEMENT: APPLICATION WITHIN THE KWAZULU- NATAL DEPARTMENT OF PUBLIC WORKS

A Research Report presented to the

Department of Construction Economics and Management

By

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DEDICATION

“Don’t you know yet, It is your light that lights the worlds”- RUMI

I dedicate this work to my son, L. M. Khumalo. Your arrival gave me the courage not to give up and forced me to always be the best version of myself because you are watching.

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This academic journey proved to be a long and challenging one, yet God in His infinite goodness has carried me through. In pursuing this dream, I encountered many people who made significant contributions to make my dream come true.

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ABSTRACT

Organizations invest millions in planning for investments and projects and apportion very little to nothing for evaluating and learning from them. This study reviewed the current knowledge management practices, particularly project closeout information at the KwaZulu-Natal Department of Public Works. This report provides a review and interpretation of knowledge management literatures in the project environment with a focus on the project closeout stage and the role and value that lessons learnt from post project reviews could potentially provide to project teams to improve current and future project implementation efficiency.

A qualitative research approach, using thematic analysis and interpretive philosophy was used to analyse the data collected in this study. Semi-structured interviews, along with a survey questionnaire, were conducted with a selected sample of construction project managers and portfolio managers. Furthermore, the results of this study indicate that project managers see the value in cross project learning and senior management must have a structured knowledge management system in place that supports sharing of information and cross project learning that if implemented efficiently can aid in improving the performance and outputs for current and future projects.

The proposed study will contribute to the fields of project management, cross project learning and knowledge management in the project environment. The study will look at means of fostering and improving the existing learning platforms within organizations with the aim of growing the organization's capacity and project implementation efficiency.

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LIST OF ABBREVIATIONS

KZN- DOPW – KwaZulu-Natal Department of Public Works

SOPS- Standard Operating Procedures

PMI – Project Management Institute

PMBoK ® – Project Management Body of Knowledge

PPRs- Post Project Reviews

PPAs- Post Project Appraisals

PIRs- Post- Implementation Reviews

AARs- After Action Reviews

IDT- Independent Development Trust

DOH- Department of Health

DOE- Department of Education

DSD- Department of Social Development

DOT- Department of Transport

APPENNDICES

CHAPTER 1: INTRODUCTION TO THE RESEARCH REPORT

1.1 INTRODUCTION

This chapter provides an introduction to the research topic and outlines the research scope, limitations and methodology. This chapter introduced the concept of knowledge management within an organization and related topics in the infrastructure development sector. Related topics such as project closeout procedures, Post-Project Reviews, lesson learnt reports, the effects of organization culture in the knowledge sharing process, knowledge sharing practices, access to captured and stored past project information as well as informal learning platforms and such as communities of practices in the workplace will be introduced and briefy discussed.

The study will explore how KZN- DOPW creates, generates, disseminates, stores and shares its knowledge and information resources. The study will also investigate how knowledge management initiatives can support decision making to enhance organizational productivity and effectiveness. This relates specifically to developing relevant information and knowledge strategies, to understanding an organization's knowledge and information needs and aligning these with the right tools that will facilitate efficiency in the organization's core engagements (Aliba, 2008).

1.2 INTRODUCTION TO THE RESEARCH TOPIC

Scarborough, Swan and Preson (1999) define Knowledge Management as *" any process of creating, acquiring, capturing, sharing and using knowledge wherever it resides, to enhance learning and performance in organizations*." Knowledge management is therefore critical in organizational growth (Nokana, 1991).

A study on knowledge creation and sharing that was conducted by Nonaka (1991) found that in the tough economic markets and economy where uncertainty is a norm and the only lasting competitive advantage to organizations is knowledge.

The success of projects depends heavily on the right combination of knowledge and experience, therefore the distribution and access to relevant information is critical. (Rao, 2008). Disterer (2002) found that *"at the project closeout phase of a project, the exchange of information often comes to a standstill due to various factors such as burnout, incentives/ lack of motivation"*. Knowledge and experiences about methods and tools (processes) used in projects that may be useful to other project teams and employees in the organization is sometimes not captured and therefore not available for use in future projects. Disterer (2002) and Rao (2008) add that knowledge and experiences gained from past projects can be systematically captured in project closeout reports and be stored and disseminated throughout the organization for other project teams to use in current and future projects.

Closeout reports contain product information and specifications, instructions, user manuals, as- built drawings, warranties and guarantees, certificates of compliance and various schedules and lessons learnt. Disterer (2002) cited that previous project knowledge needs to be easily accessible to everyone at any given point in time hence most organizations create databases to store project closeout reports (Newell *et al.*, 2006). Project members are tasked with capturing the knowledge and learnings from their project in the form of 'lessons learned' in the project closeout report (Disterer, 2002). Lessons Learnt form part of the project closeout reports and are a common strategy used to transfer project specific knowledge from one team to another. Newell (2004) agrees with the view and add that lessons learnt are an efficient and effective way of transferring valuable project knowledge: the successes, failures and avoidable mistakes (processes and tips).

Lessons learnt are usually captured in project closeout reports, which are stored on databases (virtual drives, physical libraries and archives) for others to access (Newell *et al.*, 2006). Lessons learned are an outcome of an after action review (AAR) where the project objectives are reviewed by asking questions such as, What did we set out to do? What actually happened? Why did it happen and What are we going to do next time (Carrillo, Harding and Chaudhary, 2011). The author added that the main limitation of lesson learnt is the application or use of them in future projects by employees when undertaking new projects of a similar nature. In most cases these reports are filed away never to be seen or made reference to again.

PPRs, which are also known as Post-mortem project evaluations are conducted by the project team members and have the objective of "*evaluating past experience and developing lessons learned for the benefit of future projects* " (Schalken, Brinkkemper, and Vliet, 2004). Lessons learned from project closeout reports are discussed and documented in PPRs or post project appraisal meetings where the aim of the sessions are for the project team to present and discuss their project's experiences and lessons learnt in an effort to assist other employees within the organization with experience retention for future reference.

In a typical PPRs session, a project is presented, in groups, participants are instructed to compile individual lists of good and bad things they experienced and observed about the project process (WHYs and HOWs) and course of action and make recommendations for future projects in a form of a comprehensive lessons learnt report (Busby, 1999).

Studies have found that in order to conduct effective PPRs, there has to be management support, the right stakeholders should be involved and knowledge should be shared across projects in both formal and informal ways (Newell *et al.*, 2006). A survey on PPRs in Research and Development (R&D) projects revealed that

only one out of five (20%) R&D projects conducted a PPRs at the end of the project, which is a loss to organizations as PPRs have a great potential for competence building (Zedtwitz, 2002).

Wenger, (1998:1) described Communities of Practice (CoPs) as *"groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly".* CoPs generally create a relaxed environment that is conducive to knowledge sharing and learning and they allow participants to share both tacit and explicit knowledge and create an ongoing culture of informal project knowledge sharing (Clautier, 2007).

Projects can be considered as 'Learning Generators' and project teams as primary forms of CoPs because that is where knowledge is generated (Jugdev, 2012). The author further added that effective lessons learned culture could be embedded into a company's practices, especially through informal learning and sharing practices, such as through CoPs which play an important role in individual and organizational professional development.

The structure of CoPs can be adapted by organizations to promote a more effective cross project learning environment and the organization's performance will improve as employees and team members will learn to deal with project closeout reports in a more humanistic manner (Clautier, 2007). CoPs generally create a relaxed environment that is conducive to knowledge sharing and learning and they allow participants to share both tacit and explicit knowledge and create an ongoing culture of informal project knowledge sharing. Professionals are urged to be affiliated or belong to multiple CoPs and participate in knowledge brokering, knowledge encounters and reflective practices as a part of their professional development where they get to meet and have topic specific presentations, group

discussions and sit down one on ones with industry experts in a social environment (Lesser and Stark, 2001).

1.3 BACKGROUND

Studies show that projects are often plagued with problems and very few projects eventually achieve their operational objectives on time and within the stipulated budget (Clautier, 2007).

Kwa-Zulu Natal Department of Public Works (KZN- DOPW) is one of the leading infrastructure development and/or implementing agents (IA) for the various government departments in KwaZulu-Natal and is the custodian of all state-owned immovable assets within the Province. It provides integrated immovable asset management as well as infrastructure planning, maintenance and development on behalf of client departments (Sharpley, 2019). Project targets and performance based on the construction project lifecycle are documented in the departmental annual report for presentation by the MEC to cabinet (Sharpley, 2019). The detailed annual report is compiled as a means of enforcing transparency and accountability to both National Treasury as well as the general public and is aimed at demonstrating the extent to which state infrastructure development has played key roles as both an economic driver as well as meeting the crucial obligations of service delivery to South Africans (Sharpley, 2019).

Project closeout is therefore an important stage where the project manager and the team get to identify and capture the new knowledge learnt during the course of the project and prepare means of transferring the knowledge to other projects (Disterer, 2002).

The conclusion of a detailed closeout report with lessons learnt is vital to ensure that knowledge knowledge (tips and process knowledge and information) and experiences from the project are captured and stored and can be retrieved and used in future projects(Disterer, 2002; Kaul, 2014). A common problem is that once a project is completed, project teams disperse and return to their functions/ units without compiling a comprehensive closeout report of the project as well as conducting PPRs for the lessons learnt report (Cloutier, 2007). Newell *et al*.,(2006) agreed and cited that Project team members are often under pressure to move to new projects causing decentralization and knowledge fragmentation and eventually loss of valuable knowledge resulting in recurring failures or repetitive mistakes.

Disterer (2002) noted that a large quantity of valuable experience is gained during the course of a project. Such experiences are potentially useful in other future projects. The lack of planning and resource allocation at project closeout stage is found to be the root course for the absence of proper project closeout procedures such as the gathering, reviewing, compiling lesson learnt reports, dissemination and storing of valuable project knowledge that comes is both tacit and explicit form (Kaul, 2014).

It is a common occurrence within government departments that are infrestructure implementation agents such as the Department of Public Works (DOPW) to be furnished with incomplete project briefs and specifications from the client departments, and face complex and inflexible approval processes as well as pressure to deliver the product in unrealistic timelines which often leads to cutting of corners and not conducting adequate Quality Assurance throughout the project stages. Kaul (2014:11) found that " *very few projects actually meet their completion deadlines with the desired efficiency all the way to final completion*."

Only a few firms have been able to successfully transfer valuable knowledge from past projects to following or upcoming projects as the closeout reports are rarely stored correctly and in instances where they are, project teams rarely make reference to the available closeout reports(Disterer, 2002; Rao, 2008).

Lessons learned involves sharing knowledge about the elements of specific project phases that were successfully completed, components that require further improvement and plans to address these issues before moving on to the next phase (Jugdev, 2012). The author further adds that negative events often compel companies to add lessons learned practices to their project management processes. In cases where these reports are compiled correctly, the reports are filed away and often never to be accessed again. This means that potentially essential knowledge that may assist other project teams is not exploited (Carrillo, Harding and Chaudhary, 2011).

Nokana (1991) noted that new knowledge in a form of lessons learnt, process improvement knowledge "*Whys and Hows*" is continually created in projects undertaken by various project teams in an organization. Lessons learned therefore play an important role with continuous improvement as they help organizations build a database of useful knowledge to ensure that future projects benefit from these lesson (Carrillo, Harding and Chaudhary, 2011). It is vital for that knowledge to be transformed into organizational knowledge that will be of value to the organization as a whole. "*The processes of learning and sharing should be organic and fluid and not mechanistic and rigid''* (Jugdev, 2012:20).

Traditional codification methods of knowledge methods transfer such as Virtual drives, physical libraries and archives are failing because current project documentation do not contain any vital knowledge that can be used for future projects The author goes on to state that the superficial content of project closeout

report is one of the primary reasons project managers and other personnel don't make reference to the available closeout reports (Johansson *et al.*, 2012).

Few managers know how to manage knowledge and they misunderstand what knowledge is and what organizations must do to exploit it (Nokana, 1991). The author adds that most managers are used to or can work with explicit/ hard i.e. readable and quantifiable knowledge but however do not have the skills to facilitate the process of unpacking and disseminating tacit knowledge. Tacit knowledge is by nature highly subjective and entails insight into a particular field of study or craftsmanship. It is intuitive and mostly works as gut feelings and hunches of experienced individuals. Such information is made available for testing and if proven correct can be documented and used as explicit knowledge which can be shared and used to meet the organizations strategic goals.

PPRs are a great way of sharing experiences and insight gained from projects (Disterer, 2002). According to Zedtwitz (2002) PPRs offer a rare opportunity to systematically improve performance in succeeding projects within an organization. PPRs are however often constrained with lack of time and minimal attention combined with lack of personal interest and meant from project team members.

It has been observed that project managers and other relevant personnel rarely conduct PPRs on completed and closed projects. PPRs are done at the end of the project not at intermediate phases of a project. In instances when PPRs are conducted, they are conducted with the aim of tracking the project status and targets with regards to the program (time) cost and quality related issues, they are not conducted with the purpose of learning in mind- such as best practices and what works and what doesn't work (Disterer, 2002:516). Busby (1999) and Disterer (2002) agreed that projects don't generally undergo PPRs, in both public and private organizations. This means that a great potential for competency building is forfeited

when PPRs are not conducted as PPRs are an effective tool for systematic inter-project learning which is beneficial for both the employees and organization as a whole (Zedtwitz, 2002).

Schalken, Brinkkemper, and Vliet (2004). noted that when the insights gained in the course of the project are made explicit and are recorded in project closeout reports and effective PPRs are conducted on those projects, project managers are able to access and make reference to past project practices and process knowledge which can assists Project Managers in compiling effective Project Management Plans and implementation strategies. In many cases, people are reluctant to engage in PPRs and activities that might lead to blame, criticism or recrimination (Argyris, 1999).

Egbu (2004:301) noted that "*an organization's capacity to innovate depends greatly on the knowledge and expertise that its staff possesses*," which is linked to the organizational culture and behavior. Organizational behavior as defined by (Rao, 2008:5) is the "*behavior, attitudes and performance of people in organizations."*

Nokana (1991) states that successful companies/ organizations are those who make a point of constantly creating new knowledge, harness and use it as intellectual capital which they disseminate throughout the organization through PPRs and informal learning platforms such Communities of Practice so that the information can be shared and captured and be utilized in current and future projects. This facilitates innovation amongst team members which results in the embodying of the acquired information in new technologies, products and services which give the organization the competitive edge to stay on top in the markets.

Communities of Practice (CoPs) play an important role in individual and organizational professional development as they can be seen as "*Learning Generators*" and project teams as embryonic forms of CoPs because that is where

knowledge is generated (Jagdev, 2012:14). CoPs create a relaxed environment and platform that is conducive to knowledge sharing and learning.

Kwa-Zulu Natal Department of Public Works (KZN- DOPW) has a history of not fully utilizing knowledge from past projects, which has limited growth and development. Proof of this is evident in the KZN- DOPW 2018/19 year financial report which states that 60% of projects (New ,rehabilitation and refurbishment) were targeted to be completed within the 2018/19 financial year, only 49% of those projects were successfully completed within agreed time period by the end of March 2019. 80% of all projects on site were targeted to be completed within approved budget and only 77% of projects completed within approved budget by the end March 2019 (Sharpley, 2019:41). A considerably low number of those projects have had comprehensive closout reports completed for archiving and made reference to in current projects.

This study will focus on the knowledge management aspect of projects at project closeout stage ie.. the documenting, disseminating and storing of project experiences, knowledge and information, particularly knowledge gained from past and completed projects and how lessons learnt from past projects can be used to improve practices for current and future project success.

1.4 PROBLEM STATEMENT

This study will therefore focus on identifying the challenges faced by KZN- DOPW project teams in undertaking and completing comprehensive project close out reports and PPRs for completed projects with the aim of learning from their experiences and improving performance and outputs for current and future projects within the KZN- DOPW.

The research problem statement is:

Despite evidence that post project review reports offer a rare opportunity to systematically improve performance in succeeding projects within an organization in most cases these are not being completed within KZN- DOPW on completion of projects.

1.5 RESEARCH QUESTION

What are the challenges faced by project managers and teams in undertaking and completing post project review reports within the KZN- DOPW?

1.6 OBJECTIVES OF THE RESEARCH

- Determine what infrastructure and processes are required and applicable at the project closeout stage.
- To explore challenges faced with conducting PPRs on completed/ closed projects.
- Explore viable knowledge sharing platforms such as a community of practice structure or framework when conducting PPRs to assist knowledge sharing and dissemination.

1.7 RESEARCH PROPOSITION

By adopting the culture of conducting post project review reporta for completed/closed projects, project teams will be able to learn and apply knowledge gained from past projects when undertaking new projects which could result in increased outputs in a form of project successes.

1.8 RESEARCH METHOD

To meet the research objectives, a literature review was conducted in order to review information and factors effecting cross – project learning and the role of PPRs s in knowledge management in the construction project management environment from materials found in books, peer reviewed journal papers and conference proceedings using key words such as (Knowledge Management, Project Closeout, PPRs s and Communities of Practice) when searching journals and discourses.

A case study methodology was applied to gather the relevant data for the study.

- Survey questionnaires were distributed to a representative sample. The representative sample included only relevant officials within the subject area.
- A cover letter detailing the nature and reason behind the research was attached (for both survey questionnaires and interview participants).
- Participant Consent Form were completed and signed by all participants.
- Participation was voluntary and the data collected was be stored electronically and is treated as confidential.
- Semi Structured Interviews were conducted with relevant officials within the subject area. Due to the COVID 19 regulations, all interviews were conducted via telephone/ SKYPE with available personnel.
- The information obtained from the literature review, questionnaires and interviews were analyzed and findings were presented.

1.9 LIMITATIONS OF THE STUDY

This study was limited to KZN- DOPW Project Managers, Portfolio Deputy Directors, Program Managers and available Project Leaders from the various client departments i.e.. Department Of Health (DOH) Department Of Education (DOE)

Department Of Social Development (DSD) Department Of Transport (DOT) -Officials working on the various portfolios.

1.10 STRUCTURE OF REPORT

Chapter 1- Provides the introduction and background to the research undertaken, along with an overview of the research value, problem statement, research objectives, research questions, and research proposition.

Chapter 2- an extensive literature review which covers:
The ideal infrastructure and processes applicable at project closeout stage for storing and sharing project-based knowledge within the organization.
Challenges faced by project teams with conducting PPRs s on completed/ closed projects.
The various behavioral factors that hinder the exchange, capturing and storing of information and knowledge during project closeout stage.
Viable knowledge sharing platforms such as a community of practice structure or framework when conducting PPRs s to assist with knowledge sharing and dissemination.

Chapter 3- Identified the research methodology applied in addressing the requirements for this research and the limitations and ethical considerations will be noted.

Chapter 4- Provides a view of the research results, discussion of the results and identified themes.

Chapter 5- ConcludeS the research by providing a summary of the research based on the research objectives and questions identified. The chapter will conclude by providing

recommendations for future research that will build on the findings made in this research

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews literature on the concept of knowledge management within an organization and related topics in the infrastructure development sector. Firstly, the ideal infrastructure and processes applicable at project closeout stage for storing and sharing project-based knowledge within the organization will be explored. Followed by challenges faced by project teams with conducting PPRs s on completed/ closed projects and the various behavioral factors that hinder the exchange, capturing and storing of information and knowledge during project closeout stage. Lastly viable knowledge sharing platforms such as a community of practice structure or frameworks will be revied to see if they can aid in conducting more conducive PPRs s to assist with knowledge sharing and dissemination.

2.2 BACKGROUND

With economic development and globalization, organizations must improve the management approaches to adopt to the changing market conditions and meet the requirements and needs of its customers to maintain and strengthen the position in the market. Most organizations have opted to do this using management by projects (Wang *et al.*, 2019).

To be the province's "Implementing Agent of Choice," is one of KZN- DOPW core mandates as stated by (Sharpley, 2019) in the 2018/19 annual report. There are a number of other players in the infrastructure development space such as Coega Development Corporation (CDC) and the Independent Development Trust (IDT). There are also Department's which manage their own projects internally like the Department of Health.

Sharpley (2019) stated in the annual report that the challenge confronting the Department of Public Works (DOPW) is to be able to demonstrate that it has the necessary skills and capacity for it to be the first point of contact for any Provincial government department (Client departments). This entails having the correct mix of skills, professional expertise, creativity, innovation, admin, managerial and executive support of which KZN- DOPW has endeavored to accomplish. (Sharpley, 2019; pp 40) reported that under the -***Enhance infrastructure planning and implementation Indicato****r,* which entails effective planning and implementation of infrastructure plans:

- 60% Of projects (New ,rehabilitation and refurbishment) were targeted to be completed within the 2018/19 financial year, only 49% of those projects were successfully completed within agreed time period by the end of March 2019) with a variance of -11% which was due to change of scope and non-performance by the contractors. Furthermore there were delays at procurement stage and some projects were withdrawn by the client department.
- 80% Of all projects on site were targeted to be completed within approved budget and only 77% of projects completed within approved budget by the end March 2019) with a variance of -3% which was due to change of scope and non-performance by the contractors. Furthermore there were delays at procurement stage and some projects were withdrawn by the client department.

The various indicator findings show gaps in the outputs achieved annually from what was targeted to be achieved and what eventually materializes. The inability to complete all the targeted projects within prescribed schedule and budget creates a strain on the client departments that DOPW serves especially critical clients like Health, Education and Social development who rely heavily on the infrastructure provided by DOPW to efficiently carry out their functions.

It is therefore vital for DOPW infrastructure component to continually assess and find ways of improving its systems, processes, seek and retain its talent/ professionals so it can provide the best possible service to the client departments and be the "Implementing Agent of Choice" it claims to be. This requires DOPW to be a learning organization that according to Love *et al.*, 2000 should be skilled in the following*:*

- *"Systematic problem solving*
- *Experimentation with new approaches*
- *Learning from their own experiences*
- *Learning from experiences and best practices of other"*

Cross project learning has been found to be a great tool in developing competencies in project based organizations (So¨derlund, Vaagaasar, and Andersen, 2008). By adopting the above concepts, DOPW will have a culture and systems in place to better use knowledge gained from past project experiences in order to minimize repetitive mistakes and come up with innovative solutions to clients problems. This should save costs, reduce turnover time and improve service delivery.

2.3 PROCESSES APPLICABLE AT PROJECT CLOSEOUT STAGE

Construction Project Management entails the overseeing of all items related to meeting the project objectives by leading the work of a team made up of various built environment professionals and specialists to achieve the set project goals and meet success criteria at a specified time and budget.

The PMI (2017) states that the project close out phase of the project entails the processing and finalizing of all activities for the project, phase, or contract. The key benefits of this process are the project or phase information is archived, the planned work is completed and commissioned and organizational resources are released to

pursue new endeavors. The project closeout stage is therefore the final stage of the project lifecycle. In this stage all work is inspected and checked against the approved plans for quality assurance and then signed off and all accounts are settled.
Clautier (2007) found that better understanding of project closeout on employees can have a significant and lasting effect on the organization's performance, morale and motivation.

The project closeout is an important stage where the project manager and the team get to identify and capture the new knowledge learnt during the course of the project and prepare means of transferring the knowledge to other projects. Knowledge and experiences from past projects can be captured in project closeout reports and be stored and disseminated throughout the organization for other project teams to use in current and future projects (Disterer, 2002).

Kaul (2004) describes the project closeout phase of any project is said to begin at practical completion which is when the contractor has completed a substantial amount of work and the works are deemed fit for purpose, this phase of a project can be extended long after the final completion of the works on site.
Project closeout documents include user manuals and instructions, drawings, completion documents like certificate of compliances `etc. Project documents include project folders, plans, schedules, cost summaries, progress reports protocols and *Lessons Learnt reports* (Disterer, 2002; Abdelrahman, 2018).

Although project closeout is part of the project lifecycle, it is an aspect of the project that has endured a considerable amount of negligence. Studies have found projects that were progressing according to schedule often falter at closeout stage because of various admin, technical, financial and psychological factors (Clautier, 2007; Kaul, 2014). The author noted a problem where once a project is completed, project teams disperse and move to new projects causing decentralization and

knowledge fragmentation. Hence the conclusion of a detailed closeout report with lessons learnt is vital to ensure that knowledge (tips and process knowledge) and experiences from the project are captured and stored and can be retrieved and used in future.

Atkinson (2014) and Kaul (2014) found that a small fraction of implemented projects actualy meet their targets based on time, cost, quality with the desired efficiency all the way to final completion. Clautier (2007) agrees and further added that, most projects are derailed by problems resulting in very few projects eventually achieve their operational objectives.

Atkinson (2014) noted that the project closeout stage is a challenging aspect of project management in the construction industry as project team members often reassigned to new projects. Due to this approach, projects keep failing and organizations avoid implementing corrective measures because of lack of time and money.

During the project closeout phase of a project, the exchange of information often comes to a standstill due to various factors such as burnout factors, incentives/ lack of motivation (Rao, 2008). Kaul (2014) found that up to 80% of projects implemented all over the world get delayed due to the closeout stage which comes at a great cost to the owner/ developer.

Most project managers are aware that they should finish and close a project, problem is that many forget how to do it, or do not know how to do it as they lack the required skill set , admin, coordination, technical expertise to close projects systematically at the prescribed time (Kaul, 2014).

Abdelrahman (2018) stated that it is important for organizations to complete project closeout reports and do project evaluations as it aids in improving

performance and provides data required for future projects. Project evaluations also help with developing the organization's quality assurance procedures and performance measures that are required to meet customer's expectations.

Evaluations are important as they are used to monitor important aspects of projects and lessons learned from past problems and obstacles (Atkinson, 2014). Aspects like human resource, cost, time constraints, quality, Health and Safety, client satisfaction and communication (Abdelrahman, 2018). The author recommends that the appraisal committee, more commonly known as the evaluation committee should consist of people directly involved with the organization on a day to day basis.. ie the project team, IT, admin as well as senior management and a client representative.

2.4 LEARNING FROM PAST PROJECTS- LESSONS LEARNT REPORTS

Projects are seen as knowledge generators in organizations and a lot of vital information can be harnessed from them to improve organizational systems to realize profits and returns for the future (Hartmann and Dorée, 2014). With every product development, teams learn a unique set of skills and lessons in solving the many problems that arise in projects and it is therefor crucial that these lessons are documented and shared (Goffin et al., 2015).

Wiewiora and Murphy (2017) noted that one of the most common ways to share and capture project knowledge is through lesson learnt, although this practice might seem common, this process of capturing, storing, reviewing and revising lessons learnt from past projects still remains sub- optimal. Therefore rich knowledge with a potential to yield profit and development is left idle .

Senge (1994:2) defines lesson learnt as ” Elements of both organizational learning and knowledge management. Learning in the organization being the continuous testing of experience, and the transformation of that experience into knowledge accessible to the whole organization, relevant to its core purpose.”

Learning increases the capabilities and maturing levels of not only the project team but the entire organization as well. Al-Shehab, Hughes, and Winstanley (2004) noted that risk management focuses on identifying problems, but it is difficult to predict the future events and problems hence it is important to make reference to the past.

Carrillo (2005) noted that lessons learnt are therefore an aspect of knowledge management because it encourages the capture and dissemination of knowledge gained on past projects to enhance learning and future performance. Scarborough, Swan and Preson (1999) view knowledge management to be any process of creating, acquiring, reviewing, capturing, disseminating and reusing information to improve learning and performance in organizations.

Harris (2002) noted that it is essential for organizations to learn and grow in order to retain their market position. Studies show that learning from past project failures and successes continues to be the exception rather than the rule (Newell *et al.*, 2006). This results in even successful projects having minimal impact on organizational growth as they are not adding on anything and rich knowledge with a potential to yield profit and development is left idle .

Harris (2002) claims that *the lack of priority given to* effeciently capturing and disseminating lesson learnt throughout the organization means that the full potential offered by new technologies will continue to elude technology based organizations such as banks, manufacturing and engineering sector until their

complicit attitude toward learning is addressed. The author further noted that it is essential for organizations to learn and grow in order to retain their market position. Studies show that learning from past project failures and successes continues to be the exception rather than the rule (Newell *et al.*, 2006).

Benefits of learning

Howard and Smith (2016) noted that learning from past projects experiences ensures avoidance of repetitive mistakes and facilitates the re- use of successful instances. Learning when effectively done saves time and money and is useful in future proofing practices and helps build competence and confidence and thereby team morale which is found to be instrumental in improving customer satisfaction which greatly enhances competitive advantage in the markets. Carrillo (2005) concluded that lesson learnt form a part of organizational learning because it attempts to collate lessons learnt from previous projects and use them as a learning curve and experience so the same mistakes are not repeated in current and future projects.

Reasons for lack of learning

Apart from lack of time and resources, the lack of guidance from management in a form of a structured process for conduction Post- Project Reviews and lessons learnt reports as well as lack of guidelines for effectively conducting effective PPRs adds on to the disinterest of partaking in the exercise. The superficial and unclear Lessons learnt reports that are often subject to group think and not necessarily the truth of what transpired which once detected leads to distrust contribute to the negative perception of PPR and poor value placed in reporting and disseminating of vital project information for learning, (Foucault, 1979; Al-Shehab, Hughes, and Winstanley (2004); Goffin *et al.*, 2015 and Howard and Smith, 2016).

Goffin *et al.,* (2015) noted that recording lessons learnt and entering them onto a database or virtual library is not sufficient for learning as studies have established that having written reports fails to capture and convey much of the key learning obtained during projects.

The sender- receiver approach is not always conducive to knowledge transfer as knowledge transmitted does not always reach the intended receipient. Therefore for more efficient knowledge transfer, projects should be connects through their orgnizational setting tools and norms and the experiences of the project team members (Hartmann and Dorée, 2014).

Researchers have observed that there is a gap that exists when it comes to knowledge transfer. Project knowledge management can be improved to support sharing of knowledge between projects within the organization (Johansson, Moehlerb, and Vahidic, 2012)

Johansson, Moehlerb, and Vahidic (2012) established that with the support from the executive level and a system based lesson learnt guidance, a lesson learnt culture change is possible to optimize learning writing organizations.

Management needs to find innovative and sustainable ways to generate and transfer tacit knowledge like conducting Post- Project Reviews, apprenticeships/ mentoring programs and establishing communities of practice which foster knowledge brokering (Goffin *et al.*, 2015).

Johansson *et al*., (2012) found that mangement of knowledge has become a competitive advantage to for companies but it poses certain challenges to companies. Because of the time pressure, lower priority is given to activities which

do not directly contribute to project delivarables like project closeout reports, lessons learnt and the transmission thereoff.

2.5 POST- PROJECT REVIEWS AND CHALLENGES WITH LEARNING FROM PAST PROJECTS

The PMI (2017) is very clear on the role of a project manager in an organization. The PMBOK guide states that the role of a project manager is distinct from that of a functional manager or operations manager. The functional manager is operations orientated and focuses on providing management oversight and efficient operations of the business unit whilst project manager is the person assigned by the organization to lead the team that is responsible for achieving specific project objectives. Part of a project manager/ leader's duties is to manage and co-ordinate all aspects of projects throughout the project lifecycle. This includes project planning, implementation, monitoring, reporting and evaluation in line with project management methodology. McAvoy (2006) stated that for future projects to improve, it is necessary to evaluate lessons learnt from previous projects and the incorporation of such activities in the project management plan ensure that they are conducted before closing the project. The goal of a project evaluation is to determine if a project is meeting its objectives.

The author further added that the exercise of reviewing what worked and what failed and identifying areas for improvement is called a (PPR) or Project Post Mortem. An output from the Post Project Review is a comprehensive lesson learnt report. Post- Project Reviews also known as Post Mortem Revies or Post Implementation reviews all have one objective which is to learn from past projects, hence the need to make lesson learnt reports more explicit so it can be easily utilised as a basis for planning for future projects (Al-Shehab, Hughes, and Winstanley (2004); McAvoy, 2006).

Names that re synonymous to knowledge transfer are experience retention, debriefing amongst others listed below:

- Post- Project Reviews (PPRs)
- Post Project Appraisals (PPAs)
- After Action Reviews (AARs)
- Project Post-mortem review
- Corporate feedback cycle

(Disterer, 2002)

Howard and Smith (2016) view post project review process a " process to evaluate project outcomes and to leverage learning." According to Zedtwitz (2002) Post-Project Reviews (PPRs) provide an opportunity to systematically improve performance in subsequence projects.

PPRs can be used as a tool to improve organizational learning. Zedtwitz (2002) noted that many companies forfeit a great potential for competence building by neglecting PPRs and not viewing them as a tool for learning and by not investing adequate resources in PPRs.

Projects often outlive the accuracy of the memories of individuals and hence the need to regularly review and document important fact and lessons learnt as we go so valuable information is not lost as teams disintegrate and people leave organizations and take their memories along with them, hence the need for an efficient debriefing, experience and knowledge transfer and retention system, to adequately capture and disseminate lessons learnt from projects undertaken by the organization (Weinberg, 2001).

Weisers and Rothman (2001) stated that the main objective of project post mortem is to evaluate a current project's status and progression with the aim of providing guidance and potential solutions for similar issues in future projects. PPR provide a perfect platform for knowledge management which can be utilized to encapsulate

experience and elicit recommendations for improvement in future applications (Howard and Smith, 2016).

Two types of project evaluations have been established:

- Intermediate project evaluation that takes place during the course of the project.
- Post mortem project evaluations that take place at the end of a project, when the actual project is completed (Schalken, Brinkkemper, and Vliet, 2004).

One strength of post mortem evaluations is that it forces participants to reflect on past work experiences and also provides a platform for feedback to be provided and received from other project team members (Schalken *et al*., 2004).

The information provided, discussed and recorded from post mortem evaluations can be used by people throughout the organization to improve on their projects and avoid the pitfalls recorded on the post mortem reports from past projects (Schalken, Brinkkemper, and Vliet, 2004).

Carrillo (2005) noted that even though AARs are a highly valuable activity, they often don't occur for the following reasons:

- Most of the time they happen at the end of a project, team members are reassigned to other projects.
- Lack of detail because of the lag time between the incident and the review, a lot of vital information is forgotten along the way.
- Deciding what to put in as a Lessons Learnt in the report that could be used in future.
- Trying to steer away of recording once- off outcomes/ exceptions that look like they are trying to reinvent the wheel.

2.5.1 Benefits and Drawbacks of Post- Project Reviews (Busby, 1999):

Benefits:

- Allows employees to assemble the different experiences and draw coherent conclusions.
- It allows employees to consult others to know the outcome of their performance.
- What employees learn from doing a project is disseminated to others who may have to do similar tasks in the future.

Drawbacks:

- They take time which means it incurs a cost. The beneficiaries are future projects, not the current one.
- Reviews involve looking back at potentially embarrassing situations.
- Employees are reluctant to engage in activities that lead to blame, criticism or recrimination.
- Many people believe that you learn from your own experience and that others without that experience cannot learn from it (Busby, 1999).

Post- Project Reviews (PPRs) are not yet the norm in most Project Management practices despite the numerous benefits that PPRs bring (Howard and Smith, 2016). This is in line with Gwillim, Wieder and Dovey (2005) findings, where he states that imperiacl studies conducted found that only a few organizations undertake any formal form of project Post- Implementation Reviews (PIRs) . Reports from PPRs are filed and stored away and seldom made reference to (Carrillo, Harding and Chaudhary, 2011). This means that a wealth of potentially important / useful knowledge that may be utilized in current and future projects is not exploited to improve project performance.

Apart from time and cost measurements, studies have found socio political factors that influence the success of PIRs. PIRs occur within a socio- political organization context where power relations and vested individual interests influence the evaluation decisions made by individuals (Gwillim, Wieder and Dovey, 2005; Anbari, Carayannis,and Voetsch,2008).

In a survey done by McAvoy (2006), a Project Manager admitted that groupthink was effecting the team's view of the project post morten review exercise and he being part of the team was going to go against his own team's views.The author found that the team members more especially the project manager had an appreciable influence over the other team member's perception of the project .

The author goes on to say that this behaviour goes against the whole aim of project post mortems as participants diverge from providing facts and information for learning purposes and turn to self-preservation in order to protect their reputation's amongst their peers.

McAvoy (2006) noted that the term post mortem also adds to the negative perception that participants have of the exercise as it has negative connotations related to it like the death or demise of a project whereas post mortem reviews are meant to review and evaluate the project successes and failures of not just the failed projects but the successful ones as well.

Problems with Post Mortem Reviews

Yourdon (1998) argues that project post mortems do not achieve their intended goals as participants are often too exhausted from being overworked and frustrated to perform the task well.

Other researchers such as Kwak and Stoddard (2003) found that participants use project post mortem sessions to as a platform for socializing and boasting about achievements instead of getting the crux of the matter which is discussing and

documenting project successes and failures for future purposes. In cases of failure, participants are hasitant to participate in the project post mortem reviews as they do not want to draw attention unto themselves.

Olson and Stimmel (2002) also question if the post mortem reports are referred to and implemented in future projects once the reports are documented and stored. In a study conducted by Howard and Smith (2016) noted that none of the respondants refered back to the Post Project review reports and in some cases the lessons learnt were not adequetly recorded or recorded at all. The authors further added that participants admitted to not having learnt anything or gained any value from the Post Project Review session in any of their previous or past sessions. They participated in the sessions because it was mandatory or compulsory and the review was part of the project closeout checklist. Another manager attributed lack of maturity in the Post Project Review process as a result of lack of prioritization of this exercise from top management.

In other instances Howard and Smith (2016) found another factor that attributed to the the lack of success of Post- Project Reviews is that various role players were under represented in these reviews, ie.. executive management and business teams. Majority of the participants need guidance from the executive level to empower them to effectively implement the reviews.

Lack of guidlaines of how to extract and retain l tacid knowledge during the review session was considered a factor.

Project post mortem review are found to be ineffective because individuals give bias reviews of their work (McAvoy, 2006). This is referd to as cognitive dissonance, where an individual finds it difficult to find fault with is or her own work or decisions.

Gwillim, Wieder and Dovey (2005) further noted five reasons for organizations failing in conducting PIRs:

- The perception that PIR';s are not importany and are deemed unnecessary
- The difficulty in appropriete measurement in evaluation
- The cost of the evaluation
- Political and cultural constraints, Hilliam et. Al, (2000) found that PIRs " Often become a political instrument which influences the balance of organizational power. Evaluation decision are found to be based on the perceived interest of those with the most power in an organization. Any evaluation results that will results in a negative outcome, critiscm,power or support loss will be prevented from being implemented in the organization.
- Managers not investing resources and not emracing PIRs and failing to practice what they preach.

From the research Howard and Smith (2016) concure that a lot of potential value exists within the Post Project Review process, to levarage this potential, companies must do the following;

- Include all relavant stakeholders as well as business stakeholders in the sessions
- Systematically disseminate lessons learnt and documented form the sessions
- Ensure executive directive and governance
- Establish a common understanding between business and development project teams.

2.6 ORGANIZATIONAL CULTURE AND INDIVIDUAL BEHAVIORAL FACTORS

Knowledge Management refers to how the organization manages the knowledge resources in a company to achieve a business benefit. Knowledge management is not an end in itself (So¨derlund *et al.*, 2008a). The authors noted that projects are

not only new knowledge generating centres but also form a good platform for sharing knowledge. They provide the firm with the opportunity to reuse existing knowledge in innovative ways. The author observed that there is gap or neglect in the interrelatedness of the competence development at the project level and the competence developed at the organizational level.

Cross project learning has been found to be a great tool in developing competencies in project based organizations and a foundation for innovation. Innovation is a creative process implemented by entrepreneurs with the aim of improveing products and services (So¨derlund *et al.*, 2008b). Innovation yields new products, materials, resources, creates new markets and creates new and improved production processes and forms new organizations.

Roles in the Knowledge sharing process:

Employees act as contributors when they share their project gained knowledge and as receivers when they utilize or apply the knowledge that has been shared (Johansson, Moehlerb, and Vahidic, 2012).

The autors add that the key management focus is to set the environment and culture where employees are willing to share knowledge gained where the act of shairing the propriety knowledge outweighs the perceived valuse of the knowledge. The business benefit is only realized when the receiver utilizes the shared knowlegde by the contributors to realize results in a form of profits.

Three knowledge sharing strategies were outlined by Newell (2004) and Johansson *et al.*, (2012) :

1. **Codification strategy-** used when knowledge is made explicit and transfared through written materials and can be codified.
2. **Pesonilization strategy**- " *the transfare of knowledge which can not be codified but requires knowledge transfer by personal interaction.*" Face to face stategies

are applied in voluntary structures line Communities Of Practice (COPs) where groups of people who share a concern, a set of problems or interests interact on an ongoing bases to share knowlegde and experiences to broaden their knowlegde and expertise (Wenger, McDermott and Snyder,2002).

3. Cognitive community model which is much like the codification strategy, it relies on the use of ICT to store and transfer knowledge across an organization and is deemed to be appropriate where the knowledge transferred involves clear unambiguous information that is shared between people with similar backgrounds.

Codicfication and personalization strategy compliment each othe as codification allows for large volumes of information to be transferred at a time and personalization allows custormazation of knowlegde to the receiver's needs , Codification is the more popular strategy of the two (Johansson, Moehlerb, and Vahidic, 2012).

Key Successful factors in codification and personalization (Johansson *et al.*, 2012)
These factors influence the use of the strategy by both the contributor and receiver.

1. **Culture:** Organizational culture is the "shared belief , values and practices of a group within an orgznizatio." Clture affects the behaviours of both contributors and receivers through the set organizational norms. Culture is said to be the most important factor in knowledge transfer.
2. **Process:** Process within and organization guides employee's behaviour and actions in a set manner. The generation, storage, dissemination and retrieval of project knowledge which is facilitated by systematic processes.
3. **Technology:** Which can support or hinder knowledge sharing between employees? The support of Information Technology (IT) tools has proven to be necessary but not sufficient factor for quality of project knowledge management.

So¨derlund *et al.,* (2008) posit that projects have become an integral part of any organization and economic units. Ensuring project success has become a strategic goal and in most organizations it is critical to company performance and sustainability that ensures that the company remains a competitor in the markets.
The authors noted that the three project based learning mechanisms which are relating, reflecting and routinizing. Relating which describes the extent of the resource base of the project. Reflecting is about improving the use of the resource base. Routinizing which entails ensuring the accurate use of the resource. The author however noticed that there is gap or neglect in the interrelatedness of the competence development at the project level and the competence developed at the organizational level

Newell *et al.*, (2006); Julian (2008); Kotnour and Vergopia (2015) agreed that the most common activity with learning from projects is the practice of reflecting on project experience. PPRs involve reflective discussions about what went right and wrong in a project and learning from both cases.
Norms and procedures are seen to be the main drivers for knowledge sharing in organizations. Employees (contributors) claim that they only write project reports because it is mandatory, whilst reviewers chose whether they want to access and retrieve the stored information or not for present and future projects.

2.6.1 Cross project learning enablers

- Support from senior management.
- Organizational culture conducive to learning and knowledge transfer.
- Neutral facilitators to conduct PPRs and lessons learnt
- Development of professional capabilities of project managers through training, apprenticeship or knowledge sharing.

Appropriate content (procedural learning as well as product content) is key in effective knowledge sharing. This must be provided at a timely fashion where the

knowledge will be accurate and relevant for use in situations for current and future projects.

Innovation is a product of creative destruction, where the existing is dismantled or destroyed in order to produce and present improved products and services for the future and current markets.

Parnell, Bergen, and Soper (2005) established that many organizations and businesses suffer from repeat errors and management mistakes at all levels. A lot of time is invested searching for ways to improve qualityand efficiently run organizational systems to realize better profits. Howerver managers rarely ever learn from their past mistakes. They consider history to be irrelevant and claim that what happened in the past has a very low chance of happening again.

Wiewiora *et al.*, (2014) cited that patters exist between the type of culture at Project Management Unit (PMU) level and the project manager's perception of valuing trustworthy behaviour and the manner and level members are willing to share knowledge.

The authors added that projects are knowledge generators and offer insightful knowledge and often prompt innovative or unique approaches to problem solving when addressing problems during the course of a project.

Projects are not viewed in isolation, but as repositories of knowledge and experience for organizational and future projects (Wiewiora *et al.*, 2014).

Some organizations have been found to have knowledge management procedures in place to capture knowledge for future use. These processes are in a form of Post-Project Reviews where participants are required to capture lessons learnt in the project closeout report. However an appreciable number of participants expressed dissatisfaction from the outcomes of the exercise and felt it did not bear any fruit

(Newell, 2004). Post- Project Reviews are conducted superficially in intances when they are actually done. This is most because of lack of time and participants not seeing the value of the exercise (Parnell, Bergen, and Soper, 2005).

Parnell, Bergen, and Soper (2005) noted that majority of companies onvest millions in planning for investments and projects and aportion very little to nothing for evaluating and learning from them.

The practice of project knowledge management remains a limitted exercise in organizations and the understanding of how to capture, process and resuse the information gathered still remains a mistery to most organizations (Johansson, Moehlerb, and Vahidic, 2012). When decisionmakers fail to reflect on the past, valuable knowledge ends up forgotten (Parnell, Bergen, and Soper, 2005). The author further stated that most organizations suffer from Korsakov's syndrom where long term memory is lost and cannot be recalled and the desease makes one unable to form new long tem memories for future reference and in that eway you lose all accumilated knowlegde.

Newell (2004) recommends that having lessons learnt reports that capture the new knowledge and lessons related to processes and procedures that have been successfully used is the key to project knowledge transfer, whereas current lessons learnt reports are more product orientated and offer no real and usable information for future projects. By adopting the capturing, storing and retrieving project based knowledge using codified methods (explicit) organizations can save a lot of time and moneys by not having to starting projects from scratch, conducting fesibility studies on existing sites or similar projects and making the same mistakes as others have made before them.

2.6.2 Barriers to cross project learning

- Lack of direct authority (Program Managers) over a project manager or teams as a fixe head ensures continuity and improvement in systems and team culture.
- Time pressure
- Staff rotation (project start and end, deployment etc…
- Fear of airing mistakes publicly make it difficult make it difficult to learn from past project experiences
- Employees that are reluctant to share project information with others, failure that occurred during the course of the project that they want to remain hidden.
- Project reflection / review sessions are differed till the end of the project whereas real time feedback of lessons learnt would be more effective (have reflective sessions on a regular basis).
- Lack of senior management support
- Team members having difficulty accessing past lessons learnt from libraries and archives because they were either lost or not recorded and stored in a organized manner.

(Newell *et al.*, 2006)

One of the noted drawbacks from referring to past successes is the fact that people tend to assume that if a certain method worked in the past, it will work in the present, forgetting the change in circumstances, therefore people have a tendency to not think through actions thoroughly as they just blindly assume that it will work and that is a recipe for disaster (Parnell, Bergen, and Soper, 2005).

Newell *et al*., (2006) found that the reasons for poor inter project learning and sharing of information were primarily:

1. Insufficient use of technology-based applications designed to capture and share project knowledge.
2. Poor quality or superficial lessons learnt reports focusing on what was achieved rather than how it was achieved and why it worked.
3. Researchers also found that there are instances with efficient IT support but that still did not improve or ensure the quality of interaction between project teams.

Many managers have been found to be hesitant to refer to historical data as they are scared of being trapped into the mindset that the future will be the same as the past (Parnell, Bergen, and Soper, 2005). The authors further added that others rely excessively on history and count on events unfolding as they had in the past not taking in consideration current factors and the change in the business climate. Managers are warned not to use memory as a substitutue for innovative thinking and they should question past practices and see if they are relavant to the current context and amend their plans and strategies accordingly.

Another berrier to learning from history is peoples egos and their perception of their own superiority and exergerated self worth and egos which hinders them from larning from the successes and failures of others as they do not believe they would find themselves making the same mistakes or they think too highly of themselves to give credit where it is due to others when deserved (Parnell, Bergen, and Soper, 2005; Johansson, Moehlerb, and Vahidic, 2012) .

Most people assume that we have learned from past mistakes because we are aware of them which is mostly not the case s it is human natue to forget mistakes and past hurts as a coping machenism (Parnell *et al.*, 2005).

By reviewing history, one actually recognises the facts that present events often follow past patterns and a lot of insight can be gained through reviewing history in that light (Newell *et al*., 2006).

Parnell, Bergen, and Soper (2005) believes that " much can be gained from thoughtful review of history and the perspectives subsiuently gained. " Memory is very important, it is the main component of a leaning ornaization. Just like individuals cannot develop and pprogress without emebering past knowledge, the same can be said about organizations not being able to advance without institutional memories (Parnell, Bergen, and Soper, 2005).

Possible solutions to aid cross project learning

Project Reviews that force managers to consider periodically conducting project reviews to capture and learn from real time project experiences and no. These reviews must become a natural and integral part of the organization's prcactices and culture as they have been tried and tested and deemed successful in military organizations. Post Project Appraisal units are formed to regulary conduct Post-Project Reviews which improves organization's overall performance and efficiency (Parnell, Bergen, and Soper, 2005).

Post- Project Reviews is argued by some as a comon practice in strategic planning and it enatils SWOT analysis and portfolio metres which emphasise the organization's current position whilst others refer to the future possibilities and forecasts instead of the past. Therefore Post- Project Reviews structure must first be changed and implemented at a strategic level before the other organizational tiers (Parnell, Bergen, and Soper, 2005).

Post- Project Reviews are not a common practice, therefore leave many ununswered questions regaring the structure of the reviews, like who should conduct them, how often, who must be involved as well as how to leverage and use the information gained from them (Newell *et al*., 2006).

Recommendations (Parnell, Bergen, and Soper, 2005):

- Organizations should form strategies to learn from past and curent successes an failures
- Organizations should have machenisms in place to review, capture and disseminate information to relevant people in the ornanization.
- Find a way of chaning the attitudes of participants towards failed projects and see failures as learning curves and a chance to do better in future.
- Support from top management and angagement with lower management on strategic directions and steps to get a buy in from everyone to create a sense of everyone being valued.
- Filed good trials are a good platform for innovation which translates to better product development and profit .
- Sharing of information within organizations on good and bad outocmes for future references to ensure similar mistakes are not repeated.

Senior Managers use brokering as a means to facilitate cross- project knowledge transfer.

Brokering is the process of translating, coordinating and aligning among various communities in the organization to deliver organizational strategic objectives,(Julian, 2008).

Newell *et al.*, (2006)– stated that codification is written knowledge

Personalization- Knowledge that is deeply imbedded in practice making social networks necessary**.**

The knowledge sharing process entails individuals taking back into the system the knowledge learnt and the system having structures , processes and culture in place to embed and support organizational learning.(Julian, 2008)

Organizational routines can provide Project Mangers with repeatable was of generating and transferring knowledge from past project experiences, but they can also fail if they are drawn from failed parts of projects (Julian, 2008).

Organization should put measurements in place to make the refrain from " red light learning " as a practice as it becomes a blame game and punitive process for participants that drives defensiveness and closing in instead of opening up sharing and learning from others (Julian, 2008).

The auther is of the view that the main function of the Project Management Office (PMO) is to facilitate cross project learning and continuous improvement. This can be done by embedding accumulated knowledge from past projects experiences into project management routines that are utilised across multiple projects. So¨derlund *et al.,* (2008b), suggested that the greater the level of trust , the greater the level of accessibility people will have and the greater the chances of knowledge sharing within a project. Research findings indicate that people are open to using social networks to find solutions to particular problems that they are facing by asking people they know that have experiences and overcome similar challenges in the past (Newell, 2004).

Trust is vital within a project team, it ensures clear, unambiguous communication and mutual respect amongst team members making knowledge sharing easier (So¨derlund *et al.*, 2008b).

PMO leaders and Program Manager's main objectives are to facilitate the continuous improvement of the quality and the quality of the reflective practices over the course of the project lifecycle. They are knowledge brokers and facilitate organizational learning and continuous improvement (Julian, 2008).

The PMO office is there to facilitate and improve project performance and ensure that projects deliver according to end user or customer's needs and expectations and to ensure that projects are run within budget and are on schedule and quality is ensured (Julian, 2008).

Julian (2008) noted that continuous system –level learning is required if organisations are to improve, this requires:

1. Individuals to share and reuse knowledge gained in current and future projects.
2. The system to have structures, processes and culture in place to embed and support organizational learning.

Wiewiora *et al*., (2014) revealed that cultural values related to uniformity, teamwork, collaboration, employee involvement and non- competitive environment promoted sharing of any kind of knowledge and information related to project successes and shortcomings. Whereas values related to competitiveness, achievement and focus on winning mentality led to knowledge hoarding. Lone ranger attitudes and the respect boundaries and no unrequested interference fostered knowledge silos and hindered sharing of information .

To foster a knowledge sharing culture within an organization, top management can involve Project Managers in their strategic decisions to get their " buy in" and encourage high frequency interaction and collaboration with junior staff and recognise and reward knowledge sharing initiatives and create an atmosphere of learning not blaming (Wiewiora *et al.*, 2014).

Newell (2004) recommends that management should make it a priority to bring people together for different projects so they can share knowledge and experiences from their peers and develop social networks whilst learning at the same time and not only meet when they need information or assistance on a project.

2.7 ADOPTION OF THE COMMUNITY OF PRACTICE STRUCTURE IN THE PROJECT ENVIRONMENT TO AID CROSS PROJECT LEARNING

Wenger, McDermott and Snyder (2002) define Communities of Practice as "a group of individuals who shares their interests and problems with a specific topic, and gains a greater degree of knowledge of and expertise on a topic through their regular interaction."
Wenger (2011) rephrases the definition and states that "COPs can be defined as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly"

Communities of Practice are mechanism through which knowledge is held, transferred and created. The concept of community of practice was originally proposed by Lave and Wenger (1991) and was further developed by Wenger (1998) and has been described as "*one of the most influential concepts to have emerged within the social sciences during recent years"* (Hughes *et al*. 2007: 1).

COPs are primarily used to analyze and facilitate knowledge transfer in a wide range of organizational environments Lave and Wenger (1991) COPs help foster an environment in which knowledge can be created and shared to improve the effectiveness of existing practices used in organizations (Lesser and Everest, 2001).

According to Wenger (1998) and Roberts (2006) COPs following three key characteristics or dimensions, which are Mutual engagement, Joint enterprise as well as Shared repertoire.

"**Mutual engagement**: refers to the extent to which members interact with one another and form their own relationships and culture.

Joint enterprise: refers to the common purpose that binds people together and builds relationships that enable them to work on a specific interest.

Shared repertoire: refers to the continual development of the community, through which members produce sources over time through participation (these resources include, for example, procedures, techniques, forms, stories, tools and concepts)."

Social interaction has been identified as a vital factor for knowledge transfer in the project environment (Hartmann and Dorée, 2014). Social interaction are channels or tools for knowledge transmission because it is in those contextually embedded collaborative efforts (groups) in projects that knowledge is transferred and lessons are learned (Hartmann and Dorée, 2014).

Probst and Borzillo (2008) noted that COP differs from a project team in that the participants' roles are not assigned formally and are not defined with respect to the COP task. Moreover, the delineations of member roles are not clear. COP's progress is not measured by meeting certain milestones at a predetermined time and cost, they are measured by the quantity of practices developed and exchanged within the COP, enabling the organization and its members to improve their performance.

COP members share a common interest in developing practices in a specific field and unlike project teams, COP do not disintegrate once they has achieved their initial objectives, they change and grow according to member's needs and exist for as long as there is a need for them and they provide value to their members.

Wenger, McDermott and Snyder (2002) observed that in a typical meeting, participants oftentimes find themselves in a lively debate about a certain topic, discussing the merits and drawbacks about the design or project implementation plan presented by the presenters, it is a relaxed and mind stimulating environment prompting learning and sharing.

COPs provide a living source for knowledge (Wenger, 2004). Thus communities of practice are not confined to formal apprenticeships, but are natural social structures existing wherever people work and accomplish things together (Wenger, 1998). Wenger, McDermott and Snyder (2002) added that since communities of practice are voluntary, what makes them successful over time is their ability to generate enough excitement, relevance, and value in a form of knowledge and insight to attract and engage members over extended periods of time. (Roberts, 2006) noted that "COPs are not stable or static entities. They evolve over time as new members join and others leave.

Wenger, McDermott and Snyder (2002) noted that seeing that Communities of practice are separate from the everyday work pressures of people's jobs, they enable community members the opportunity to offer advice on a project with no risk of getting entangled in it, presenters can listen to advice with no obligation to take it.

A noted unique factor when it comes to COPs is the fact that within communities of practice, meaning is negotiated through a process of participation and reification by members (Wenger, 1998). The author continues to note that *"any COP produces abstractions, tools, symbols, stories, terms, and concepts that reify something of that practice in a set form."*

Wenger, McDermott and Snyder (2002) noted that large portion of community members are peripheral and rarely participate. Instead, they keep to the side lines, watching the interaction of the core and active members.

Some community members remain peripheral because they feel that their observations are not appropriate for the whole or carry no authority. Others do not have the time to contribute more actively, but these peripheral activities are an

essential dimension of communities of practice as peripheral members gain their own insights from the discussions and put them to good use in their own work spaces (Wenger, McDermott and Snyder, 2002).

Aljuwaiber (2016) found that though technology is a great tool and enabler in the business environment, it inhibits transfer of tacit knowledge as it prohibits social interaction (e.g. face-to-face, person-to-person) and results in a loss of direct human interaction.

From his studies, (Aljuwaiber, 2016) found that there are several organizational factors that could affect COP activities within companies. These are top management, organizational structure and organizational culture.

His study results indicated that top management plays a vital role in supporting COPs within an organization. With regards to organizational culture, the knowledge sharing culture and reward systems has been found to be rather poor and new initiatives need to be applied to embed the spirit of learning and growing together within organizations (Aljuwaiber, 2016).

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Challenges with Community Of Practices

Roberts (2006) found that qualities that make a community an ideal structure for learning – are shared perspectives on a domain, trust, a communal identity, longstanding relationships, an established practice – are the same qualities that can

hold it hostage to its history and its achievements. Issues concerning power, trust and predispositions, which have already been explored in the academic literature.

Power- A necessary element in successfully leading and influencing any group of people can be a drawback as pressures from internal sources such as directors and experts as well as from outside the organization can inhibit the will and ability of workers to engage effectively in the negotiation of meaning which is one of the founding elements of COPs. And those who have the knowledge sometimes use it as a bargaining chip to get their way, " *power and knowledge imply each other* (Foucault, 1979). "

Trust: Without trust, *"members of a community of practice may be reluctant to share knowledge*" (Roberts, 2006).

Predispositions: According to Wenger (1998) meaning is negotiated within communities of practice. Knowledge that is aligned with the specific predispositions of a community and supports the identity and current practices of its members is likely to be adopted more readily than knowledge that challenges current identity and practices.

Broad socio-cultural factors may or may not be conducive to the success of communities of practice as a knowledge management tool.

Roberts (2006) noted that one of the strengths of the communities of practice approach is that it can be applied in a wide range of organizational settings. However, this can also be viewed as a weakness, since it may encourage its inappropriate application.

From his studies, Aljuwaiber (2016) found that there are several organizational factors that could affect COP activities within companies. These are top management, organizational structure and organizational culture.

Aljuwaiber (2016) study results indicated that top management plays a vital role in supporting COPs within an organization. With regards to organizational culture, the knowledge sharing culture and reward systems has been found to be rather poor and new initiatives need to be applied to embed the spirit of learning and growing together within organizations.

2.8 LITERATURE REVIEW SUMMARY

No two projects are identical making each project to have challenges and lessons that are unique to them. " Projects offer insightful knowledge, prompt innovative or unique approaches to problem solving when addressing problems throughout the course of a project. "(Wiewiora *et al.*, 2014).

Cloutier (2007) cited that, regardless of the degree of success or failure, all projects have to be formally closed out sooner or later. The project closeout is an important stage where the project manager and the team get to identify and capture the new knowledge learnt during the course of the project in lesson learnt reports and prepare means of transferring the knowledge to other projects. lessons learnt reports are vital to ensure that knowledge (tips and process knowledge) and experiences from the project are captured and stored and can be retrieved and used in future.

It has been observed that many organizations and businesses suffer from repeat errors and management mistakes at all levels (Parnell, Bergen, and Soper, 2005). Abdelrahman, (2018) stated that it is important for organizations to complete project closeout reports and do project evaluations as it aids in improving

performance and provides data required for future projects. Project evaluations also help with developing the organization's quality assurance procedures and performance measures that are required to meet customer's expectations. Reviewing projects, enables the project team to do a retrospection on the project, to look at what worked and what failed or could be improved upon for current and future projects (McAvoy, 2006).

Howard and Smith (2016) view post project review process a method to evaluate project outcomes and to leverage learning. According to Zedtwitz (2002), Post-Project Reviews (PPRs) provide an opportunity to systematically improve performance in subsequence projects.

Only a few organizations undertake any formal form of project Post-Implementation Reviews (PIRs) / Post- Project Reviews (PPRs) (Gwillim, Wieder and Dovey, 2005). Studies have found that project reviews are not yet the norm in most Project Management practices despite the numerous benefits that they bring (Howard and Smith, 2016).

Johansson, Moehlerb, and Vahidic (2012) and Newell (2004) outlined two knowledge sharing strategies, the Codification strategy which is used when knowledge is made explicit and transfared through written materials and can be codified and the Pesonilization Strategy- requires knowledge transfer by personal interaction.

These two mechanisms of knowledge transfer have not been effective because of the superficial nature of the lesson learnt reports and the current post project review practice (Newell, 2004).

Newell (2004) noted that even with state of the art IT support for capturing, storing and retrieving project based knowledge using codified methods (explicit) project

information as well as situational approaches that involve social interaction and networking well established project based organizations still have a problem with capturing lessons learnt and experiences from past projects for future use. These organizations also find themselves starting projects from scratch and making the same mistakes as others have made before them. No one organization can claim they have mastered the art of sharing knowledge and information within an organization (Newell, 2004).

Communities Of Practices (COPs) are primarily used to analyze and facilitate knowledge transfer in a wide range of organizational environments (Lave and Wenger, 1991). From his studies, (Aljuwaiber, 2016) found that there are several organizational factors that could affect COP activities within companies. These are top management support, organizational structure and organizational culture.

Top management plays a vital role in supporting COPs within an organization. The knowledge sharing culture and reward systems has been found to be rather poor and new initiatives need to be applied to embed the spirit of learning and growing together within organizations (Aljuwaiber, 2016).

In order for organizations to grow their knowledge base, knowledge management needs to be prioritised and management must invest in and focus on creating an environment and culture conducive to cross project learning has been found to be a great tool in developing competencies in project based organizations (So¨derlund *et al.*, 2008b).

In this environment employees wil be willing to share knowledge gained from current and past projects (Johansson, Moehlerb, and Vahidic, 2012). The business benefit will be realized when the receiver utilizes the shared knowlegde resulting in profits (Johansson, Moehlerb, and Vahidic, 2012).

CHAPTER 3- RESEARCH METHODOLOGY

3.1 INTRODUCTION

The aim of the research is to investigate the challenges faced by KZN- DOPW project teams in undertaking and completing comprehensive project close out reports and Post-Project Reviews for completed projects with the aim of learning from their experiences and improving performance and outputs for current and future projects within the KZN-DOPW.

This chapter examines the methodology applied in this study. Leedy (2005:2) defines research as *"a systematic process of collecting, analyzing, and interpreting information (data) in order to increase our understanding of the phenomenon about which we are interested in or concerned about"*

The methods used to research topics are based on assumptions driven by or conceived from what reality is perceived to be at a point in time (Punch, 2009). This study explored the two types of research methodologies used for research namely quantitative and qualitative research. There are many tools to gather data for research. These tools are not to be confused with research methodology but are rather a result of the research methodology selected (Leedy, 2005).

The decisions regarding the best methodology and data collecting technique to use for this project was informed by recommendations made in literature from similar studies conducted which proved to be the most suitable to meet the research objectives. The most appropriate research design to adopt for the study was deemed to be a qualitative approach where the data collection would take the form of an initial survey questionnaire followed by a series of semi-structured interviews.

3.2 RESEARCH PURPOSE

The philosophical approach of this research was exploratory as it intended to identify, investigate and understand the challenges with Knowledge Management and Organizational Learning at KwaZulu-Natal- Department of Public Works. This was accomplished by identifying factors, which effect and hinder cross project learning and knowledge management within the organization which negatively impacts project delivery.

3.3 RESEARCH PHILOSOPHY

Research philosophy relates to the development and the coherent structuring of knowledge based on the nature and context of that knowledge (Seale, 1999). It should be noted that the research philosophy adopted contains important assumptions about the way in which the researcher views the world (Seale, 1999; Gray, 2014). Seale (1999) further states that there are three epistemological classes: positivism, interpretivism, and critical studies.

With positivism, reality consists of what is available to the senses – that is, what can be seen, heard, smelt, touched, etc. and enquiry should be based upon scientific objective observation (as opposed to philosophical speculation) and therefore on empirical inquiry. Positivism is a methodological philosophy that is quantitative research where we will apply the methods of natural sciences to discover the study of social science (Pham, 2018).The results of the research are presented as objective facts and lend themselves toward the quantitative approach. It can provide wide coverage of the range of situations

Interpretivism stresses that natural reality (and the laws of science) and social reality are different and therefore require different kinds of method (Seale, 1999). With interpretivism, the world is interpreted through the classification themes and graphics of the mind and this research philosophy lends itself toward the qualitative approach which prompt the researcher to seek and adopt data-gathering methods that are perceived to be more natural than artificial.

Critical studies which is also known as the *"transformative paradigm" has an ontology based on relativism* (Riyami, 2015; Pham, 2018). From this point of view, it is referred that reality is socially constructed through the media, institutions and society. Critical researchers often intentionally adopt the ethical, moral, political standard s of the phenomena, occurrence or behavior to judge the situation and practice their research with consideration of social, economic, political and cultural context for specific research's objects or events (Hammersley, 2013).

3.4 RESEARCH APPROACH

There are three main research approaches: (a) quantitative (b) qualitative and (c) mixed methods. Qualitative and quantitative research should not be viewed as fixed and polar opposites to each other, but must be taken as representatives of alternate ends on a field (Creswell, 2014).

3.4 .1 Quantitative research

Quantitative research is an approach for testing objective theories through scrutinizing the relationship among variables and data (Amaratunga *et al.*, 2002; Creswell, 2014; Gray, 2014). Quantitative research also known as descriptive research involves identifying the characteristics of an observed phenomena or exploring possible correlating among two or more phenomena (Leedy and Ormrod, 2010). Quantitative research examines the situation as it is. The data collected can then be measured, via

instruments to allow for numbered data that can be analyzed using statistical procedures (Creswell, 2014; Gray, 2014; Laurie and Jensen, 2016). "*The subject under analysis is therefore measured though objective means, rather than being inferred subjectively"* (Amaratunga *et al.*, 2002). The focus in quantitative studies is on a specific feature of conduct. The conduct needs to be measurable against a yardstick. The quantitative researcher has to remain objective when making assessments (Leedy, 2005).

3.4.2 Mixed Method Research

Mixed methods research is an approach which seeks to answer an questions on a certain subject by means of gathering both quantitative and qualitative data, combining and integrating the two sets of data (Creswell, 2014; Laurie and Jensen, 2016). The principal assumption of this approach is that through combining the qualitative and quantitative methods, it provides the research with a more thorough understanding of the research problem than either quantitative or qualitative can provide individually (Creswell, 2014); (McKim, 2017); (Gray, 2014); (Jensen and Laurie, 2016).

As noted by (Creswell, 2014), mixed methods are chosen because of their ability for drawing strength on both qualitative and quantitative research and reducing the limitations of both approaches. Furthermore, it is also an ideal approach if the researcher has access to both quantitative and qualitative data, as is the intention of this research (Creswell, 2014; McKim, 2017). The authors further added that mixed-methods approach provides a more complete understanding of the research problem than either quantitative or qualitative can provide individually. This approach is however time-consuming as it requires significant data collection and the analyzing of both sets of qualitative and quantitative data is a lengthy process requiring the researcher to be familiar with both quantitative and qualitative forms of research (Creswell, 2014). Convergent Parallel Mixed Methods Design can be followed where the researcher collects both quantitative and qualitative data, analyses the data separately, and then

compares the results to determine if the findings confirm or disconfirm the data sets (Creswell, 2014; McKim, 2017).

3.4.3 Qualitative Research

Qualitative research is research that does not focus on one specific approach. The research includes many techniques that may be different from one another. All qualitative research methodologies are similar in that the research methods concentrate on phenomena that occur in natural settings and involve studying those phenomena in all their complexity (Leedy, 2005).

Qualitative research is an approach that seeks understanding and the meaning individuals or groups attribute to "*social or human problem*" (Creswell, 2014:5). The principal of qualitative research is that it does not merely accept observations of the senses but it goes deep into the underlying issues causing the reality (Leedy and Ormrod, 2010). Qualitative research works with the emotions behind the thoughts and actions of a certain phenomenon or occurrence (Leedy and Ormrod, 2010). This approach involves developing questions and procedures, with data typically obtained from literature and from the participant's environment, and data analysis inductively building from specifics to general themes and the researcher constructing interpretations of the meaning of the data (Seale, 1999; Amaratunga *et al.*, 2002; Creswell, 2014; Gray, 2014). According to to (Amaratunga et al., 2002;19) *"A key feature of this approach is that it presenting a view on what the real life experience is like from the participants perspective as it allows the researcher to focus on naturally occurring, regular events in natural surroundings."*

A summary of purposes for which qualitative research may be useful (Leedy, 2005) :

- Describing the nature of certain situations, settings, processes, relationships, systems or people.

- Interpreting the studied phenomenon through gaining new insights about a particular phenomenon, developing new ideas about the phenomenon and discovering the drivers and problems that exist within the phenomenon.
- Verifying certain assumptions, claims, theories or generalizations within natural settings.
- Evaluating the effectiveness of particular policies, practices or innovations.

Table 1: Research Approaches, adapted from (Creswell, 2014)

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

The research question asks what the predominant challenges are that project managers and teams face that keep them from undertaking and completing comprehensive project close outs that include Post- Project Reviews for

completed/closed projects within the KZN- DOPW? In order to get authentic responses from the participants for this study, a qualitative research approach was chosen for gathering data via a brief survey questionnaire supplemented by a semi-structured interviews which aided in gaining a deeper understanding around the challenges with Knowledge Management and organizational learning at KZN-DOPW.The research questions were structured in a way that would prompt the participants to respond in a way that would provide relevant answers and insight that would aid in meeting the research objectives which sought to understand the processes involved at project closeout stage of a project and compare the prescribed Standard Operating Procedures (SOPs) which is the planned and the observed current practice (actual) to find the discrepancies between the two and the causes thereof.

The questions sought to obtain a holistic view of the challenges faced by project managers during the course of the project and more importantly the closeout stage that hinder them from applying structured knowledge management principles in their projects with the aim of formulating a project knowledge base for future references

3.5 RESEARCH METHODS

Leedy (2005) recognize ethnography, phenomenological study, Grounded theory, Content Analysis and Case studies as the various types of research methods that can be adopted in qualitative research.

3.5.1 Ethnography research

In an ethnography a whole group that shares a common culture is studied in depth over a lengthy period of time (Leedy, 2005). The ethnographer participates in individual's lives for a period of time noting the happenings and what is said and asks questions (Punch, 2009). The investigation concentrates on everyday events in which the people in

the group are active in with the objective of identifying cultural norms, beliefs, social structures and other patterns other cultural patterns. This type of researcher is seeking to gain understanding of the complexities of a certain culture (Leedy, 2005). Data is collected through site based fieldwork. Data collection is through participant observation, structured and unstructured interviews with "informants" and document collection (Leedy, 2005).

According to Punch (2005) the characteristics of ethnographies are:

- Ethnographies are committed to cultural interpretation
- An ethnography begins with the assumption that the shared cultural meanings of the group are essential in understanding the groups behavior
- An ethnography is not pre-structured but rather unfolds and evolves with time
- The data collected in ethnography is prolonged and repetitive.

3.5.2 Phenomenological Study

A phenomenological study seeks to understand people's perceptions and understandings of a particular situation. The purpose of the study is to understand and experience from the participants' point of view (Leedy, 2005). He further adds that data collection is in the form of in depth, unstructured interviews as well as purposeful sampling of five to twenty five individuals. He concludes by stating that data is analyzed through searching for 'meaning units' that reflect various aspects of the experience and integration of the meaning units into a typical experience.

3.5.3 Grounded Theory Study

The purpose of a grounded theory study is to gather data first and then develop a theory. This form of study is useful when theories and documented literature about a phenomenon are not adequate or do not exist. It is a process that includes human actions and interactions and how they result from and influence one another (Leedy, 2005). The word "grounded" means that the theory will be generated from the collected data. The word "theory" stems from the objective of this research which is to generate a

theory and explain data (Punch, 2009). Data is primarily collected through interviews and any other relevant data sources. Data is analyzed through the prescribed and systematic method of coding the data into categories and identifying interrelationships, continual interweaving of data collection and data analysis and construction of a theory from categories and interrelationships (Leedy, 2005).

3.5.4 Content Analysis

A content analysis is qualitative research technique used for detailed and systematic examination of the contents of a particular body of material for the purpose of identifying patterns, themes or biases. Content analysis show three distinct approaches: conventional, directed, or summative. All three approaches are used to interpret meaning from the content of text data (Shannon, 2005). The purpose of content analysis is to seek out specific characteristics of a body of material. This type of study focuses on any verbal, visual or behavioral form of communication. Data is collected through identification and possible sampling of specific material to be analyzed and coding of the material in terms of predetermined and precisely defined characteristics (Leedy, 2005). Research methodology in qualitative studies involves sampling, observations and interviewing. The identification of a sample must be done in relation to the research questions at hand. In order to make deductions about an entire population, a sample that represents the whole must be selected. In qualitative research, the sampling is purposeful rather than random. The sample is selected according to the value of information it will yield with regards to the research question **(**Leedy, 2005). Content analysis is the form of data collection that was adopted for the study, it comprises of the quantitative information was collected and analyzed for this study.

3.5.5 Case study research

In a case study, a specific situation is studied in depth for a defined period of time. Case studies allows the exploration and understanding of complex issues especially where an in-depth investigation is required (Zainal, 2007). A case study may be suitable for

understanding a situation that is poorly understood. It may also be used to investigate how a specific phenomenon changes over time as a result of circumstances or interventions (Leedy, 2005). The case study research method asks the question of how and why. Case studies do not require the control over the behavior of events and focuses on contemporary events (Punch, 2009).

A specific case may be focused on because of its distinctive nature or exceptional qualities that can increase understanding or provide information for similar situations.
By including both quantitative and qualitative data, case study helps explain both the process and outcome of a phenomenon through complete observation, reconstruction and analysis of the cases under investigation (Zainal, 2007).

Researches have a choice between single and multiple case study methodologies. The difference between a single case study and a multiple case study is that in the latter, the researcher studying multiple cases to understand the differences and the similarities between the cases, compare and analyze t the findings accordingly (Gustafsson, 2017).
Multiple case studies can be used to either augur contrasting results for expected reasons or either augur similar results in the studies (Yin, 2003). In this way the author can clarify whether the findings are valuable or not (Gustafsson, 2017).

The chosen single case study approach was qualitative to fit with the explorative nature of the research whose main objective was to illustrate the factors that hinder the exchange, capturing and storing of information and knowledge during project closeout stage.

3.6 UNIT OF ANALYSIS

Collis and Hussey (2009) define a sample "*as a subset of a population, and consequently, the sample size measurement is with respect to the population size*." However, they

proceed by expressing that guaranteeing a base sample size is not a concern in qualitative studies, as it is for quantitative examinations. This is because the objective of qualitative studies has profundity and lavishness from the investigation. Marshall and Rossman (1999) agree with this, revealing that in qualitative research, effectively addressing the research question is what dictates the sample size. Blumberg, Cooper and Schindler (2014) agree asserting that in qualitative research, sample sizes are usually small and differ according to the different methods used in selecting the respondents, several considerations were made when deciding on the sample for the distribution of the research instrument.

The focus of this research was on infrastructure projects, it was determined that the research sample would only focus on infrastructure and construction project professionals which is a key factor in constructing the research approach where the participants selected will be representative of the target population. Participants were chosen as a result of their involvement on infrastructure projects environment (Etikan, Musa and Alkassim, 2016). More specifically, the target population of this research was restricted to construction project managers and program managers working in an infrastructure project environment as well as their accessibility, availability to participate in this research study.

As a result, convenience sampling, where individuals of the target population that meet certain criteria, such as easy accessibility (email and telephone) geographical proximity, availability at a given time, or the willingness to participate", was utilized (Etikan, Musa and Alkassim, 2016).

Furthermore, construction project managers and program managers were selected as the target participants for this research as they are generally better positioned to support the researcher in providing understanding and insight into the research focus, being individuals who are at the "management center of the various infrastructure

projects undertaken by the KZN-DOPW and should manage the project deliverables and end user expectations to achieve the project success. The researcher obtained access to these participants via a directory of all appointed construction project managers and program managers for the various portfolios acquired through the organizational intranet.

3.7 DATA COLLECTION

3.7.1 Observations

During observations the qualitative researcher observes either as an outsider or a participant observer. There is no structure followed when making observations in qualitative research (Leedy, 2005). The researcher can shift focus from one thing to another as data sources reveal new concepts and views (Leedy, 2005). The connection of data collection with research questions and purposes takes place during observations (Punch, 2009). Whilst conducting observations of a qualitative study the researcher should (Leedy, 2005):

- Test different methods of capturing the data and select the best one in order to be effective in data collection
- Remain relatively quiet and unnoticeable while observing but also appear approachable. docile

3.7.2 Interviews

Interviews are the leading data collection method in qualitative research. Interviews can be structured, unstructured or open ended. Structured interviews are interviews where all respondents receive the same questions in the same order. Unstructured interviews are non-standardized interviews. Group interviews or focus groups are interviews where more than one person is interviewed (Punch, 2009). The interviews in a qualitative study are mostly semi structured and open ended. Open ended interviews are flexible and may end up revealing information that the researcher had not anticipated. This

flexibility may however; lead to different and incomparable responses from the interviewees if no control measures are put in place (Leedy, 2005).

The approach to data collection that is selected determines the kinds of data that the researcher has access to, and consequently shape analyses (Price, Jewitt and Brown, 2013; Marshall and Rossman, 2016). As a qualitative approach was chosen for this study, the data collection instrument that was adopted was in a form an initial survey questionnaire followed by a series of semi-structured interviews. The benefit of this approach is that it allowed the researcher to send out fillers and gather of data quickly on the subject matter, as well as allowing the researcher to understand the meanings that people hold for the daily activities, in relation to that of the research topic (Marshall and Rossman, 2016).

A mix of multiple choice questions, tick boxes as well as requests for brief descriptions/ elaborations. This was used to accurately capture response to questions from the participants. The arrangement of the follow up semi-structured interviews was via telephone/ SKYPE with available Infrastructure Deputy Directors, Program Managers and Portfolio Managers. This approach allows for the exploration of the subject matter revealing the participants views on the subject whilst respecting how the participant frames and structures responses (Marshall and Rossman, 1999: Marshall and Rossman, 2016).

In addition, participants were provided with consent letters inviting them to contribute to this study **(Refer to Appendix A and B).** Participants were afforded the freedom to talk openly and provide insight into their perspectives and experiences regard challenges with Knowledge Management and organizational learning at KZN- DOPW with the interviewer intermittently intervening to ensure the participants' responses remained applicable to the area of research, and interview questions presented. As such, the participates were given a platform to voice their perspectives on the topic and

their views and opinions were allowed to unfold as the participants viewed it, all of this was recorded and documented allowing the researcher to convey the standpoint that the participants perspectives as it is important and useful (Marshall and Rossman, 1999).

Participants who made themselves available to be interviewed were made welcome and thanked for their agreement to participate. To establish clarity, the researcher verbally reiterated the aims of the research, process for data collection and gave assurances about confidentiality and anonymity, with consent forms being signed by each participant. The interviews conducted with the participants were recorded to ensure the accuracy of the data. The interviews were transcribed using Microsoft Excel for coding of the data, as well as providing better structure in regard to detecting themes, linking and managing the data during data analysis. The process of recording and preserving the data and meanings, along with the combined transcription assisted with increasing the efficiency of the data analysis responses (Marshall and Rossman, 2016).

The average duration of the interviews were given a 30-40 minutes time allocation. The interview was guided by the questions listed, exploring the participant's experiences on issues related to cross project learning within KZN-DOPW. Where required to complete the survey portion of the interview, the researcher clarified the role of project closeout exercise in the project lifecycle, Post- Project Reviews and the concept of Community of Practice (COPs). Time was a factor, due to the nature of their roles in the organization, certain participants were limited by their own time constraints and other commitments. As a result, the duration of interviews though allocated a maximum of 40 minutes were mostly determined by the participants.

The survey questionnaires was distributed to project managers across all ages, which indicates reasonable levels of education amongst the respondents and provides an advantage of having mature project managers who are assumed to have substantial

knowledge and experience in the construction project management and should be evident in their project management conduct and capabilities.

3.7.3 Research Instrument

The research instrument used for this research was adapted from those used by (McAvoy, 2006), as this is a previously validated research instrument where he was focusing on the Preconceptions of Project Post- Mortems by Developers and project managers from two diverse software development organizations were surveyed to determine their view of post-mortems.

A copy of the semi-structured interview questions is provided i**n Appendix D,** where the challenges faced by project managers in undertaking and completing comprehensive close out reports and Post- Project Reviews for completed as well as cancelled projects within the KZN-DOPW are investigated**.** The questions were divided into the following two sections:

Section A: Demographic profile of the participant: The purpose of this section was to obtain an overview of the participant's demographics, including role, experience and value of projects worked on in South African Rands.

Participant's Level of experience was asked to see if later the level of experience in the project management field somehow translates to the project manager adopting strategies of consciously using knowledge and experiences about methods and tools (processes) from past projects in current practice and the added value in a form of higher project success rates that such practices would bring.

Section B: Challenges with Knowledge Management and Organizational Learning at KZN- DOPW: This section intended to gather information around the Challenges with Knowledge Management and Organizational Learning at KZN- DOPW.

This was aided by a brief survey which project managers had to complete **(Appendix C)** following which the researcher probed for further details regarding survey results via an

unstructured interview with the available Infrastructure Deputy Directors, Program Managers and Portfolio Managers to gain a further understanding of the participants' preferences.

Prior to completing the survey, the researcher made every effort to ensure participants were clear on the role of project closeout exercise in the project lifecycle, Post- Project Reviews and the concept of Community Of Practice (COPs) indicated within the survey.
The survey used a mix of multiple choice questions, tick boxes as well as requests for brief descriptions/ elaborations. This was used to accurately capture response to questions from the participants. The recordings of the interviews were later transcribed and correlated with the notes that the researcher took.

3.8 RESEARCH INSTRUMENT VALIDATION

The researcher sought to validate the intended research instrument to assess the face and content validity (Seale, 1999). The validation was achieved by conducting a trial study with a single construction project manager to assess the reliability and validity of the research instrument. The interview posed open-ended questions was conducted to get the general idea of probable response and the manner in which questions should be phrased in order to obtain the most appropriate responses. This allowed the researcher to identify and reflect on any ethical and structural considerations which might occur during the research study.

Following the pilot interview, updates were applied, where required, to reword and/or remove certain items deemed ambiguous, or which did not add value to intended research objectives. Consequently, the below question regarding behavioral factors affecting cross project learning were added on the research questionnaire:

1. According to you, what are the requirements for a favourable learning environment in the workplace? Briefly describe a scenario for a favourable learning environment.

2. Competitive practices can be advantageous or detrimental to organizational development, According to you, what role does competition amongst colleagues play in organizational learning

3.9 DATA ANALYSIS TECHNIQUE

The primary approach to the analysis of the qualitative data in this research was directed by the thematic analysis approach, as categorized by (Braun and Clarke, 2006). *"Thematic analysis is an approach that can be applied to encode qualitative information" (Boyatzis, 1998)*. Furthermore, its application extends to identifying, analyzing and describing themes contained in the data gathered in the data collection procedure (Braun and Clarke, 2006). The author further added that this approach allows the researcher to systematically categorize the content of the data, in order to identify the relationships amongst the themes, and describe the data in further detail. An advantage of this approach is in its flexibility, as it provides a decisive and valuable research method with the prospective to deliver a rich and detailed description of the data collected (Boyatzis, 1998; Braun and Clarke, 2006). Braun and Clarke (2006) added a further advantage of this approach, which is that "it does not require the detailed theoretical and technical knowledge of other approaches, such as Grounded Theory of Discourse Analysis, as it offers a more accessible form of analysis, specifically for those new to qualitative research."

3.10 THEMES

A theme is a trend found in the data that, at the minimum, describes and organizes possible observations or, at the maximum, interprets aspects of the phenomenon (Boyatzis, 1998). It allows the researcher to identify something significant in the data collected, in relation to the research topic, and represents "*some level of patterned response or meaning*" within the data collected (Braun and Clarke, 2006: 82). The

authors further added that *a* key consideration while assessing and reviewing data for themes is to consider what constitutes a theme.

The general view relates to frequency, where there will preferably be a number of examples of the theme across the data set (Braun and Clarke, 2006). However, more instances do not automatically suggest the theme is of greater significance (Braun and Clarke, 2006). Thematic analysis allows the researcher the flexibility to determine themes and occurrence in many ways, it is therefore vital that the researcher remains consistent in how this is applied across the data set (Braun and Clarke, 2006). For the purpose of this research, the researcher was focused on themes relating to the research questions.

3.10.1 Thematic analysis

The approach to thematic analysis applied in this research study is the approach defined by Braun and Clarke (2006) which consists of 6 phases, below is the Process of Thematic Analysis, adapted from (Braun and Clarke, 2006).

*"**Phase 1- Familiarization with the data:** Researcher should immerse and familiarize themselves with the data, reading and re-reading the data and noting any preliminary key observations*

***Phase 2- Producing codes:** Entails generating labels for key features of the data which is relevant to the research question. The researcher codes all data items and ends this phase by collating all their codes and relevant data extracts.*

***Phase 3- Identifying themes**: Codes are aggregated into potential themes, whereby themes are constructed via a process of collating all relevant codes. The researcher ends this phase by collating all the coded data relevant to each theme.*

***Phase 4- Reviewing themes:** Reviewing the themes in relation to both the coded extracts and the full set of data. The researcher will reflect on whether the themes tell a convincing and compelling story about the data, and start to describe the nature of each individual theme, and the relationship between the themes.*

Phase 5- Defining and naming themes: *Each theme is reviewed and refined, to identify the essence of the theme, and constructing a clear classification for each theme*

Phase 6- Writing up the report: *The write-up involves assembling the themes identified into a constructive and coherent description in order to produce a report of the analysis conducted. In such cases the quantitative data is analyzed using descriptive statistics and weighted average."*As noted, a qualitative research approach was followed. The structure of the data findings and presentation will be in a form of a combination of the quantitative results from the questionnaire along with the interview responses to identify themes in the data collected which will be discussed in the report.

3.10.2 Themes identified from the case study

Conducting the thematic analysis as described in the methodology section of this report, yielded the identification of themes and sub themes from the data. The main themes identified are:

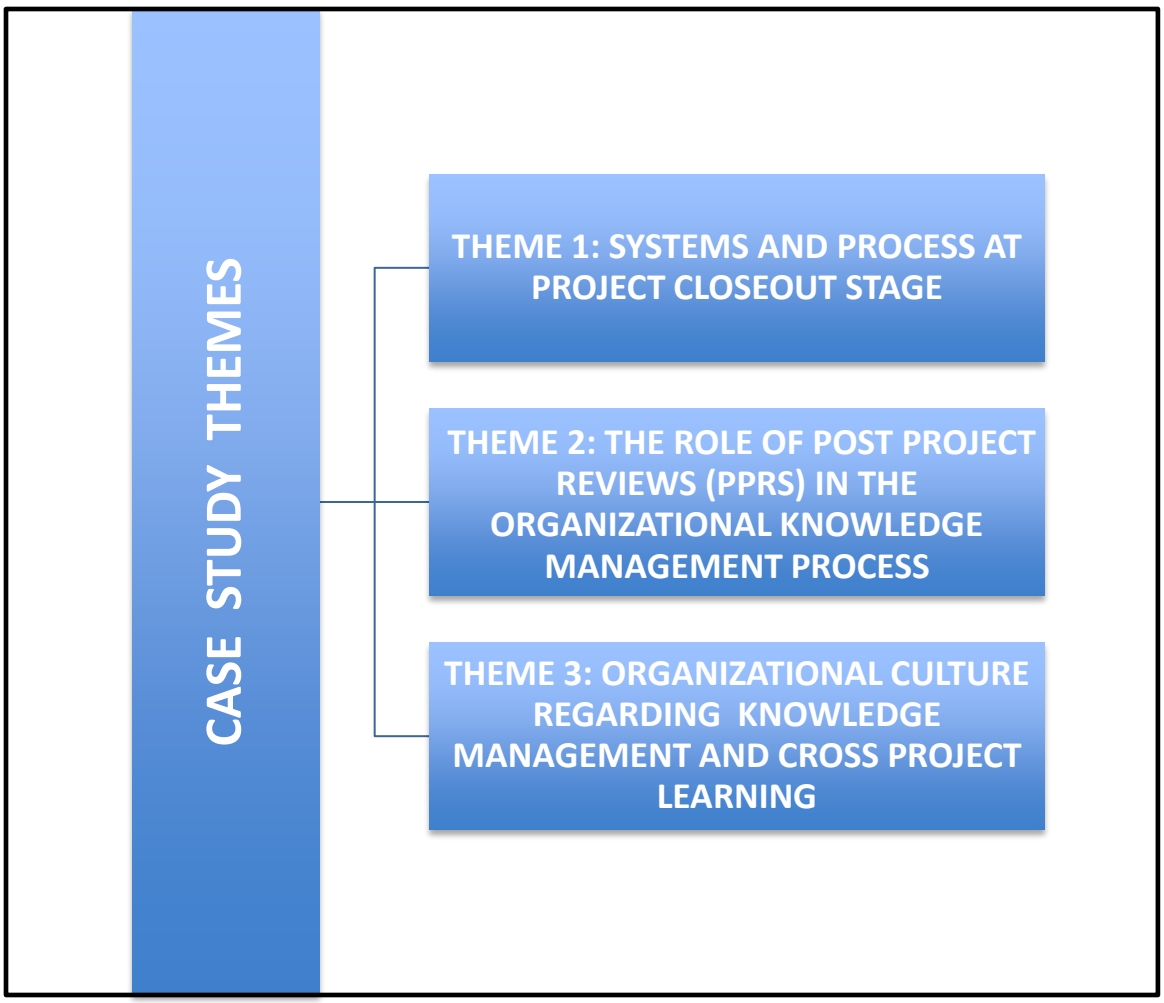

Figure 1 Identified themes chart

3.11 RESEARCH LIMITATIONS

As noted by (Marshall and Rossman, 2016), all proposed research projects have limitations. The primary limitations of this research were as follows:

Researcher's subjectivity: The question of subjectivity is open and recognized as a constraint in this research study however the researcher maintained every effort to minimize this limitation

Availability of certain stakeholders: Due to the nature of the role of the participants chosen for this research and the Covid19 pandemic coupled with the mandatory social distancing, a survey via email will be conducted with all available project managers at

the KZN- DOPW. Follow up interviews will be conducted via telephone/ SKYPE with available Infrastructure Deputy Directors, Program Managers and Portfolio Managers.

The research questions were structured in a way that would prompt the participants to respond in a way that would provide relevant answers and insight that would aid in meeting the research objectives which sought to understand the processes involved at project closeout stage of a project and compare the prescribed Standard Operating Procedures (SOPs) which is the planned and the observed current practice (actual) to find the discrepancies between the two and the causes thereof.

The questions sought to obtain a holistic view of the challenges faced by project managers during the course of the project and more importantly the closeout stage that hinder them from applying structured knowledge management principles in their projects with the aim of formulating a project knowledge base for future references.

3.12 ETHICAL CONSIDERATIONS

Ethical issues are prevalent in any kind of research (Orb, Eisenhauer, and Wynaden, 2001). Furthermore, the nature of ethical problems within qualitative research studies is subtle and different in comparison to those experienced in quantitative research (Orb, Eisenhauer, and Wynaden, 2001). These may include the research design itself Ramos (1989) the researcher/participant relationship as well as the researcher's subjective interpretations of data. It may prove difficult to predict ethical dilemmas that may arise from the data collection approach, however the researcher needs to be conscious of the sensitive issues and possible conflicts of interest (Orb, Eisenhauer, and Wynaden, 2001).

- As such, every endeavour was made to guarantee that the identity of all the participants, the organization they are employed at, and the information and opinions provided by them remained completely anonymous.
- No personal sensitive details of the participants were collected.

- The interview research protocol was provided to the University of Cape Town Ethics Committee for review and approval, with interviews commencing once approval was granted.
- The interview instrument was also reviewed and approved by the Ethics Committee at the University of Cape Town. All data and information collection during this study was kept strictly confidential, with the researcher maintaining sole access to the data.
- Participants were fully informed about the nature of the research.
- The participants voluntarily took part in the interviews, with participants providing their consent to be involved.
- The researcher also endured to ensure that research participants were protected from undue intrusion, distress, indignity, physical discomfort, personal embarrassment, or psychological or other harm.
- All interviews were conducted via telephone in the participant's environment to ensure participant comfort with the research and interview process. As noted by Orb, Eisenhauer, and Wynaden (2001) the intention of the researcher is to listen to the participant in their natural environment's minimal distractions. Therefore, a balanced research relationship and comfortable setting will "*encourage disclosure, trust, and awareness of potential ethical issues*" (Orb, Eisenhauer, and Wynaden, 2001).

3.13 PROBLEMS EXPERIENCED UNDERTAKING THE STUDY

Access to the officials was a challenge due to the Covid-19 pandemic as the lockdown restricted contact and communication as officials were home based which led to reduction of the sample size which was based on the availability of the officials to participate as well as the prolonged response times.

In view of the fact that any form of a performance review and criticism is a sensitive issue, responses obtained from respondents may not have been objective as participants are reluctant to engage or be in support in activities that they feel might lead to blame, criticism or recrimination.

3.14 RESEARCH METHODOLOGY SUMMARY

This chapter has outlined the research process that was utilized in to address the research problem raised.

For this study a qualitative research approach adopting an interpretive philosophy was utilized. The data was collected through survey questionnaires followed by semi-structured interviews. Thematic analysis approach was used to analyze the data collected in this study.

CHAPTER 4: DATA ANALYSIS AND RESEARCH FIINDIINGS

4.1 INTRODUCTION

This chapter provides an overview of the research results and also covers the identified themes and the discussion of the results. It includes introductory data analysis using descriptive statistics to provide an overview of the participants, as well as the analysis of the survey and follow up interview data. Furthermore, the themes identified in support of addressing the key research questions are presented and discussed.

The identified themes listed go a long way towards highlighting factors and various challenges faced by project managers at project closeout stage, factors that speak to the organizational culture which affects the behaviors of both contributors and receivers of information through organizational norms as well as the processes within the organization that guide the employee's behavior and actions in a set manner. This is also evident in the use of technology and training which is available to employees which can either support or hinder knowledge sharing between employees.

This investigation sought to obtain an understanding of the challenges with knowledge management based on the project manager's and portfolio manager's perspectives considering the various factors (Requirements, Procedures, Participants, Documentation and Dissemination) pertaining to the management of past project information and the role of lessons learned in improving project delivery. The research adopted a case study methodology to investigate the challenges and behavioural factors faced by project managers and teams in undertaking and completing comprehensive project close outs that include Post- Project Reviews for completed/closed projects within the KwaZulu-Natal Department of Public Works (DOPW).

4.1.1 The case

The Kwa- Zulu Natal Department of Public Works (KZN- DOPW) was selected for the case study because of the abundance of ongoing infrastructure development projects and the observed absence of formal directives regarding Post- Project Reviews and articulated/ structured project closeout procedures which should include the storage and dissemination of completed project information and lessons learnt reports within the organization.

As previously stated in chapter three, the research sample was made up of 28 pre-selected participants (20 construction project managers and 8 Infrastructure Deputy Directors) all whom are currently employed by the KZN- DOPW. They were selected based on their current positions within the organization which enabled them to better support the researcher in providing understanding and insight into the research focus.

The researcher obtained access to these participants via a directory of construction project managers and infrastructure Deputy Directors acquired through the departmental email address book that is used by all current employees. The research was done in two parts, the first being a survey questionnaire that was completed by project managers that are referred to as the participants (P) and then later the follow up- semi structured interviews which was conducted with the deputy directors and portfolio managers who are referred to as the interviewees (I). The data collected from both the survey questionnaire and follow-up, semi structured interviews will be presented and discussed simultaneously. Refer to Figure 2: below for the organizational chart that illustrates the structure of an organization, the relationships and clear reporting structures in relation to the management of projects.

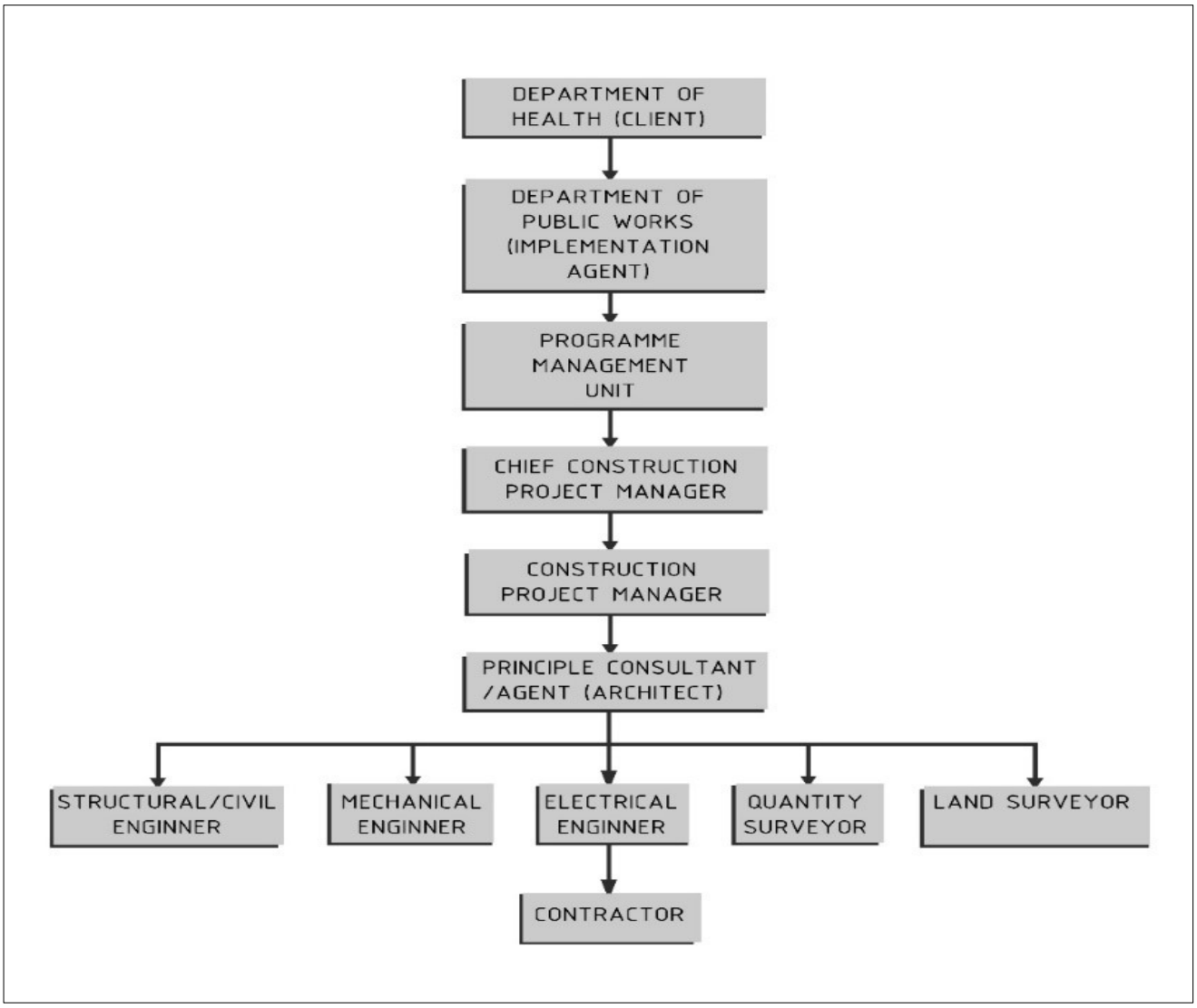

Figure 2: DOPW project organizational chart

4.2 PARTICIPANT DEMOGRAPHICS

4.2.1 Survey Questionnaire Participant (P) demographics

Level of Experience: In order to assist the researcher in providing background and context, demographic information on each of the survey questionnaire participants (P) were collected. Only 12 of the 20 project managers responded and completed the survey questionnaire, translating to a 60% response rate.

The questionnaire comprised of two (2) sections, with the first section focusing on participant's experience in the construction project environment and the last section focusing on the research questions. The demographics (experience in years, average number and value of projects worked on) for each participant for the follow up interview and discussion are displayed in the attached **ADDENDA -1**

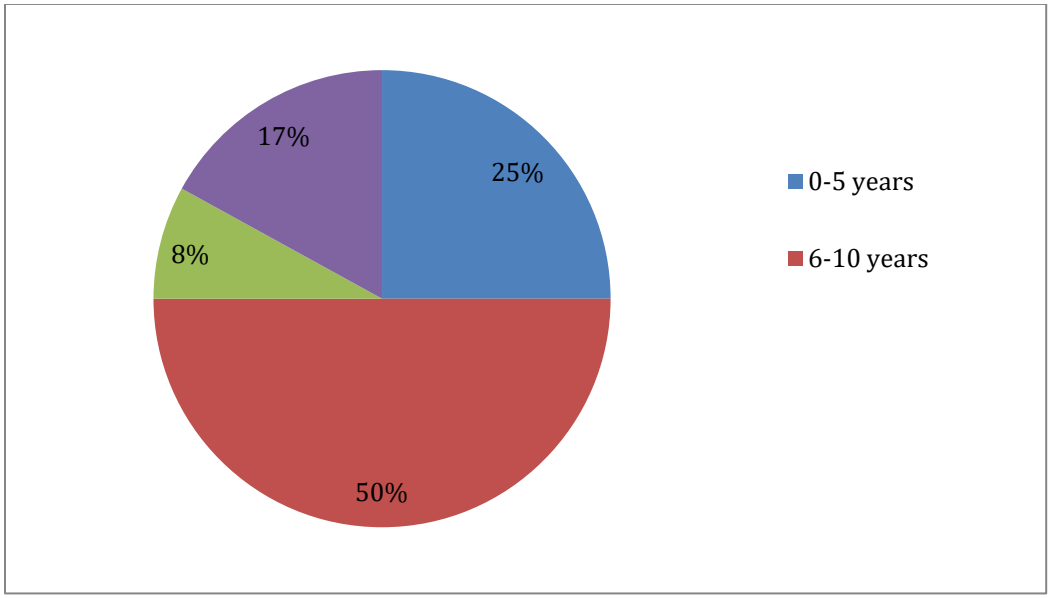

Figure 2: Participant's project management experience in years

As presented in **FIGURE 1**: A total of 12 participants, all whom are construction project managers with a range of experience in the industry, completed the survey questionnaire for this research study. Figure 1 highlights that twenty five percent (25%) have 0-5 years' experience, fifty percent (50%) have 6-10 years' experience, eight-point three percent (8.3%) have 11-15 years' experience and sixteen percent (16.7 %) have more than 16 years in the construction project management experience.

The survey questionnaires were distributed to project managers across all ages, which indicates reasonable levels of education amongst the respondents and provides an advantage of having mature project managers who are assumed to have substantial knowledge and experience in the construction project management and should be evident in their project management conduct and capabilities.

4.2.2 Interviewee (I) Demographics

The persons interviewed for the follow up interview were portfolio managers with program management responsibilities which entail project and program performance management, monitoring and evaluation, enforcing the procedures stipulated in the Standard Operating Procedures (SOPs) and knowledge management within the various sections and portfolios that they head.

Only 5 of the 8 pre- selected Infrastructure Deputy Directors were available for the follow up interviews. Each interview lasted between forty-five minutes to an hour. The interview transcripts were then reviewed by the interviewees for accuracy. Saturation point was reached at interviewee number 5.

Their experience proved invaluable when providing feedback to the survey questionnaire as the two respondent's that had more than 16 years of project management experience, responded positively to Post- Project Reviews citing that they conduct PPRs as a form of evaluating the project plan against the actual and they normally conduct the PPRs to all their project after completion and have gained a lot of knowledge during the process of PPR and capturing lessons learnt which help a lot in terms of project planning, conflict and contracts management. This indicates that the longer individuals practice project management, the more likely they are to adopt learning practices and tools that will assist them in future projects.

A summary of the interviewee's demographics is represented in **ADDENDA 2.** The demographics relating to (Participant's current role/ job title in the organization, experience in years, average number and value of projects worked on/ supervised over the past five years)

4.3 THEME 1: SYSTEMS AND PROCESS AT PROJECT CLOSEOUT STAGE

4.3 1 Reports and documentation required at project closeout stage

Participants were initially asked about their work experiences followed by the processes applicable at project closeout stages and documents that must be collected for storing, sharing and possible reuse in future projects. One hundred percent (100%) of the survey participants indicated that they have coordinated a project close-out before. A bar chart was used to depict the most commonly collected project closeout documents. As is evident from **Figure 2.**

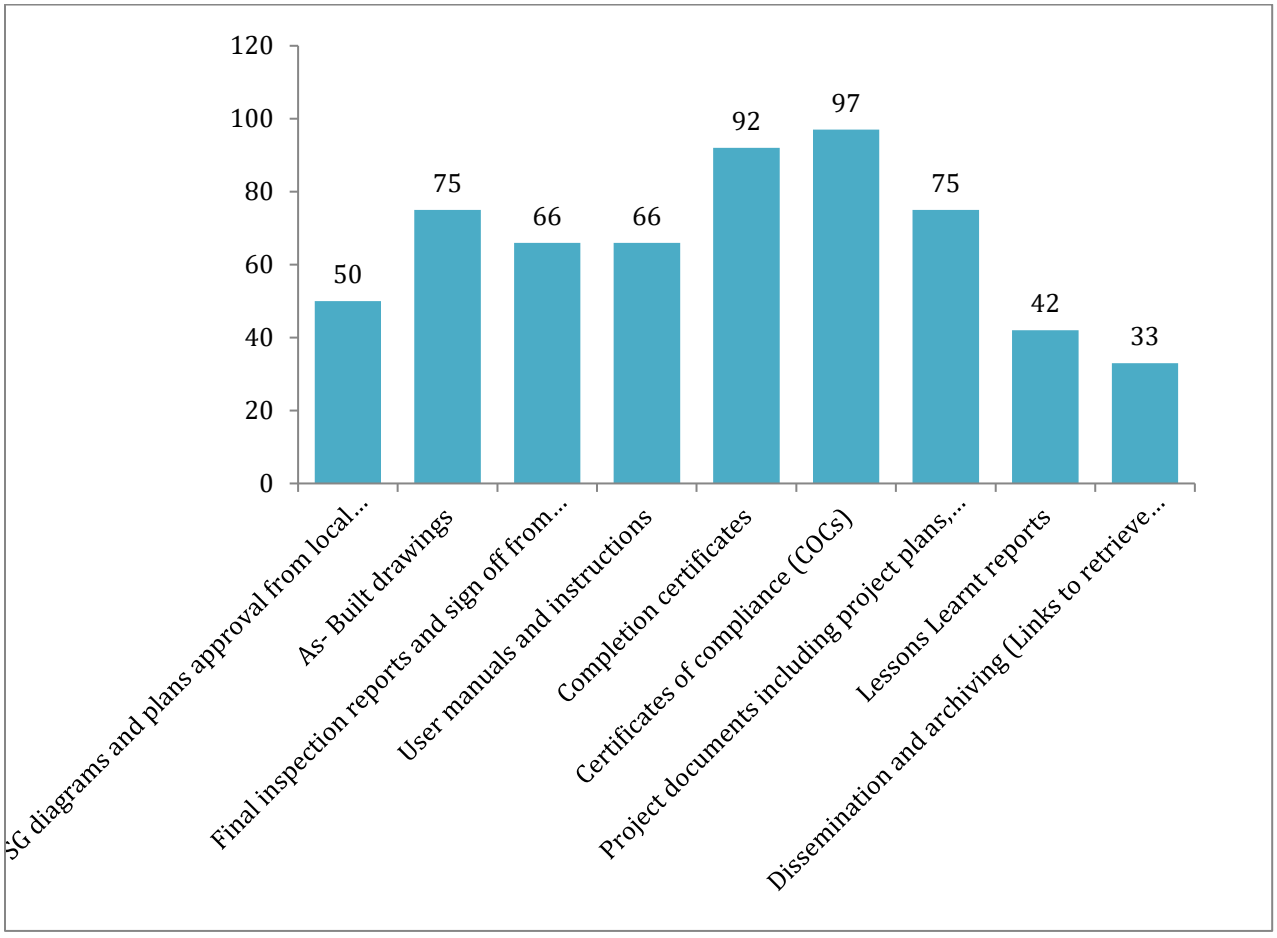

Figure 3: Project closeout report documentation

Completion certificates - The most collected documents were completion certificates and **Certificates of compliance (COCs**) both at ninety-one-point seven percent (91.7%). **General Project documents** including project plans, schedules, cost summaries, progress reports protocols and As- Built drawings both at seventy five percent (75%). **Guarantees, user manuals and instructions and final inspection reports** and sign off from relevant professional disciplines were both at sixty-six-point seven percent (66.7%).**SG diagrams and plans approval from local authority** at fifty percent (50%). **Lessons Learnt reports** at forty-one-point seven percent (41.7%) **Dissemination and archiving** (Links to retrieve the report/ closeout pack at thirty-three-point three percent (33.3%).

All five of the interviewees gave a general list of items expected on the project closeout report which generally store comprised of:

> "*COCs, operating manuals, guarantees, final accounts, EOTs. VOs etc... which are all meant to be submitted for sharing with the end user, client department and for ƒ archiving. With lessons learnt report. Others should make reference to report hard copies and electronically* **(I1, I2, I3, I4 & I5)".**

4.3.2 Procedures and standardized processes at project closeout stage

Most project managers are aware that they should finish and close a project, problem is that many forget how to do it, or do not know how to do it as they lack the required skill set, admin, coordination, technical expertise to close projects systematically at the prescribed time (Kaul, 2014) .

One of the interviewees made reference to the SOPs and indicated how vague it was regarding the issues relating to project closeout reports:

> *"SOPS is not clear on what is required at project closeout stage, pressure to move on to other projects once PC is reached **(I1)."***

"At DOP, the main focus is getting the infrastructure built/ delivered and reaching PC. Many instances where the PCR is not submitted and there are no penalties for that. Reference to past project is minimal. No central hub/ archives for storing information from past projects. PCR is not an APP target and very little attention and time is allocated to it ***(P1****). "*

"*However currently, no electronic template exists for archiving closeout reports exists and very little reference is made to past projects. Close out reports are submitted for compliance only and lessons learnt are not documented. If they are they are superficial and done for compliance reasons only* (**I1).**

Another interviewee agreed and added that:

"*Close out reports are mandatory because they are part of the project lifecycle which forms part of the departmental Standard Operation Procedures .However officials are not abiding and not submitting PCRs and when they are submitted there is no place to store them.* ***(*****I3)"**

An interviewee conveyed frustration caused by lack of direction and a standardized template for recording lessons learnt report that could be used in future.

"SOPS is not clear on what is required at project closeout stage, pressure to `move on to other projects once PC is reached. SOPS is not clear on what is required at project closeout stage it doesn't sensitize the need for a comprehensive lessons learnt report ***(I1)****."*

Another interviewee added that part of the reason for not enforcing the compilation and submission project closeout repot is the fact that there is

"*No system in place for storing project based knowledge and experiences hence repeat mistakes. PMs always have to start from scratch even when undertaking*

*new projects/ work on existing sites. No virtual drives libraries for storing past project closeout reports **(I3)”.***

The lack of a Lack of/ inadequate standardized processes with regards to the management of project closeout information was dominant in the responses

These findings are in line with literature where Egbu (2004) noted factors that inhibit knowledge sharing in organizations citing the lack of/ inadequate standardized processes to be one of the factors that hindered cross project learning and sharing.

4.3.3 The outsourcing of project management function and duties to external organizations

Another interviewee brought to our attention that that portion of the work is outsourced citing that:

*“Currently consultants are expected submit their closeout reports, however an appreciable number of them don’t. The project close out reports is required by the client for all capital projects **(I4)”.***

The data collected regarding project closeout documentation coincides with literature which states that project closeout documents include user manuals and instructions, drawings, completion documents life certificate of compliances`..etc. Project documents include project folders, plans, schedules, cost summaries, progress reports and protocols (Disterer, 2002).

Carrillo (2005) noted that lesson learnt form a part of organizational learning practices because it attempts to collate lessons learnt from previous projects and use them as a learning curve and experience so the same mistakes are not repeated in current and future projects. The data from the project managers who participated in the questionnaire indicates that whilst the completion certificates with the relevant sign offs is seen as important in closing out a project, very little attention is given to the lessons learnt reports and dissemination and archiving (Links to retrieve the report/

closeout pack). This behaviour matches with findings from previous studies found in literature where Howard and Smith (2016) conducted a study on the factors affecting the lack of post-project reviews in IT projects and found that none of the respondent's referred back to the Post Project review reports and in some cases the lessons learnt were not adequately recorded or recorded at all.

The compilation of the closeout report by an external party to the organization cannot be reasonably seen as a factor to not having access to completed project's closeout reports as the internal project manager/ leaders from DOPW work hand in hand with the appointed team of consultants and are responsible for coordinating all aspects of the project. This oftentimes requires the internal project leader to present the work to the various approval committees.

It is therefore not lack technical knowledge from the project manager/ leader's side but the lack of a structured process of storing and disseminating project based information that is the problem when it comes to information sharing and cross project learning.

Project information and knowledge gained from past and present projects needs to be easily accessible to everyone at any given point in time hence most organizations create databases to store project closeout reports (Newell *et al.*, 2006).

Norms and procedures are seen to be the main drivers for knowledge sharing in organizations. Project members are tasked with capturing the knowledge and learnings from their project in the form of 'lessons learned' in the project closeout report (Disterer, 2002). The data collected supports literature as employees (contributors) claim that they only write project reports because it is mandatory, whilst reviewers are not mandated to, but rather choose whether they want to access and retrieve the stored information or not for present and future projects.

The above observed theme talks to objective No. 1 which seeks to determine what infrastructure and processes are required and are applicable at the project closeout

stage. In the case of the KZN- DOPW, project managers are not clear or seem to have a vague idea of what is expected of them at project closeout stage regarding the capturing, storing, dissemination and retrieval of project based information for future reference. In the unfortunate case of KZN- DOPW, fifty percent of the participants (50%) indicated that they kept copies of the reports to themselves for future reference and therefore were not accustomed to the culture of sharing vital project information that could assist their colleagues in current and future projects.

The SOPS is not clear on the management of project information at that closeout stage. There seems to be no norms and procedures in place for storing and sharing project based information which is a handicap for any learning organization as set norms and procedures are seen to be the main drivers for knowledge sharing in organizations (Newell *et al*., 2006).

4.4 THEME 2: THE ROLE OF POST- PROJECT REVIEWS (PPRS) IN THE ORGANIZATIONAL KNOWLEDGE MANAGEMENT PROCESS

4.4.1 Familiarity and history of project managers with conducting Post- Project Reviews

Post- Project Reviews (PPRs) , are sessions conducted by project team members with the aim of evaluating project performance and documenting experiences and lessons learned for possible application in future projects (Schalken, Brinkkemper, and Vliet, 2004).

From the survey questionnaire, seventy five percent (75 %) of the participants indicated that they are familiar with the concept of (PPRs) and twenty five percent (25%) indicated that they are not familiar with PPRs.

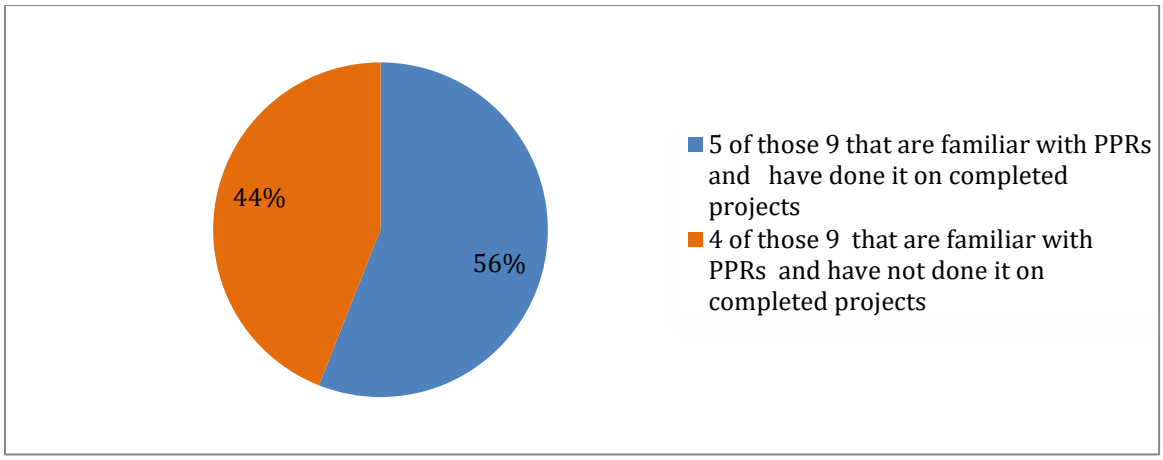

Figure 4: History of conducting Post- Project Reviews (PPRs) on completed projects

As presented in **FIGURE 4**: Fifty six percent (56%) of the participants who have conducted or participated in PPRs before indicated that they have done them on completed projects and forty four percent (44%) indicated that they are familiar with the concept of PPRs however they have not conducted the exercise on any of the projects that they have completed.

This in essence means that of the entire sample, only forty two percent (42%) of the twelve participants are familiar with the concept of PPRS and have actively participated in them which is a concerning finding as efficient project management practice dictates that project reviews should be done on a regular basis throughout the project lifecycle. Julian (2008), noted that the most commonly practiced activity with learning from projects is the practice of reflecting on project experience. PPRs involve reflective discussions about what went right and wrong in a project and learning from both cases.

Carrillo (2005) noted that even though AARs/ PPRs are a highly valuable activity, they often don't occur because they are mostly done at the end of a project and team members are reassigned to other projectsor go back to their functional units of the time they happen at the end of a project, team members are reassigned to other projects. Another reason is the lack of detail because of the lag time between the incident and the review, a lot of vital information is forgotten along the way. This speaks to the

processes in place and time frames for closing out a project and ensuring the capturing and dissemination of vital project information. Newell *et al*., (2006) agreed and added that most project reflection sessions when done at all are differed till the end of the project whereas regular real time feedback of lessons learnt would be more effective.

4.4.2 Perceptions of project managers when it comes to Post- Project Reviews

Feedback from the interviews revealed that Twenty five percent (25%) of the participants stated that they are not familiar with the concept of Post- Project Reviews. Participants were further asked what they think might be the reason that PPR are not part of the Project Management Plan forming part of the project closeout activities?

> *"I believe PPR is not practiced simply because the Department does not have the Project Management Office which would have ensured efficient application of Project Management methods* **(P3)".**

Participants were further asked if they have gained any knowledge from the review sessions that you are able to use in current projects? Their responses assisted with gaining a better understanding of the psychology behind how people work and the value they put on knowledge and continuous improvement.

The participants emphasized how helpful and enlightening the PPR sessions were and how they assisted them in preventing similar issues when planning for new projects.

> **"***Due to the nature of our projects, it is very important that we do PPR every time when the project is completed. This will assist us in the prevention of similar issues when planning for new projects* **(P10)."**

> "*Did it once. and it was a great help to me as I was able to improve on my current projects by not repeating the past mistakes* **(P6)",**

A couple of participants indicated that they had conducted PPRs on both completed and aborted projects.

> *"I have done it for every successfully completed or aborted project for compilation of a lessons learnt report* **(P1)",**

4.4.3 Challenges faced when conducting Post- Project Reviews on completed/ closed projects

Project Managers were asked about the challenges that they face when conducting Post- Project Reviews on completed/ closed projects?

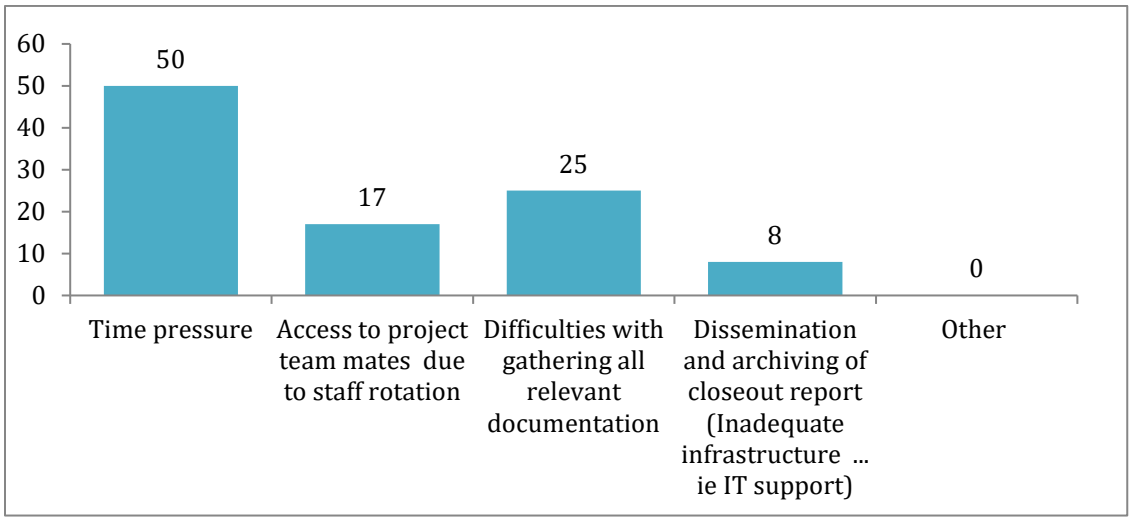

Figure 5: List of challenges faced when executing a project close out reports

A bar chart on **Figure 6:** was used to depict the most common challenges that project managers face when executing project close out reports. As is evident from **Figure 6**:

4.4.3.1 Time pressures - The common challenges identified by participants were - time pressure at fifty percent (50%) respondents indicated that as a result of time pressures key activities were not carried out according to the prescribed project management plan.

> *"The large volume of projects pressure to move on to other projects once PC is reached. Very little time available to facilitate PPR session* **(I1& I4)**. "

This is in line with Disterer (2002) who observed that at the end of the project , vital reports like the lesson learned report and capturing and codifying project knowledge and experiences is often abandoned because of a shortage of time resource as team members have moved onto new projects and because in most cases fund have been depleted (Disterer, 2002).

Johansson, Moehlerb, and Vahidic (2012) found that that because of time pressure, lower priority is given to activities which do not directly contribute to project deliverables like project closeout reports, lessons learnt and the transmission thereof (Johansson, Moehlerb, and Vahidic, 2012).

> *"The large volume of projects pressure to move on to other projects once PC is reached. Very little time available to facilitate PPR session* **(I1& I4)**.

Zedtwitz (2002) agrees and added that PPRs are however often constrained with lack of time and minimal attention combined with lack of personal interest and investment from project team members.

Research findings seem to be in support of this finding:

> *"At DOPW, the main focus is getting the infrastructure built/ delivered and reaching Practical Completion* ***(P1)"***

4.4.3.2 Difficulties with gathering all relevant documentation- this factor ranked second at twenty five percent (25%).

At the end of the project , vital reports like the lesson learned report and capturing and codifying project knowledge and experiences is often abandoned because of a shortage of time resource as team members have moved onto new projects and because in most cases fund have been depleted (Disterer, 2002). Newell *et al.* (2006) added that another hindrance to the recording of lessons learnt from projects is the reluctance of

employees to share project information with others, failures that occurred during the course of the project that they want to remain hidden.

4.4.3.3 Access to project teammates**-** due to staff rotation at sixteen-point seven percent (16.7%).

Carrillo (2005) noted that even though AARs/ PPRs are a highly valuable activity, they often don't occur because they are mostly done at the end of a project and team members are reassigned to other projects or go back to their functional units of the time they happen at the end of a project, team members are reassigned to other projects.

Kaul (2014) agreed and added that some of the **factors affecting closeouts are administrative** issues such as improper or untimely contractual closeout documentation and the project team members shifting focus and engage in new projects causing decentralization and knowledge fragmentation. Newell (2004) shares the same sentiment and added that that staff rotation was a major contributor in getting access to project teammates which contributed in the difficulties with gathering all relevant documentation in order to compile the comprehensive project closeout reports. Hence the swift conclusion of a detailed closeout report with lessons learnt is vital to ensure that knowledge (tips and process knowledge) and experiences from the project are captured and stored and can be retrieved and used in future.

> *"The large volume of projects and the pressure to move on to other projects once PC is reached **(I1)**"*

Due to this approach, projects keep failing and organizations avoid implementing corrective measures because of lack of time and money.

The above observed theme gives further insight to objective No. 1 which seeks to understand the challenges faced by practicing project managers with conducting Post-Project Reviews on completed/ closed projects which is predominantly work overload and time pressure.

4.4.3.4 Dissemination and archiving of closeout reports -(Inadequate infrastructure i.e IT support) at eight-point three percent (8.3%). A common problem is that once a project is completed, project teams disperse and return to their functions/ units without compiling a comprehensive closeout report of the project as well as conducting PPRs for the lessons learnt report (Cloutier, 2007).

Wiewiora and Murphy (2017) noted that one of the most common ways to share and capture project knowledge is through lesson learnt, although this practice might seem common, this process of capturing, storing, reviewing and revising lessons learnt from past projects still remains sub- optimal. Therefore, rich knowledge with a potential to yield profit and development is left idle.

4.4.3.5 Other factors: Lack of capacity within the Department - Project Managers within DOPW indicated that most of the project management work and principal agent roles are outsourced due to the lack of capacity within the department.

> "*Public sector usually appoints professional team to perform the service from initial till commissioning of the facility* **(P12)".**

This situation leaves the internal project managers (DOPW) with the task of formulating the procurement strategy, defining the scope and articulating the program objectives, overseeing a list of dependent projects needed to reach the program's overall goals and reporting on them which in essence is program management rather than project management.

4.5 THEME 3: ORGANIZATIONAL CULTURE REGARDING KNOWLEDGE MANAGEMENT AND CROSS PROJECT LEARNING

4.5.1 Management of project closeout information

4.5.1.1 Familiarity/ experience with compiling lessons learnt report- When interviewees were asked if they are you familiar with lessons learnt (LL) reports and if they make use of them and encourage their team members/ sub-ordinates to do so as well, one of the interviewees responded that**:**

> " *Yes they do, however there is no known accessible platform where they can extract past lessons learnt reports on past projects to make reference to them.* The interviewee also added that "*People take certain actions to help themselves and oftentimes that information even when captured is irrelevant/ not helpful to other PMs. A tool that could assist with access to past project information is to have a virtual drive similar like GOOGLE/ search engine where one can just type certain words and projects reports in the field would pop up.* **(I2)"**

Twenty five percent (25%) of the participants stated that they are not familiar with the concept of Post- Project Reviews. Participants were further asked what they think might be the reason that PPR are not part of the Project Management Plan forming part of the project closeout activities?

> *"I believe PPR is not practiced simply because the Department does not have the Project Management Office which would have ensured efficient application of Project Management methods* **(P3)".**

Newell *et al.*,(2006) found that that for the organization in charge of implementing the project, during the project closeout stage, most Lesson Learned reports are stored in the database and reflect what was done but not how or why it was done and that falls under product rather than process knowledge .

However the experience of participants from surveys indicate that PPRs are not conducted and lessons learnt reports are generally not done because of the large project volume and time constraints. In the few instance where the lessons leant reports compiled it filed away and not reused/ made reference to for current and future projects.

4.5.1.2 Management of information from Post- Project Reviews- When participants were asked what they do with the information gained from the post project review session, they responded:

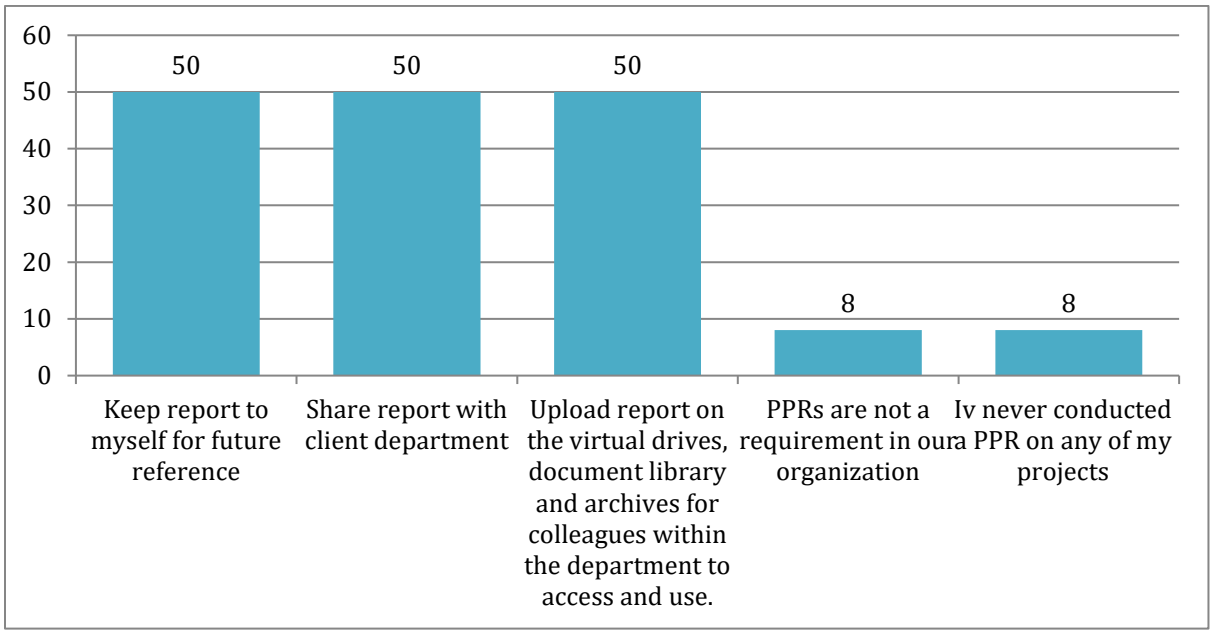

Figure 6: Indicates what happens to PPRs reports once they are completed

As presented in **figure 5:** Of all the participants that had taken part in PPRs before, fifty percent of the participants (50%) indicated that they kept copies of the reports to themselves for future reference and also shared the report with the client department; fifty percent (50%) indicated that they uploaded report on the virtual drives, document library and archives for colleagues within the department to access.

It is evident from the responses that there is no system in place for storing project based knowledge and experiences and the SOPS is not clear on what is required at project closeout stage hence the lack of documentation and dissemination of information leading to the frequent repeat mistakes experienced in projects. This results in a waste of time and money doing investigations on existing sites because the survey, geotechnical, as- built and other important site related information that was gathered from previous projects on the same site was not document and stored correctly for future use.

Another participant made a note of the organizational structure and culture and how projects are managed within the department.

> "*Public sector, usually appoints professional team to perform the service from initial till commissioning of the facility. All required documents i.e. as built drawings signed by Municipality, final account statement, technical and progress minutes of the meeting, progress and fee payments, Variation Orders (V.O's) Extension of Time Claims (EOT's) Work Break Down of items with cost implication as built drawing, compliance certificates, close-out reports etc* ..**(P12)."**

This observation speaks to instances when the required documentation with relevant knowledge is gathered, how very few managers know how to manage gained knowledge and how organizations must exploit it for future gains (Nokana, 1991).

These finding coincide with literature that states that the practice of project knowledge management remains a limited exercise in organizations and the understanding of how to capture, process and re-use the information gathered still remains a mystery to most organizations Johansson, Moehlerb, and Vahidic (2012) "When decision makers fail to reflect on the past , valuable knowledge escapes or worse, is intentionally forgotten." (Parnell, Bergen, and Soper, 2005). The author further stated that most organizations suffer from Korsakov's syndrome where long term memory is lost and cannot be

recalled and the disease makes one unable to form new long tem memories for future reference and in that away you lose all accumulated knowledge.

4.5.2 Perceptions and Organizational culture regarding cross project learning

4.5.2.1 Reuse of post project information in current projects- Participants were further asked if they regularly make reference to available past project closeout reports or PPR reports to guide them with current projects?

Fifty percent (58%) of the participants indicated that they make reference to available past project closeout reports where they compare the different procurement options used and application of the documented lessons learned when doing new projects; Forty two percent (42%) indicated that they do not make reference to available past project closeout reports or PPR reports to guide them with current projects.

> *"Some officials do not see the point in partaking in PPR sessions and they are not open to discussing and learning from others* **(I1).**

4.5.2.2 Reasons for not making reference to past project close-out reports: As indicated in **figure 6**: The forty two percent (42%) of participants that do not make reference to available past project closeout reports or PPR reports ,fifty eight percent (58.%) cited insufficient use of technology based applications (IT support) designed to capture and share project knowledge and forty two percent (42 %) cited that poor quality of the report to be one of the major factors and superficial lessons learnt reports focusing on what was achieved rather than how it was achieved and why it worked as reasons for not making reference to past project closeout and eight percent (8%) of the respondents made reference to various behavioral issues that kept them from making reference to documented past project closeout reports.

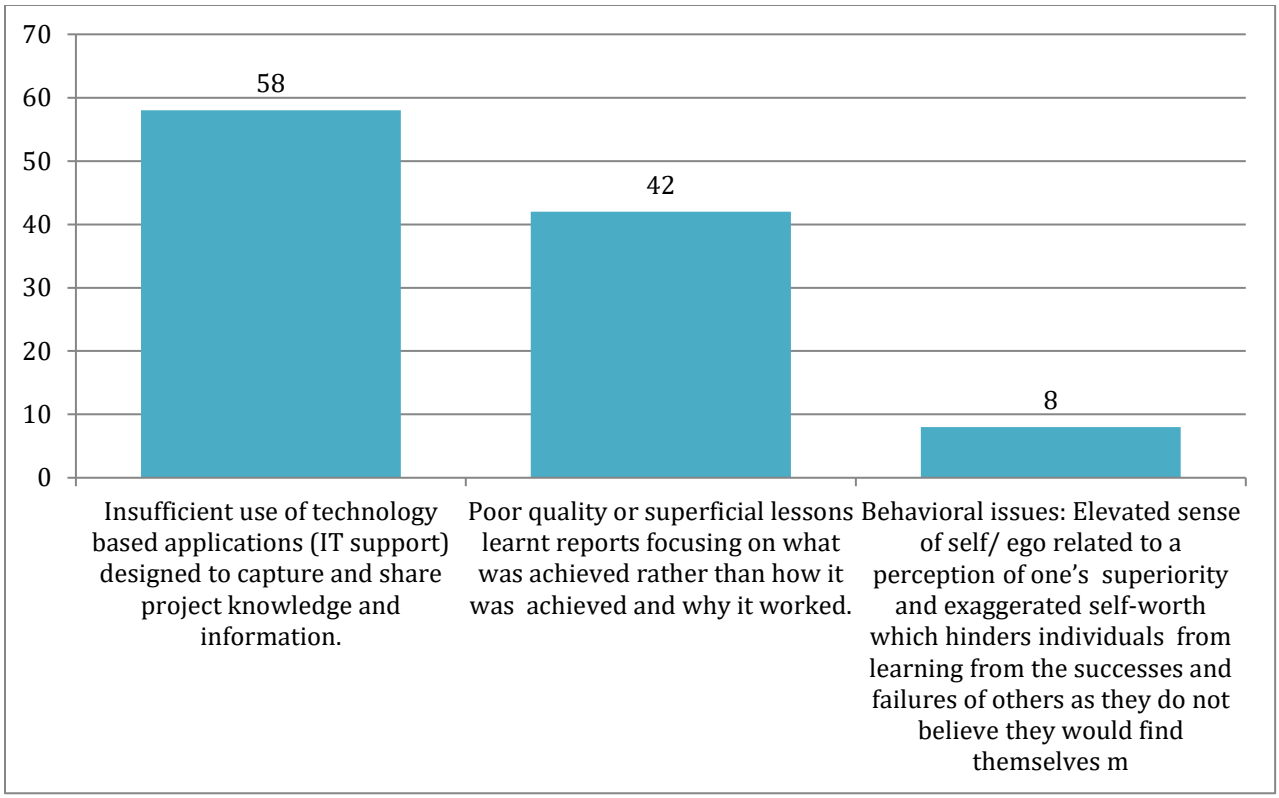

Figure 7: Reasons for not making reference to past project close-out reports

4.5.2.3 Organizational culture regarding cross project learning and knowledge management: Participants were asked if they felt that top management (executive level) have has prioritized cross project learning and have put adequate measures in place by providing support and guidance to effectively implement the reviews?

In an ideal environment where knowledge management is an organizational strategic goal, top management enforces and coordinate Project Reviews or Post Project Appraisal meetings at a regular basis throughout the course of the project with the where project teams present and review project performance and discuss their project's experiences and document their lessons learned in an effort to assist other employees within the organization with experience retention for future reference (Busby, 1999).

In the case of KZN-DOPW ninety two percent (92%) of the participants feel that PPRS are not part of the organizational culture, the reviews are not a priority and are not imbedded in the standard operations and processes and cited the following:

> "*PPRs are not part of the organizational culture due to poor archiving practices, time constraints where time can no longer be spent on a project as the completion stage has one of the lowest percentage allocations in terms of cost per work stage and professionals generally practice* ***(P2****)"*

Literature supports these statements where (Kaul, 2014) is of the view that that the project closeout stage is a challenging aspect of project management in the construction industry as project team members often shift focus and engage in new projects. Due to this approach, projects keep failing and organizations avoid implementing corrective measures because of lack of time and money.

Parnell, Bergen, and Soper (2005) and Gulliver (1987) noted that majority of companies invest millions in planning for investments and projects and apportion very little to nothing for evaluating and learning from them.

Newell (2004) recommends that having lessons learnt reports that capture the new knowledge and lessons related to processes and procedures that have been successfully used is the key to project knowledge transfer. A common mistake made is the compilation of lessons learnt reports that are more product orientated and offer no real and usable information for future projects.

4.5.2.4 Perceptions on the current organizational culture and information sharing and learning- Interviewees were asked their opinion on whether the current organization culture conducive to workplace learning and responded by stating that:

The primary focus of this question was to get a holistic view of the challenges faced by project managers during the course of the project and more importantly the closeout stage that hinder them from applying structured knowledge management principles in their projects with the aim of formulating a project knowledge base for future references.

> *" Government structures and processes are too rigid and have limited room for flexibility. Platforms for meeting to discuss project challenges and successes are scarce as only progress and expenditure are put in the forefront* **(I4)"**

Another interviewee agreed adding that **"***No, we work in silos coz we work in our own individual offices and have private conversations to discuss whatever challenges we face. The training of staff is not based on gaps identified from lessons learnt reports but rather done for compliance* ***(I1)*****."**

Newell *et al*., 2006; Julian, 2008; Kotnour and Vergopia, 2015) noted the following cross project learning enablers:

- Support from senior management.
- Organizational culture conducive to learning and knowledge transfer.

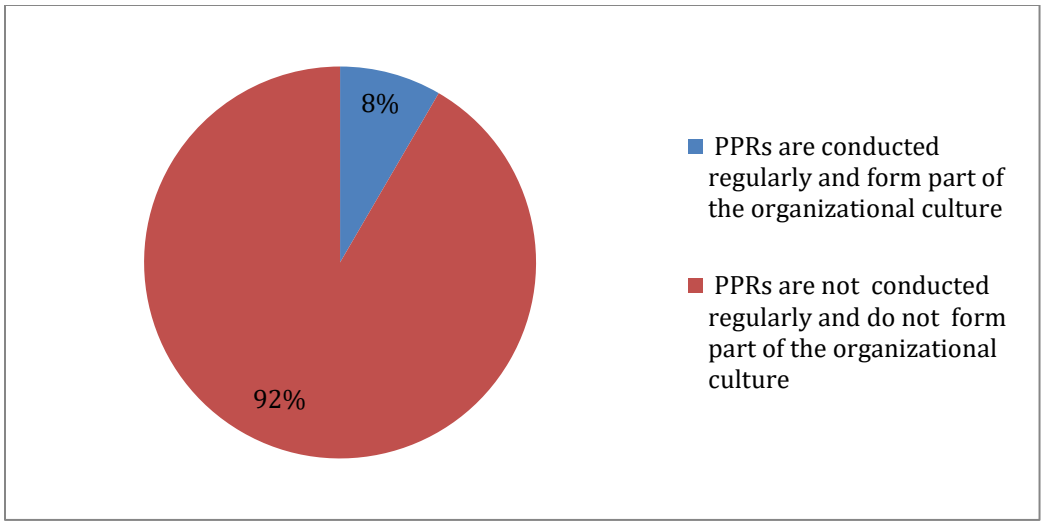

Figure 8: PPRs and the organizational culture

As presented in **figure 9**: only eight percent (8%) of the participants indicated that PPRs formed part of the organizational culture, whilst ninety two percent (92%) indicated that PPRs don not form part of the organizational culture.

Some organizations have been found to have knowledge management procedures in place to capture knowledge for future use. These processes are in a form of Post-Project Reviews where participants are required to capture lessons learnt in the project closeout report. However an appreciable number of participants expressed dissatisfaction from the outcomes of the exercise and felt it did not bear any fruit (Newell, 2004). Post- Project Reviews are often conducted superficially (for compliance purposes rather than learning) in instances when they are actually done. This is mostly because of lack of time and participants not seeing the value of the exercise (Parnell, Bergen and Soper, 2005). In light of this observation, the research also sought to understand the value that participants put on gaining knowledge and growth and how open they were to exploring and participating in various knowledge sharing platforms.

4.5.2.5 Behavioural factors that hinder cross project learning and information sharing:

What are the various behavioral factors that hinder the exchange, capturing and storing of information and knowledge during project closeout stage?

Learning increases the capabilities and maturing levels of not only the project team but the entire organization as well. Carrillo (2005) and Snider, Barrett, and Tenkasi (2002) conducted a study in lessons learned practices in the engineering, procurement and construction sector and noted that lessons learnt are an aspect of knowledge management because they encourage the capture and dissemination of knowledge gained on past projects to enhance learning and future performance. Harris (2002) noted that it is essential for organizations to learn and grow in order to retain their market position.

One interviewee indicated that the submission of project closeout reports (PCR) is important as it acts as a source document / evidence of work done so final fee payments can be processed which in essence is more for compliance rather than for learning.

> *"Yes, for all capital projects PCRs are mandatory and have to be submitted to the client. If PCR are not submitted we don't pay the consultant their final fees.. Content of the report is import* ***(I4)"***

The content of the report that the interviewee is referring to are the completion certificates and general documentation that needs to be handed over to the end user and client for record keeping. It should be noted that no mention is given to the conducting of a post project review and ensuring that the capturing and dissemination of lessons learnt is efficiently done for ease of access and future reference.

Studies show that learning from past project failures and successes continues to be the exception rather than the rule (Newell *et al*., 2006). This results in even successful

projects having minimal impact on organizational growth as they are not adding on anything and rich knowledge with a potential to yield profit and development is left idle.

This mirrors the current culture, behavior and attitudes of project management officials at the DOPW where the reviewing of projects and proper documentation of lessons learnt is not made a priority. Senior management do not enforce the need to conduct the reviews and are satisfied with just the completion and closing of the project on the Works Information Management System (WIMS).

> "*No set /prescribed methods of what must be done, NO roles and responsibilities which causes a lot of confusion and wastes time* **(I2)."**

> *"No, we work in silos because we work in our own individual offices and have private conversations to discuss whatever challenges we face* ***(I1)."***

4.5.2.6 Senior management support regarding knowledge management**:** When participants were asked about whether they feel that senior management (executive level) has prioritized cross project learning and have put adequate measures in place by providing support and guidance to effectively implement the reviews? They responded by saying:

> *"No it is not the part of the organization's culture. Management should think twice to adopt it* **(P12)"**

> *"Information management can never be a waste of time. All projects /programs that have reached practical completion must have lessons learnt reports which should be presented to peers for learning for the future* ***(I2)."***

Egbu (2004) noted the following behaviours that inhibit knowledge sharing in organisations:

- Lack of/ or inappropriate methods/tools for measuring and valuing knowledge
- No appreciation/ lack of appreciation of knowledge as an important asset.
- Lack of an information sharing culture and climate.
- The "knowledge is power syndrome" and failure to see the "law of increasing returns" associated with knowledge creation – shared knowledge stays with the giver while enriching the receiver
- Lack of a clear purpose, shared language, meaning and understanding of the concept of Kknowledge Mmanagement and the benefits thereof.

Another interviewee touched on the **organizational culture and strategic goal** and how that influences the mandatory outputs from the project and cited that:

> **"***Private sector is profit driven and therefor always want to minimize cost and improve their output. Whilst public sector is social driven and not much attention is focus on overspending and the implications of repeat mistakes and time overruns* **(I1)***."*

Another interviewee highlighted the **lack of integration amongst the various components within the department**, which causes major difficulties when it comes to information sharing, the interviewee cited that*:*

> *"PMs work in isolation from the other support departments like SCM, Property Management and EPWP which leaves room for a lot of mistakes. There is no one center that operates as an integration/ coordination agent for all the various sections within the department that encompasses all aspects of infrastructure delivery that can align and streamline information sharing and more efficient working mechanisms leading to better output* ***(I3).***

4.5.3 Competition and workplace learning

It has been observed that that some employees treat knowledge as a tool to gain power or superiority over others and sometimes use knowledge as a bargaining chip to get

their way, "*according to such employees power and knowledge imply each other* (Foucault, 1979) .

> *"The organizational culture is that of a self learning experience where you find some officials working to shine by themselves/ to gain recognition and do not share any project based knowledge with others. Officials are not trained and guided so that they know what is expected of them at the various stages of the project* ***(I2).****"*

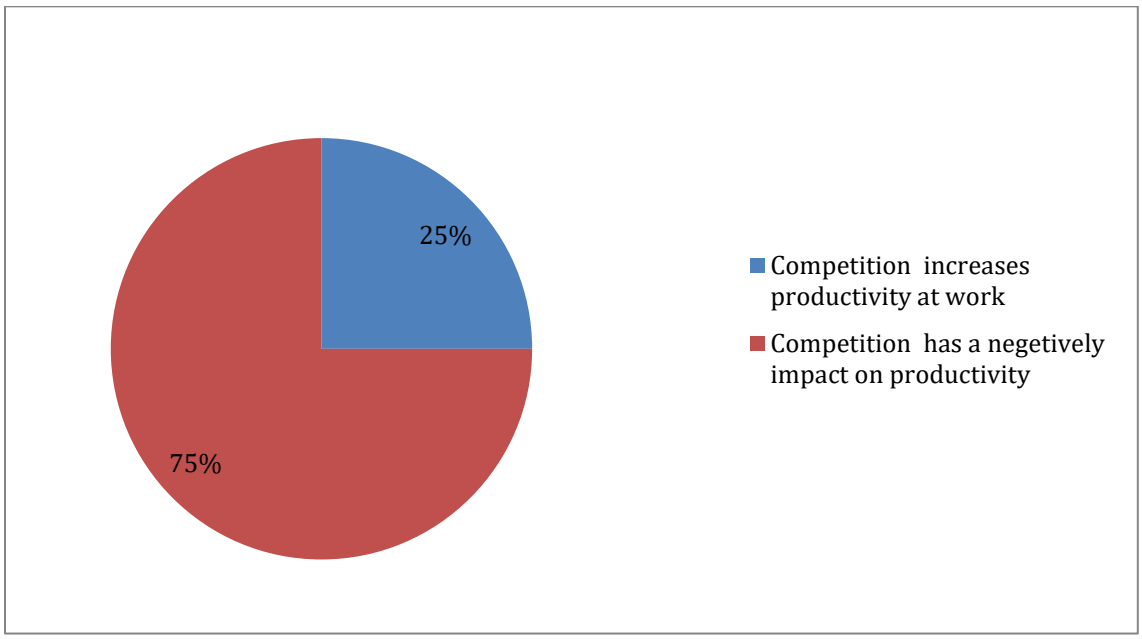

Figure 9: Competition and workplace learning

As indicated in **figure 10:** twenty five percent (25%)of the participants are of the view that competition plays a negative role in work place learning as it hinders information sharing which adversely affects productivity. Seventy five percent (75%) of the participants feel

4.5.3.1 When participants were asked whether competition plays a positive role and improves productivity and efficiency. The participants cited the following:

*"It hampers information sharing that can be crucial in the successful completion of a project **(P5)**"*

This speaks to the official's egos and sense of pride and how they believe or see themselves to know everything and think there is very little that they could possibly learn from other officials' experiences.

4.5.4 The need for structured information sharing and learning platforms

4.5.4 .1 Requirements for a favourable learning environment in the workplace

Howard and Smith (2016) noted that learning from past projects experiences ensures avoidance of repetitive mistakes and facilitates the re- use of successful instances. Learning when effectively done saves time and money and is useful in future proofing practices and helps build competence and confidence and thereby team morale which is found to be instrumental in improving customer satisfaction which greatly enhances competitive advantage in the markets.

Appropriate content (procedural learning as well as product content) is key in effective knowledge sharing. This must be provided at a timely fashion where the knowledge will be accurate and relevant for use in situations for current and future projects (Newell *et al.*, 2006).

All the respondents agreed that mentorship, adequate skills development and training, supervision and guidance, properly articulated operational procedures and access and use of technology based applications were required for a favourable working environment.

- Development of professional capabilities of project managers through training, apprenticeship or knowledge sharing.

- Appropriate content (procedural learning as well as product content) is key in effective knowledge sharing. This must be provided at a timely fashion where the knowledge will be accurate and relevant for use in situations for current and future projects. This is not the case at DOPW as one of the interviewees indicated the lack of appropriate professional development and training they currently undergo in the organization.

  "The training of staff that we receive is not based on gaps identified from Lessons Learnt reports but rather done for compliance ***(I1)***

Aliba (2008) stressed that knowledge management requires knowledge managers to who will continually monitor the process and further added that knowledge, like any other organizational resource such labor and capital needs dedicated and responsible personnel to engage in marketing, collecting and categorizing knowledge, develop, run and maintain knowledge systems (IT) develop through engagement management strategies, influence and get buy in from all employees to utilize information technology and information management infrastructure and also to audit and monitor the initiatives.

The lack of integration amongst the various components within the organization speaks to the general organizational culture of working in silos, the prevalent competitive spirit amongst colleagues and the lack of common knowledge sharing platforms that should exist and be driven by senior management for a well-functioning organization.

The above observed theme is in line with Objective No. 3& 4 which explores the various behavioral factors that hinder the exchange, capturing and storing of information and knowledge during project closeout stage and the viability of introducing knowledge sharing platforms such as a community of practice structures or framework when conducting Post- Project Reviews to assist knowledge sharing and dissemination. From the finding, the participants have expressed a need for formal knowledge sharing platforms that are going to be prioritized and supported by senior management if the

organization is planning to take active steps toward learning from past experience in an effort to improve future operations and productivity.

Al-Shehab *et al*., (2004); Hartmann and Dorée, (2014);Howard and Smith, (2016)) speak about the negative perception of PPRs and poor value placed in reporting and disseminating of vital project information for learning stemming from various factors such as disinterest, lack of time, skills and knowing what knowledge and information to put in lesson learnt reports , distrust of the process , lack of guidance from management as well as lack of guidelines for effectively conducting effective PPRs as well as inadequate resources such as time, finances and human resource which every organization should have in place if knowledge management is made a priority.

4.5.4.2 The adoption of a Community Of Practice (COPs) structure or framework to support knowledge sharing and dissemination within an organization:

Jugdev (2012) found the Communities of Practice (CoPs) structure to be a simple and very effective mechanism that promotes the knowledge sharing culture can easily embedded into a company's practices when driven by senior management. The structure of CoPs can be adapted by organizations to promote a more effective cross project learning environment and the organization's performance will improve as employees and team members will learn to deal with project closeout reports in a more humanistic manner and play an important role in individual and organizational professional development (Clautier, 2007).

When participants were asked if they would be open to participating in knowledge sharing platforms such as communities of practices within the organization- One hundred percent (100%) of the participants responded positively to the question and cited that they were open to the idea and thought it would be a good practice to adopt. The following responses were received:

> *"YES, I would be open to adopting a COP structure, as it will not only provide proven learning solutions for completed projects, but can provide solutions to individuals currently implementing projects that encounter a similar issue. There is a saying that ignorance costs money, therefore implementing a proven solution takes time than creating a new solution* ***(P2)"***

Literature supports the participant's need for learning platforms free of criticism and reproach where they will be free to express themselves, share what they have learnt and articulate their shortcomings with the aim of improving their performance. This sentiment is reiterated by (Lesser and Storck, 2001) where he indicated that COPs help foster an environment in which knowledge can be created and shared to improve the effectiveness of existing practices used in organizations.

CHAPTER 5- CONCLUSION AND FUTURE RESEARCH RECOMMENDATIONS

5.1 INTRODUCTION

This chapter presents the overview of the research, the summary of the research findings, recommendations, evaluation of the research approach undertaken and problems experienced undertaking the study. The chapter also proposes possibilities for further research.

5.1.1 Overview of the Research

The purpose of the study was to investigate the factors effecting cross – project learning and the role of Post- Project Reviews in knowledge management in the construction project management environment using officials from the KwaZulu-Natal- Department of Public Works.

The research was conducted with infrustucture project professionals and managers from the KwaZulu-Natal Department of Public Works (KZN- DOPW) through survey questionnaires and interviews. The findings reflect the views and experiences of the infrastructure project management officials at KZN-DOPW who participated in the survey questionnaire and follow up semi- structured interviews.

5.2 REVISITING THE RESEARCH OBJECTIVES

This section presents the findings with reference to the objectives stated in chapter one and relates the objectives to the literature reviewed in chapter two and research findings in chapter four.

5.2.1 Objective one: Determine what infrastructure and processes are required and applicable at the project closeout stage.

The infrastructure and processes that are applicable at project closeout were explored through literature and confirmed in questionnaires. The literature revealed that project closeout is an important stage where the project manager and the team collect the necessary project completion documents such as the COCs, guarantees, user manuals etc. The project team also gets to identify and capture the new knowledge learnt during the course of the project in lesson learnt reports and prepare means of transferring the knowledge to other projects. Lessons learnt reports are vital to ensure that knowledge (tips and process knowledge) and experiences from the project are captured and stored and can be retrieved and used in future.

The research findings in chapter four are in line with literature as majority of the study participants cited that the following documents are collected to compile the project closeout report before the project can be closed on the payment system. User manuals and instructions, Completion certificates, Certificates of compliance (COCs) As- Built drawings and final inspection reports and sign off from relevant professional disciplines, project documents including project plans, schedules, cost summaries, progress reports protocols with very little mention of compiling lessons Learnt reports and the dissemination and archiving of project-based documents for future reference.

5.2.2 Objective two: To explore challenges faced with conducting Post- Project Reviews (PPRs) on completed/ closed projects.

Literature revealed that PPRs are exercises conducted with the aim of evaluating project outcomes and to leverage learning. PPRs provide an opportunity to systematically improve performance in subsequence projects.The prctice is an exception rather than a norm as very few organizations mastered the art of cross project learning and have sustainable knowledge sharing structues and processes in place. This is mainly due to lack of resources in a form of time and money,staff

rotation, lack of structured sytems and procedures for sharing project based knowledge that is supported by senior management.

The research findings indicate four dominant challenges are seen to be the major factors that keep project manager's from conducting PPRs and lessons leant reports were . Those challenges were time pressure, access to project team mates due to reassignment of team of team members and staff rotation, difficulties with gathering all relevant documentations, inadequate infrastructure ...ie IT support which resulted in difficulties in disseminating and archiving of closeout report).

The study also found that KZN-DOPW lacks considerably when it comes to the storing and disseminating of project information throughout the organization for possible reuse. This study also highlighted the fact that the leadership have not fully acknowledged the need to develop a knowledge-based philosophy to guide knowledge sharing and cross project learning activities.

The capturing of lessons learnt from projects should be prioritized my senior management and PPRs should be conducted periodically, preferably linked to project stage gates to ensure that vital project knowledge and information is captured and accessible for future reference.

5.2.3 Objective three: Explore viable knowledge sharing platforms such as a community of practice structure (CoPs) or framework when conducting Post- Project Reviews to assist knowledge sharing and dissemination.

From literature, it has been established that PPRs can be used as a tool to improve organizational learning and CoPs are a viable platform for cross project learning and sharing as they create a relaxed environment and platform that is conducive to knowledge sharing and learning. (CoPs) play an important role in individual and organizational professional development as they can be seen as "*Learning Generators*" and vital project knowledge and information can be disseminated thought the

organization using the platform provided by the CoP. The data collected coincides with literature as - one hundred percent (100%) of the participants see value in the practice and responded positively to the adoption of communities of practice as a knowledge sharing platform.

5.3 REVISITING THE RESEARCH QUESTION

The research question stated in chapter one is:

> *What are the challenges faced by project managers and teams in undertaking and completing comprehensive project close outs within the KZN-DOPW?*

The research question was answered as the data collected highlighted the various challenges that project managers face when completing project closeout reports. Challenges ranged from time pressure, access to project team mates due to reassignment of team of team members, difficulties with gathering all relevant documentations, inadequate infrastructure ...ie IT support, behavioral factors and organizational culture were cited as reasons PPRs not being conducted. All those factors are however results of senior management not having a structured knowledge management system in place that supports sharing of information and cross project learning activities.

5.4 REVISTING THE RESEARCH PROPOSITION

The research proposition posed in chapter one is:

By adopting the culture of conducting PPRs for completed/closed projects, project teams will be able to learn and apply knowledge gained from past projects when undertaking new projects which could result in increased outputs in a form of project successes.

Theresearch proposition has been proved. This study found that whilst KZN- DOPW is clearly a knowledge creating and generating organization and it lacks considerably when it cames to the storing and disseminating of project information throughout the organisation for possible reuse. The data collected from the study idicates that participants are of the view that is is very important that post project review are conducted and recorded on completed projects as the information and insight gained will not only provide proven learning solutions for completed projects, but can provide solutions to individuals currently implementing projects that encounter a similar issues not repeat past mistakes.

5.5 BENEFITS OF FINDINGS

By understanding and managing the factors that hinder cross project learning and adopting the culture of conducting Post- Project Reviews for completed/ closed projects, project teams within the KwaZulu-Natal- Department of Public Works will be able to learn and apply knowledge gained from past projects when undertaking new projects which will result in increased outputs in a form of project successes.
In today's project environment, nearly all projects occur in a context where the stakeholders fulfil key roles and participate in the accomplishment of delivering on tasks (Karlsen, 2002). With this in mind, ensuring the effective management of project knowledge can assist organizations to efficiently deliver on expected project outcomes and improve project performance.

The proposed study will contribute to the fields of project management, knowledge management and workplace learning (Jugdev, 2012). It will look at means of fostering and improving the existing learning platforms within organizations with the aim of growing the organization's capacity and project implementation efficiency.

5.6 FURTHER RESEARCH SHOULD BE CONDUCTED BY TESTING THE FOLLOWING:

Whether by adopting various cross project learning approaches such as making Post-Project Reviews and lessons learnt reports a mandatory requirement before a project can be close can improve project performance. .. ie better manage project constraints (scope, time and cost management). By adopting the approach of using knowledge gained from past project experiences should minimize repetitive mistakes and enable project managers to come up with innovative solutions to client's problems. This should save costs, reduce turnover time and improve service delivery.

Further studies should be done in developing a structured and detailed assessment mechanisms with clear and feasible targets in a form of Key Performance Indicators (KPIs) for measuring the success of the application of PPRs in projects.

Whether the creation of learning platforms (Communities of Practice within the organization) where officials can learn from their own experiences and from the experiences and best practices of others and having systematic problem-solving procedures in place will result in an improvement in project management efficiency productivity and staff retention.

The study can be conducted at other government departments and results between the departments can be compared in order for the findings of the study to be more credible.

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7. APPENDIX

ADDENDA -1

The demographics for each participant for the survey questionnaire are displayed in

Table 2: ADDENDA -1 Survey questionnaire participant demographics

Participant	Role	Years of experience as a Project Manager
P1	Project Manager	more than 16 years
P2	Project Manager	6- 10 years
P3	Project Manager	6- 10 years
P4	Project Manager	more than 16 years
P5	Project Manager	6- 10 years
P6	Project Manager	0- 5 years
P7	Project Manager	0- 5 years
P8	Project Manager	0- 5 years
P9	Project Manager	11- 15 years
P10	Project Manager	6- 10 years
P11	Project Manager	6- 10 years
P12	Project Manager	6- 10 years

ADDENDA-2

The demographics for each participant for the semi structured interview are displayed in

Table 3: ADDENDA -2 Demographics for each participant for the semi structured interview

Interviewees (I)	**Current role in your organization**	**Years of experience in your role**	**Total number of projects worked on/ Supervised in last 5 years "**	**Average value of projects worked on in ZAR**
I1	Deputy Director Head Office	7 years	Greater than 15 (Supervisory role)	Greater than 40 mil
I2	Chief CPM	20 years	Greater than 15 (Supervisory role)	Greater than 40 mil
I3	Deputy Director-Head Office	8 years	Greater than 15 (Supervisory role)	Greater than 40 mil
I4	Deputy Director-Program Management	7 years	Greater than 15 (Supervisory role)	Greater than 40 mil
I5	Deputy Director-DOH Head Office	5 years	Greater than 15 (Supervisory role)	Greater than 40 mil

ADDENDA-3

COVER LETTER (SURVEY QUESTIONNAIRES AND INTERVIEWS)

Department of Construction Economics and Management
Fifth Level
Snape Building, Engineering Mall Upper
Upper Campus
Telephone: +27 21 650 3443
Email: Con-cem@uct.ac.za

KNOWLEDGE MANAGEMENT IN THE INFRASTRUCTURE PROJECT ENVIRONMENT

Dear Sir/Madam,

My name is Sbongumusa Khumalo and I am a Master of Project Management student at the University of Cape Town (UCT). As part of my Msc PM course, a mini dissertation is required for submission. In order to fulfil this academic component, I am conducting research focusing on investigating issues that prevent KwaZulu-Natal Department of Public Works (KZN-DOPW) from being a learning organization by investigating the challenges faced by project managers in undertaking and completing comprehensive close out reports and Post- Project Reviews for completed projects with the aim of learning from their experiences and improving for current and future projects and I would like to invite you to participate in the project.

Your input as an official in this field will allow me to identify and understand the challenges that keep Project Managers from efficiently closing out projects and learning from past projects experiences to improve current and future projects.

Kindly note that in order to complete this study, you need to be employed by the KZN DOPW as a Project Manager, Infrastructure Deputy Director, Program Manager or Portfolio Manager.

Your participation is voluntary and no sensitive personal details such as name and address will be collected. Please note that due to the nature of the research and the research instrument used (Survey Questionnaires and interviews) I cannot guarantee your anonymity, however please rest assured that your identity and all data collected will be treated as confidential.

Permission/ consent to record the interviews for the purpose of transcribing will be requested and recording will proceed only when permission is granted. Confidential data likely to cause harm to reputations and hence recordings will be stored in the university cloud..ie Onedrive. All data collected will be kept strictly confidential.

Please understand that you do not have to participate, i.e. your participation is voluntary. The choice to participate is yours alone. If you choose not to participate, there will be no negative consequence. If you choose to participate, but wish to withdraw at any time, you will be free to do so without negative consequence. However, I would be grateful if you would assist me by allowing me to interview you.

The online- survey should take approximately 20-30 minutes of your time.

If you wish to receive a copy of the final results of the research, you are welcome to give me your email address and a summary of the final results will be sent to you.

The survey instruments that will be administered has been approved by the University of Cape Town Ethics Committee and thus, meets all ethical requirements imposed by the University.

Follow this link to complete the survey:

https://docs.google.com/forms/d/e/1FAIpQLSeTBLkZsoCBPbzkemaJrilijx_uIOT24b-O4LcYeOs7-X1WVA/viewform?usp=sf_link

If you have any further queries upon completing the survey , please feel free to contact me using the contact details provided below.

Thank you in advance for your participation. Your participation in this research project is greatly appreciated.Sincerely,

Ms S. Khumalo

Masters Student (Researcher)

Email: KHMSBO005@myuct.ac.za

Work: 036 638 8279 / Cell no: +2778013120

ADDENDA-4

CONSENT FORM

Department of Construction Economics and Management

Fifth Level

Snape Building, Engineering Mall Upper

Upper Campus

Telephone: +27 21 650 3443

Email: Con-cem@uct.ac.za

Participant Consent Form

Date: ……..

I agree to take part in the "KNOWLEDGE MANAGEMENT IN THE INFRASTRUCTURE PROJECT ENVIRONMENT" study conducted by Sbongumusa Khumalo, under the supervision of Mark Massyn, for the Department of Construction Economics and Management at the University of Cape Town. Any information that I provide in this study shall not be used for any other purpose other than the one stated.

Name of participant …… Date……

Signature of participant ……

Signature of researcher ……

ADDENDA-5

Application for Approval of Ethics in Research (EiR) Projects
Faculty of Engineering and the Built Environment, University of Cape Town

ETHICS APPLICATION FORM

Please Note:
Any person planning to undertake research in the Faculty of Engineering and the Built Environment (EBE) at the University of Cape Town is required to complete this form **before** collecting or analysing data. The objective of submitting this application *prior* to embarking on research is to ensure that the highest ethical standards in research, conducted under the auspices of the EBE Faculty, are met. Please ensure that you have read, and understood the **EBE Ethics in Research Handbook** (available from the UCT EBE, Research Ethics website) prior to completing this application form: http://www.ebe.uct.ac.za/ebe/research/ethics1

APPLICANT'S DETAILS		
Name of principal researcher, student or external applicant		S'BONGUMUSA ZIMISELE KHUMALO
Department		Department of Construction Economics & Management
Preferred email address of applicant:		KHMSBO005@myuct.ac.za
If Student	Your Degree: e.g., MSc, PhD, etc.	Msc Project Management
	Credit Value of Research: e.g., 60/120/180/360 etc.	60 Credit
	Name of Supervisor (if supervised):	Mark Massyn
If this is a researchcontract, indicate the source of funding/sponsorship		N/A
Project Title		Knowledge Management in the Infrastructe Proed Environ

I hereby undertake to carry out my research in such a way that:

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

APPLICATION BY	Full name	Signature	Date
Principal Researcher/ Student/External applicant	Sbongumusa Khumalo		07/06/2020
SUPPORTED BY	**Full name**	**Signature**	**Date**
Supervisor (where applicable)	MARK MASSYN		1/8/2020

APPROVED BY	Full name	Signature	Date
HOD (or delegated nominee) Final authority for all applicants who have answered NO to all questions in Section 1; and for all Undergraduate research (including Honours).	Louie van Schalkwyk		27 August 2020
Chair: Faculty EIR Committee For applicants other than undergraduate students who have answered YES to any of the questions in Section 1.	Louie van Schalkwyk		27 August 2020

ADDENDA-6

KNOWLEDGE MANAGEMENT IN THE INFRASTRUCTURE PROJECT ENVIRONMENT SURVEY

survey

*Required

1. Years of experience as a Project Manager *

Mark only one oval.

- 0- 5 years
- 6- 10 years
- 11- 15 years
- more than 16 years

2. Have you coordinated a project closeout exercise before? *

Mark only one oval.

- YES (If YES, jump to Question 3.)
- NO (If NO, jump to Question 4.)

3. If you answered YES to question 2, What documents did you gather in order to compile the closeout report? *

Tick all that apply.

- [ ] SG diagrams and plans approval from local authority
- [ ] As- Built drawings
- [ ] Final inspection reports and sign off from relevant professional disciplines
- [ ] User manuals and instructions
- [ ] Completion certificates
- [ ] Certificates of compliance (COCs
- [ ] Project documents including project plans, schedules, cost summaries, progress reports protocols
- [ ] Lessons Learnt reports
- [ ] Dissemination and archiving (Links to retrieve the report/ closeout pack)

Other: [ ] _____

4. If you answered NO to question 2, What challenges did you face that kept you from executing a project close out report? *

Tick all that apply.

- [ ] Time pressure
- [ ] Access to project team mates due to staff rotation
- [ ] Difficulties with gathering all relevant documentation
- [ ] Dissemination and archiving of closeout report (Inadequate infrastructure ... ie IT support) Other: _____

5. Are you familiar with the term Post- Project Reviews? *

Mark only one oval.

- ◯ YES
- ◯ NO

Post Project Review (PPRs)

Def of Post Project Review (PPRs) : is ”a process to evaluate project outcomes and to leverage learning (Howard and Smith, 2016).” According to Zedtwitz (2002) Post- Project Reviews provide an opportunity to systematically improve performance in subsequence projects. PPRs can be used as a tool to improve organizational learning.

6. Have you conducted or participated in PPR before? *

Mark only one oval.

- ◯ YES (If YES, jump to Question 7.)
- ◯ NO (If NO, jump to Question [1].)

7. If you answered YES to question 6, How often do you conduct or participate in PPRs in your organization? Have you gained any knowledge from the review sessions that you are able to use in current projects *

_____

_____

_____

_____

[1] . If you answered NO to question 6, Kindly state the reasons why PPR are not part of the Project Management Plan forming part of the project closeout activities? *

9. In your organization, are PPR's part of the organizational culture? Do you feel that top management (executive level) have has prioritized cross project learning and have put adequate measures in place by providing support and guidance to effectively implement the reviews? *

10. What do you do with the reports from the PPRs? *

Tick all that apply.

- [ ] Keep report to myself for future reference
- [ ] Share report with client department
- [ ] Upload report on the virtual drives, document library and archives for colleagues within the department to access and use.
- [ ] Other: _____

11. In your experience, do you make regular reference to available past project closeout reports or PPR reports to guide you with current projects? * *Mark only one oval.*

- YES (If YES, jump to Question 12.)
- NO (If YES, jump to Question 13.)
- Other: _____

12. If you answered YES to question 11, did the report prove to be useful and assist with valuable insight that you could use on your current project? *

_____

_____

_____

_____

_____

13. If you answered NO to question 11.. Choose most applicable reasons for not making reference to available past project closeout reports or PPR reports to guide you with current projects. *

Tick all that apply.

- [ ] Insufficient use of technology based applications (IT support) designed to capture and share project knowledge.tion 1
- [ ] Poor quality or superficial lessons learnt reports focusing on what was achieved rather than how it was achieved and why it worked.
- [ ] Behavioral issues: Elevated sense of self/ ego related to a perception of one's superiority and exaggerated self-worth which hinders individuals from learning from the successes and failures of others as they do not believe they would find themselves making the same mistakes or they think too highly of themselves to give credit where it is due to others when deserved (Parnell *et al.*, 2005) making the entire process non-

functional.Option 3 Other: ☐ _____

14. According to you, what are the requirements for a favorable learning environment in the workplace? Briefly describe a scenario for a favorable learning environment. *

15. Competitive practices can be advantageous or detrimental to organizational development, According to you, what role does competition amongst colleagues play in organizational learning? *

COMMUNITY OF PRACTICE (COPs)

"COPs can be defined as groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly (Wenger, 2011). COPs help foster an environment in which knowledge can be created and shared to improve the effectiveness of existing practices used in organizations (Lesser and Everest, 2001).

16. Would you be open to adopting a Community Of Practice structure to aid cross project learning in the workplace? What value do u think a COPs structure would bring to you as an individual and to an organization as a whole? *