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Name of Student: Loyiso Mfubesi

Student no: 827406

Course Code: BUQS 7027A

TITLE: INVESTIGATION INTO THE CHALLENGES FACED BY PROJECT TEAMS IN PLANNING THE SCOPE OF
INFRASTRUCTURE DEVELOPMENT PROJECTS DURING INITIATION PHASES:

A Case Study of
TRANSNET SOC LTD.

Telephone number: 082 446 6774

E-mail: 827406@students.wits.ac.za / mfubesi@gmail.com

Date of submission: 02nd November 2020

Supervisor: Prof R. Nkado

Course Co-ordinator: Prof S. Laryea

Declaration: I declare that the work I am submitting for assessment/examination contains no section copied in whole or in part from any other source unless explicitly identified in quotation marks and with detailed, complete and accurate referencing.

(Signature)

A handwritten signature in black ink, appearing to be "Loyiso Mfubesi", written over a black rectangular background. A dotted line extends from the right side of the signature box.

ABSTRACT

The purpose of this dissertation is to identify critical factors which affect scope planning at initiation stages of projects and propose improvements.

A survey using a questionnaire developed by the researcher was conducted amongst industry professionals working in Transnet Projects environment. Data collected from 26 respondents was analysed using **Ms Excel and SPSS – Version 32** statistical analysis tool and evaluated on a 5-point Likert scale whilst secondary data from interviews conducted amongst project team members within Transnet Projects environment was summarised into notes.

The analysis of objectives and discussions thereafter indicates that while there are shortcomings in Transnet project scope planning process, the organisation has somehow embraced the benchmark of the industry advocated by the PMI and is improving quite well and the future looks bright. There is also a general consensus that Project Team members are well aware of the process and feel positive about the future.

The research findings are applicable strictly to the Transnet Projects environment.

This dissertation empirically identifies shortcomings and challenges in project initiation scope planning and the impact such challenges have in project teams within the Transnet projects environment. The nature of this study is exploratory and suggests further investigation within the Project Management community at large to confirm the findings.

This dissertation provides Project Managers, Sponsors, and Senior Management with primary focus areas during scope planning at initiation stages of projects whilst other stakeholders are focused on determining other aspects of project details.

The research key words are: Project Initiation Stages, Scope Planning, project teams.

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1 CHAPTER 1: INTRODUCTION

1.1 Introduction

The purpose of this chapter is to describe the background of the study, outline the research question, position the research aim, state and explain research assumptions and limitations and demonstrate or explain the importance of the research.

1.2 Background / context of the study

This study investigates the challenges encountered by project teams when planning project scope during the Project initiation Stages in Infrastructure development projects and aims to propose measures to address these challenges for initiation of future Infrastructure Development Projects in Transnet SOC LTD. The researcher's six-year experience within the Transnet projects environment has shown more significant problems which are mainly encountered by project team members during planning of scope at initiation stages of the project and resulting in most complications which are encountered during the final stages or ensuing stages of the project. It has been evident in a lot of our projects that whilst we strive to deliver successful projects, lack of proper planning at initiation stages of these projects is the main reason for late delivery, cost overruns, scope creep and other issues affecting project delivery.

Historically, most projects in the Transnet environment have suffered similar issues which meant that these were either delayed, not according to original scope, Project charter was not followed/ lots of changes have been made due to late requests by Sponsor, Project Stakeholders etc. which meant that the project original scope is drastically affected by such changes whilst there are no calls for reviewing timelines due to these changes (re planning of scope). There are several project examples and I have selected the New Multi-Product Pipeline Project (NMPP) which is still not fully completed since it was started in year 2008 and was meant to complete in 2010.

1.3 What is a project team?

According to the PMBOK Guide (2008), a project team is a team whose members usually belong to different groups, functions and are assigned to activities for the same project. A team can be divided into sub-teams according to need. Usually project teams are only used for a defined period of time. They are disbanded after the project is deemed complete.

Once the project requirements are firmly established and the initiation phase complete, the management of a project requires bringing together a set of tools and techniques to be used by the project team to describe, organise and monitor the work of project activities. According to PMBOK Guide (2008) “Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements.” The project manager is the person who assumes responsibility for the success of the project. The project charter identifies the project manager and describes the authority the project manager has in carrying out the project. The project manager’s primary responsibilities are project planning and then executing and managing the work of the project. They are responsible for setting the standards and policies for the projects they work on. It is the project manager’s responsibility to establish and communicate the project procedures to the project team and stakeholders. They will resource the project and allocate responsibilities to team and project team members (PMBOK Guide, 2008).

1.4 The Project lifecycle

According to Campbell and Baker (2007); four phases define the project lifecycle and normally each phase will be terminated by a stage gate and they are labelled according to what occurs in them. The following are four project phases in the project life cycle.

- **The Project Initiation / Definition Phase** – This phase of the project defines what the project will attempt to accomplish when it is finished.
- **The Project Planning Phase** – In this phase the Project Manager and key project team members are planning all the work they must finish to make the project successful.
- **The Execution Phase** – During this phase, the greatest amount of effort, time, and money are expended to complete all the defined activities during the planning phase.
- **The Project Close out phase** – After a project has been successfully completed, the Project Manager and sometimes key team members capture what they have learned and complete all the administrative tasks that officially end the project.

In each phase a deliverable marks the end of the current phase and gives the Project Manager authority to continue. This study focused on the Initiation Phase/ Stage of the project due to it being one of the most important stages of the project in that it gives definition to the project. It was further narrowed down to scope planning during Initiation phase.

1.5 Infrastructure Development Projects

There is growth in infrastructure Development projects globally and one of the most important aspects of ensuring success of these projects is proper scope planning (Kerzner, 2006; Meredith and Mantel, 2006). The benefits of proper and effective planning from conceptual stages of the project can be realised in successful projects delivered by project teams.

1.6 What is Infrastructure?

Infrastructure is the basic physical systems of a business or nation; transportation, communication, sewage, water and electric systems are all examples of **infrastructure**. These systems tend to be high-cost investments; however, they are vital to a country's economic **development** and prosperity.

Infrastructure is also known in economic terms as gross fixed capital formation. Gross fixed capital formation is the addition of fixed assets less the disposal thereof. Fixed capital formation is fixed assets bought with the purpose to produce more goods and services and is used over the longer term. Gross fixed capital formation indicates the addition of fixed assets over a certain period such as a financial year (Wikipedia, the free Encyclopedia).

According to Kangas (1997), the United States of America (USA) embarked on an infrastructure drive to pull themselves out of the great depression of the 1930s. Great economists, such as John Maynard Keynes, supported moves that increase spending on infrastructure development. His theory was that an increase in capital formation, through public works, during times when employment is low has a greater impact than when the country is near full employment.

1.7 The Role of Transnet in Infrastructure Development

Transnet SOC as a Parastatal Organization/ State Owned Company is entrusted with planning and delivery of Infrastructure Development Projects in order to meet its Market Demand Strategy (MDS) which in turn forms part of South African Government's strategies on Economic Development. These projects are generally not meeting their budgets, timelines and also the envisaged quality due to challenges such as late budget approvals, insufficient budgets, scope creep, resulting in cost overruns and longer timelines.

1.8 What is a Parastatal Organization?

A Parastatal is a government-owned corporation, state-owned company, state-owned enterprise, state-owned entity, state enterprise, publicly owned corporation, government business enterprise; commercial government agency, public sector undertaking or a legal entity that undertakes commercial activities on behalf of its owner, the government.

The legal status of SOEs varies from being a part of the government to being stock companies with the state as a regular stockholder. The defining characteristics of SOEs are that they have a distinct legal form and are established to operate in commercial affairs. While they may also have public policy objectives, SOEs should be differentiated from other forms of government agencies or state entities established to pursue purely nonfinancial objectives. Government-owned corporations are common with natural monopolies and infrastructure, such as railways and telecommunications, strategic goods and services (mail, weapons), natural resources and energy, politically sensitive business, broadcasting, demerit goods (alcohol), and merit goods (healthcare).

In South Africa the Department of Public Enterprises is the shareholder representative of the South African Government with oversight responsibility for state-owned enterprises in key sectors, including: Defence, Energy, Forestry, ICT, Mining and Transport (Wikipedia, the Free Encyclopaedia).

1.9 The New Multi-Product Pipeline (NMPP) Project – (Source: Ministry of Public Enterprises, 02 Dec 2012).

The NMPP is an example of an infrastructure project where challenges faced by the project team in planning the scope of the project at initiation stages led to major upheavals in cost and project duration. Transnet commenced the construction of the pipeline during **2008**. The initial estimated cost of the NMPP was **R9.5 bn**. However, as the project progressed, the estimated costs increased progressively from **R9.5bn** to the current **R23.4bn** and the project completion date was pushed out from **2010 to 2013**. These cost increases and time delays raised concerns for the Shareholder. During December 2010, the Minister of Public Enterprises announced an investigation into the cost overruns and time delays on the New Multi-Product Pipeline (NMPP). A team comprising individuals with pipelines, project management, construction, economics, regulatory, compliance, financial and legal expertise was put together to review these deviations. The team was given full access to Transnet's documentation, past and present, Transnet employees and contractors and other consultants involved with the construction of the NMPP. The review team undertook site visits and conducted interviews with relevant persons.

1.10 The findings of the Review

Overall, the Review Team found that there were systemic failings that compromised the intended outcomes. These failings occurred within all levels of management of the project. The project management setup within Transnet Capital Projects lacked sufficient capacity and depth of experience for the client overview of a megaproject of this complexity. There was an inadequate analysis of risks and an over-reliance on the Engineering, Procurement and Construction Management (EPCM) contractor. The overall management of the project fell short of the required standards in certain areas. The implementation of Transnet's obligations on the project such as securing authorizations (Environmental Impact Assessments, land acquisition for right of way, water and wetland permits) were not pursued with sufficient foresight and vigour and outcomes were not adequately integrated into the forward planning of the project. At certain stages the appropriate governance structure and system of controls were inadequate and the timing of the appointment of the main contractors was far too early in the life cycle of the project.

The decision to change the first appointed EPCM contractor after 18 months of working on the Front-End Engineering Design (FEED) introduced risks that were not quantified and were detrimental to fast tracking the completion schedule. The initial response of the second appointed EPCM contractor was inadequate. Key roles should have been filled rapidly in line with proposal commitments. Furthermore, tried and tested cost and project management systems expected of an experienced EPCM contractor were not implemented promptly or rigorously.

1.11 The Research Problem

Project teams are often confronted with challenges in planning the scope of Transnet SOC infrastructure development projects during Initiation Stages. The project scope is often revised or changed either because there are financial constraints, political interference, economic challenges faced by the government or administrative changes. In some instances, projects are later deferred or cancelled due to scope creep, political unrests, unclear scope and plan, inconclusive business cases or uncertainty caused by political instability. When the scopes of these projects are poorly planned, the results are mostly negative in that they are not delivered in planned time, have huge cost overruns and the quality of the eventual product is not at the planned level or is extremely poor resulting in failed project(s).

Literature review presented here introduced vast use of benchmarking in the project management environment. Much of these research findings were focused on the differences in project management capabilities among

industries. The study uses the Project Management Planning Quality (PMPQ) model, which was introduced by Zwikael O. and Globerson S. (2004), for analysing the use of project planning process in each industry type. The next section describes the model briefly, followed by data analysis.

1.12 Research Aim/ Purpose

The aim of the research is to identify challenges which are faced by Project Teams during scope planning at Initiation phases of infrastructure development projects and make recommendations on ways to improve the process in the organisation in order to consistently achieve successful delivery of projects.

1.13 The Research Question

What are the challenges faced by project teams when planning the scope for Infrastructure Development projects during project Initiation Phases and stages in Transnet?

1.14 The Objectives of the Study

Specific objectives for the study are:

- To identify the challenges faced by project teams when planning the scope of infrastructure development projects at the Initiation phases.
- To propose ways to mitigate the challenges encountered by Project Teams or to make recommendations on ways to improve the process of project scope planning during initiation phases in the organisation in order to consistently achieve successful project delivery.

1.15 The importance of this study

This study is important for the following reasons:

- It draws attention to current ways of scope planning in Transnet Projects and their impact on project successes.
- It also reflects on the challenges which are faced by project teams during the scope planning at project initiation stages and proposes remedial actions to reduce their impact.

It is very important for organisations such as Transnet to become world class logistics service provider. To achieve this, Transnet will need to effectively plan, execute and align the outcomes of the projects it chooses to invest in, with its business vision. In the past, Transnet's projects have often been terminated mid-course due to a lack of planning for the most part together with lack of commitment to the capital investment decision and this resulted in wasted time, money and lost opportunity.

It has been challenging for the project teams to plan projects due to project sponsors not embracing the Project Management methodologies and process resulting in projects being managed according to how the principals see fit and eventually fail whilst organisations suffer consequences.

One of the key challenges or shortcomings within Transnet Projects environment is the lack of clear project planning processes coupled with distance between project teams and sponsors or other project stakeholders. Whilst such shortcomings have resulted in failed projects, they also meant financial losses incurred by the organisation. It is therefore important that the reasons for failures should be identified and presented in order that they may be corrected, hence this study.

The Project Management Institute defines Project Management as the process that is used to initiate, plan, execute, monitor, control and close out Projects by applying skills, knowledge and project management tools and techniques to fulfil the project requirements (PMBOK Guide, 2008). The Project Management Institute also emphasizes the importance of planning in project success. Planning is important, but proper planning alone cannot ensure project success.

1.16 Limitations / Delineations of the Research

Research findings are limited to the Transnet Projects environment.

1.17 Research design and methodology

The methodology will address the following aspects of Literature review on the subject, the population of the study including the sample frame, the sampling methods, the research instruments used (questionnaire with case sample), data analysis (SPSS and Excel version in tables and graphs) and ethics.

These will be outlined and discussed at length in chapter 3

1.18 Outline of the study

This study is divided into five chapters inclusive of Chapter 1 as follows:

Chapter 2: This chapter focuses on the literature review. The literature reviewed is from previous similar research and assisted in addressing the research objectives and answering the research question. The selection of the literature was carefully made in order that it is relevant to the study and may assist the reader in identifying what was written about in previous studies, whether there are any similarities and what the outcomes were of those studies.

Chapter 3: This chapter discusses the research methods employed to conduct the survey and clarifies how these methods were applied. A questionnaire and recorder will be used to conduct the study from a sample of 40 respondents which are divided into two groups where the questionnaire is administered to the 1st group (30 respondents) while the remainder of 10 respondents (2nd Group) will be interviewed using the recorder. All respondents were selected from the Transnet Projects environment.

Chapter 4: This chapter analyses data and outlines the findings of the survey. Data was collected through self-administered questionnaires and personal interviews as outlined in chapter 3 and was analysed and presented in accordance with the research question. The findings are presented in tables and charts followed by interpretation, analysis and summary of the interviews.

Chapter 5: This chapter concludes and makes recommendations for the study. It revisits the research question in order to align recommendations and any proposals made with the objectives of the study.

2 CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

The purpose of the literature review section is to integrate the study into a broader framework of relevant theory and research whilst a critical perspective is adopted. This chapter presents recent literature on the proposed research problem as it relates to the stated research problem.

The structure of the literature survey is as follows:

Section 2.2. provides information and discusses literature relevant to planning of mainly construction related projects and,

Section 2.3. provides information on and discusses project management of infrastructure development projects in general.

2.2 Literature relevant to planning of mainly construction related projects

2.2.1 Critical Planning Processes in Construction Projects

Project management

As project management is a core capability in the construction industry, high-quality project planning processes are necessary for project success. A project is a temporary endeavour undertaken to create a unique product or service (PMBOK Guide, 2013). The three most important project characteristics include uniqueness, temporary, and predefined goals (Ofer Zwikael, 2009). The PMBOK Guide identifies 44 processes that should be performed by a project manager during the project's life cycle (PMI Standards Committee, 2004). These processes are grouped into five process groups listed below:

- Initiation is the phase of formally authorising a new project. This phase links the project to the on-going work of the performing organisation. Projects are typically authorised as a result of one or more of the following: a market demand, a business need, a customer request, a technology advance or a social need.
- Planning processes define and refine objectives and select the best of the alternative courses of action to attain the objectives that the project was undertaken to address. Planning is of major importance to a project because the project involves doing something that has not been done before.

- Executing processes coordinate people and other resources, such as equipment and material, to carry out the plan in order to perform the project.
- Monitoring and controlling processes ensure the high-quality achievements of the project plan and updating it when necessary.
- Closing processes formalise acceptance of the project by its customers and other stakeholders and bring it to an orderly conclusion.

Construction project management

Construction projects usually include the design and building of a new structure. Together with the generic project management approach described above, unique methodologies for construction projects are introduced in the literature. For example, M Sarshar, R Haigh and D Amaratunga (2004), introduced a structured process improvement for construction enterprises, which is a project process improvement framework for construction organisations. The PMBOK, PMI Standards Committee (2004) identifies procurement as one of the nine main project knowledge areas and suggest several other procurement management processes. These processes include procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout.

Another uniqueness of construction projects involves two specific positions which are not found in other sectors. These positions include project planners and estimators. Construction project planners add value to the contracting organisation by ensuring that estimating and tendering are based on a robust understanding of the methods, time and space required to carry out the tasks for each building contract and the corresponding risks involved (J M Kelsey, G M Winch & A Penn (2001)). The second unique position in the construction industry is the “estimator.” The estimator’s main task is to predict the likely costs or resources involved in executing a project. As project managers, project planners and estimators are all involved in project planning, the content of this report is highly relevant to them as well as to senior management in construction organisations.

Construction project success is usually measured by four typical success measures: cost, schedule, quality of performance and safety (PMBOK Guide, 2013). For example, a large-scale World Bank (1996) study of construction projects has found that of the 900 surveyed projects, an *average cost overrun* of 40 % over the original cost and an *average time overrun* of 60 % over the planned completion time were reported. Even in a sample of successful construction projects, cost and schedule overruns occurred (Leung, 2004). The major reasons for the failure in many construction projects include lack of integration that may exist between designers and builders, the use of incorrect procurement systems and the condition of the general contracting market.

Despite these poor results, studies have found that construction organisations have higher maturity levels and capabilities of performing project processes than organisations in other industrial sectors (Pennypacker and Grant, 2003; Ibbs and Kwak, 2000). These results are mainly attributed to leadership, information sharing, and degree of authorisation (Cooke-Davies and Arzymanow, 2003). In order to support construction project managers in focusing on the most important managerial processes, several studies have tried to identify the critical factors for construction project success. They further asserted that managerial skills are the most important for owner representatives on design-build projects. They illustrated the importance of soft skills for project integrators, as they execute owner representative duties in a construction environment (Cooke-Davies and Arzymanow, 2003).

Kadefors (2004) found formal systems for keeping records of project communication and decision making to be very useful in construction projects. In addition, competitive bidding was the common method of concessionaire selection in many large projects. The adoption of competitive tendering has improved transparency, fairness, and allocation of resources and expertise. This has allowed bidders to focus on cost and technical factors rather than time-consuming negotiations and political matters, Wood and Ellis (2005) identified partnering relationships as a successful procurement method, based on their experience in UK construction projects.

Project planning

The literature suggests that project planning has significant impact on project success (Globerson and Zwikael, 2004). Project planning is defined as the establishment of a set of directions in sufficient detail to tell the project team exactly what must be done, when it must be done and what resources to use in order to produce the deliverables of the project successfully. The responsibility for planning lies entirely with the project manager, who must ensure that the project is carried out properly and to the complete satisfaction of all relevant stakeholders. Major advantages of proper project planning are to:

- Eliminate or reduce uncertainty;
- Improve efficiency of the operation;
- Obtain a better understanding of project objectives; and provide a basis for monitoring and controlling work

The major outcome of the planning phase is the project plan as developed by the project team during the planning phase of the project. The project plan contains the following elements: overview, project objectives, general approach, contractual aspects, schedules, resources, personnel, risk-management plan, and evaluation

methods (Ofer Zwikael, 2009). In order to develop a project plan, several managerial processes should be executed. Possible lists of planning processes are found in different sources.

The PMBOK, which lists 44 processes, identified 21 as planning processes (PMI Standards Committee, 2004). Although the relevant planning processes have been recognised, research has not yet clearly identified which of these are more crucial. As a result, project managers and planners are often short of time and are therefore unable to properly perform all planning processes. As a result, they may choose to perform the easiest planning processes, or those mandatory to the start of a project, rather than the ones that contribute the most to the success of the project. Zwikael, Shlomo and Globerson (2006) identified the following six planning processes as the ones that highly contribute to project success:

- Definition of activities to be performed in the project,
- Schedule development,
- Organisational planning,
- Staff acquisition, and
- Communications planning and,
- Development of a project plan.

However, Zwikael, Shlomo & Globerson's (2006) report was not focused on construction projects, as its results are based on responses mainly from the information technology sector. Hence, its conclusions can hardly extend the knowledge on construction projects (Ibbs and Kwak, 2000). This study uses the same approach but will identify unique critical planning processes for construction projects. There are also indications that environmental factors may impact upon the identification of critical project processes. Faniran (1998) found three critical success factors influencing construction project planning:

- Investing enough planning time before work on site,
- Reduce emphasis on developing schedules for monitoring and controlling of project progress, and
- Increase emphasis on developing operational plans for project implementation.

This study uses the project management planning quality (PMPQ) model as introduced by Zwikael and Globerson (2006). The reasons for adopting this model in the current study are:

- It is based on an acceptable PMBOK,
- It is a generic model and hence can be used to compare construction projects with others,

- It focuses on project planning,
- It was found to be reliable, and
- It is easy to use.

This model was used in Zwikael & Globerson (2006) study as a vehicle to compare projects in different industries, to identify the relative use of project planning processes by project managers, and to identify critical planning processes for construction projects.

2.2.2 The sponsor's role in project planning

Organizational projects have many interested parties or stakeholders. Yet, someone must, in all projects, take the primary role of sponsorship. The senior executive – the one who “owns” a project and is considered responsible for ensuring its success – is typically the one who proposes a project and whose business unit will reap the benefits of a successfully completed project. The effectiveness of this senior executive, often labelled the executive sponsor, is frequently a predictor of project success. Involved and committed executive sponsors must have enough clout to make the changes that are deemed necessary to successfully complete a project. These changes occur in all stages of the project life cycle, identified for purposes of this study as the initiating, planning, executing, and closing stages. Many of these changes must occur during the planning stage of the project life cycle, yet very little research exists specifying exactly what tasks or behaviours constitute the role of an effective executive sponsor and ultimately a successful project during the planning stage (Perkins, 2005).

Once identified, these behaviours are subjected to a validation and prioritization process utilizing an established procedure. Next, an exploratory factor analysis of the behaviours is conducted followed by tests of association between the project sponsor behaviours and project outcomes.

The project sponsor

A simple definition of a project sponsor is “the person or group that provides financial resources, in cash or in kind, for the project” (Project Management Institute, 2004). The full role of the sponsor is much more inclusive than the fundamental role of providing resources. Many authors suggest the need for active sponsor involvement specifically during project planning (Hartman and Ashrafi, 2002). As the key stakeholder responsible for ensuring a successful project outcome, the project sponsor has the power to influence decision making and assist in identification of stakeholders to assist in project delivery as well as those stakeholders that will be impacted by the project. With the project manager, the sponsor must coordinate communication activities that encourage open relationships and address concerns and interests of the project team (Sewchurran and Barron, 2008). Bryde

(2008) in a survey of project sponsor activities explored which classes of sponsor activity are predictors of perceived project success.

Project planning stage

According to Project Management Institute (2004), the four stages, also known as phases were considered, i.e. initiating, planning, executing, and closing to describe the project life cycle. These phases are often described as a stage gate model whereby a project must pass through an approval gate (usually by means of having someone approve a deliverable that was created during that stage) to move from one stage to the next.

In this study on Transnet infrastructure delivery processes, there are two reasons why we limit our evaluation to the planning stage. First, the role of sponsors during the initiating stage has been previously documented in T J Kloppenborg, D Tesch, C Manolis, M Heitkamp (2006). Second, the sponsor participates in significant, yet different ways in the more detailed planning stage than during the initiating stage. The planning stage normally starts when a project charter is signed. This is a starting point on many projects and the researcher have defined the planning stage to end when the full project plan is approved by all project stakeholders.

Though the end of the planning stage is not as clean on many projects, since some of the actual project execution often occurs while some of the planning is still being completed, our respondents were asked to focus on the planning activities. The sponsor individually, or as a member of an executive steering team, usually is responsible for deciding if the project deliverables are good enough to pass on to the next phase. This decision is often based on the following questions: is the project charter good enough to enter the planning stage? And is the project plan good enough to exit the planning phase and move into execution? Belout and Gauvreau (2004) in a re-test of Pinto and Prescott's (1988) previously identified independent variables effect on project success considered the moderating effect of the four project life-cycle stages. In the planning stage, all the factors except personnel and troubleshooting were correlated with project success.

A project is a unique endeavour that has not been completed before. Thus, it is difficult to know at the initial planning stage precisely all the activities necessary to complete the project. Dvir (2005) examined the relationship between project-planning efforts and project success. In a study of more than 100 R&D projects, results suggest that project success is insensitive to the level of implementation of management processes and procedures, which are readily supported by modern computerized tools and project management training. Project success is, however, positively correlated with the investment in requirements' definition and development of technical specifications. The main conclusion from these results is that no effort should be spared in the initial stage of a

project to properly define the project goals and its deliverables requirements. In an examination of data provided by 269 CIOs examined the impact of a positive internal environment supporting information systems (IS) project planning and subsequently IS project success. Results suggest that top management support of IS and management participation in IS planning are vital to the successful implementation of IS projects. In a life-cycle-based approach, Khang and Moe (2008) developed a dynamic model that identifies different success criteria and factors for the different phases of the project life cycle.

The success criteria of each phase are then linked with success criteria of the subsequent phase. Success criteria for the planning stage include approval of, and commitment to, the project by the key parties, sufficient resources committed and ready to be disbursed, and core organizational capacity established for project management. Success factors critical to the planning stage include compatibility of development priorities of the key stakeholders, adequate resources and competencies available to support the project plan, competencies of project planners, and effective consultation with key stakeholders. Each of the factors was given an overall rank and a rank within each phase. The number one ranked critical success factor within the planning stage was the competency of project planners.

Dimensions of project success (DeLone and McLean, 1992) identified key indicators of information technology (IT) project success that form a framework for measuring system performance. Expanding on the “triple constraint” notion of time, cost, and performance, this framework considered information and system quality dimensions as well as use and satisfaction constraints. In addition, the impact of the system was examined from the perspective of its impact on individuals (often customers) and the organization. Our understanding of project success has become increasingly complex. Referring to the “iron triangle” of project cost, schedule, and performance (Project Management Institute, 2004), it was long assumed that a project could do well on two of the three measures, but not all three simultaneously. Modern understanding of project success includes additional ideas. Starting in the 1980s, performance has been understood to include both quality of project deliverables and scope of work. Shenhar (2002) considered 13 success measures grouped along three dimensions: meeting design goals, benefits to customers, and commercial success and future potential.

Pinto (2004) included a time-dependent dimension considered in Shenhar (2002) as a separate dimension in assessing the effectiveness of a project. Projects must be considered not only in current terms but also in terms of the future potential that a project offers in terms of generating new business and new opportunities. As described by Pinto (2004), the four relevant dimensions of success include project efficiency, impact on the customer, business success, and future potential. Yet another model of project success suggests that success measures must

reflect the strategic intent of the company and its business objectives as well as reflect the interests of various stakeholders (Shenhar and Dvir, 2007).

Sewchurran and Barron (2008) consider a more holistic view of measuring project success that includes consideration for outcome-related elements including learning, value, and use. These elements measure the value of the system as it relates to system performance and quality, functionality, and usability. Christenson and Walker (2004) describe the role of “vision” in project success. It is vision that helps clarify the direction of a project and enables people to make sense out of a plan of action. Identified characteristics of vision include the requirements that a vision be easily understood, motivational and inspirational, credible, and lead teams to work smarter and perhaps identify additional goals. In an assessment of the evolving understanding of project success, Jugdev and Muller (2005) summarize results of several empirical studies and outline four necessary, yet not sufficient, conditions for project success.

These conditions are:

- Success criteria should be agreed upon with the stakeholders at repeated points throughout the project,
- A collaborative working relationship between the sponsor and project manager should be maintained,
- Empowered with flexibility to deal with unforeseen circumstances, the project manager should receive guidance from the project sponsor, and
- The sponsor should take an interest in the performance of the project. This approach suggests a shift of considerable responsibility for project success to the project owner.
-

In an earlier study on the role of sponsors during the initiating stage, three multi-item measures of project success were identified (T J Kloppenborg, D Tesch and C Manolis, 2011). In the study, T J Kloppenborg, D Tesch and C Manolis (2011) adopts these previously identified and empirically validated project success factors as shown in Table 1 below.

Table 1: Project success factors

Agreements	<ul style="list-style-type: none"> • Meeting schedule expectations • Meeting budget • Finishing a project on time • Meeting technical specifications
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Customer	<ul style="list-style-type: none"> • Creating a project that leads to enhanced satisfaction on the part of the customer • Creating a project that is used by the client • Addressing customer needs
Future	<ul style="list-style-type: none"> • Increasing market share • Opening new lines of products • Opening new markets • Generating a large market share • Developing a new technology • Achieving significant commercial success

Source: Shenhar and Dvir (2007).

In summary, project sponsors are executives with an interest in project success. The recommendations in this research report help these busy individuals prioritize their time during project planning with an eye toward project success. Behaviours associated with ensuring their project managers and teams plan well, managing stakeholder relations, and ensuring an effective project manager is in place are significantly and positively correlated with project success. These are a very good use of the executive sponsor's limited time. On the other hand, sponsors personally handling details of clarifying project outputs are associated with less project success. Sponsors might delegate these behaviours to project managers.

2.2.3 A taxonomy of planning and scheduling methods in construction project management purpose

The implementation and control processes of project planning and scheduling involve a wide range of methods and tools. Despite the development and modification and integration of the project management theory with newer scheduling approaches in particular, practitioners' views on the efficiency and effectiveness of these methods and tools differ. This situation can be attributed in part to a lack of understanding of the most appropriate basis for implementing these methods and tools. Planning and scheduling are among the most critical tasks in construction project management, demanding the attention of competent personnel (Kerzner, 2009) to determine how the work will be organized, scheduled and controlled. The planning process in general involves various tasks, including:

- integrating and developing the project scope;
- defining the project's inputs and deliverables; and

- setting out methodologies for executing and controlling the project schedule (PMI, 2008).

It has been argued that insufficient coordination and allocation of such tasks and resources in planning can obscure the management effort needed to develop and control schedules (H AlNasseri & R Aulin, 2015). Although scheduling is viewed as a discrete process with unique characteristics and inputs, it is an integral part of the planning process. It is concerned with the networking of activity sequences and durations and the resource trade-offs and controls that have been provisionally set in the planning process (PMI, 2008). The planning and scheduling process has a strong impact on construction projects, and so project managers and planners should consider the practical implications when implementing scheduling methods and systems (PMI, 2008). Nowadays, project planners and schedulers have increased access to various forms of visual models and scheduling control systems; yet, the dynamic nature of projects can pose other challenges, not least in identifying and controlling risk and uncertainty during project execution. Significant among these challenges is the disconnection between the underlying theory of the different methods and control systems and how they are supposed to be applied in practice. In this connection, Hajdu (1997) argued that despite advances in the development of many scheduling techniques, project managers and their planners still face a lot of challenges in achieving a fit-for-purpose schedule within the constraints of time and resources. Hajdu (1997) attributed this to the complexity of scheduling against the ability of project managers to retain all information concerning the schedule and, thus, make an informed decision. This can imply that there is a need to determine appropriate mechanisms for gaining a proper understanding of the underlying theories of different methods and tools. Consequently, this would help to reduce misinterpretation of schedule results, regardless of the sophistication, or otherwise, of computer-based tools. In partial response to these challenges, taxonomy of different methods is offered as a way forward. This paper presents taxonomy for the most commonly used methods in the scheduling of construction projects based on current practice. The taxonomy can serve as a support tool to help improve learning, as well as awareness in the project team, about the key merits and pitfalls of different planning methods and tools. As a result, this might motivate the current attitudes of practitioners toward a more appropriate selection and application of methods in their work.

The taxonomy – overview of concepts and applications

Taxonomy was initially defined as the science of species identification and classification from a biological perspective (Wikipedia, the free encyclopedia). In the context of management studies in general, the study of the planning theory results in three major taxonomy components. Tsui (2010) advocated the use of taxonomy as an initial model to help an organization disseminate information in the most efficient and comprehensible way for the benefit of end-users. Nowadays, apart from the original core subjects and sub-topics of taxonomy, there is

little doubt that taxonomies can be introduced to, and adopted by, many disciplines based on the characteristics and objectives of the organization where taxonomy is utilized. In numerical taxonomies, Romesburg (2004) considered cluster analysis as a useful quantitative tool aiding practitioners in various disciplines, including planning and management research, to form research hypotheses based on qualitative attributes to judge similarities and dissimilarities among those attributes. However, this form of mathematical taxonomy seems to be more useful for those researchers attempting to approach their research problems from a statistical perspective, particularly in studies based on deductive reasoning, which need grounding in qualitative or theoretical taxonomies.

Conceptualization of the taxonomy study

Based on the above discussion, it seems that there have been no specific studies offering an analysis of a construct-based taxonomy for the major components of construction processes, particularly planning and scheduling theories and methods. Nevertheless, a few examples were found of attempts to initiate a conceptual framework of taxonomies; for instance, utilization of a template to classify, sort and manage the causes and effects of changes in construction projects (Sun and Meng, 2009). In this regard, Sun and Meng (2009) argued that the proposed taxonomy can be used by the project team as a framework for taking necessary steps or preventive actions in a more systematic way. It can be argued, therefore, that taxonomy of related issues or factors, such as planning methods, has the potential to be used as a tool for mapping all inputs and changes in the management and execution of construction projects. Evidence from the literature screened by this study indicated that there were some notable variations among the different planning approaches and scheduling methods in terms of their capacity for handling project activities, input resources and statistical aspects, as well as users' satisfaction. It should be noted that these criteria include sub-criteria. The latter include classification of scheduling methods and tools, class of scheduling problems to be resolved, management roles in handling scheduling resources, uncertainties and statistical aspects.

Competency and requirement aspects for applying methods

Traditional methods allow the project manager and planner to focus on the completion of activities without considering potential risks relating to resource conflicts in forthcoming activities and their interdependencies. As a consequence, this behaviour encourages the project team to work in a more reactive manner when controlling schedules instead of being more proactive over scheduling constraints. On the other hand, modern methods (e.g. CCPM and LPS) have now been experienced as useful tools for managing and controlling schedules containing a large number of activities and their interdependencies. This is because such methods are concerned with the

management of resource-constrained schedules. Furthermore, the underlying theories of modern methods support integration with other classes of the scheduling method. Despite such potential features, users and practitioners in general should have a more developed understanding when assessing and evaluating implementation outcomes. Nevertheless, the key features of modern methods represent a significant departure from the application of traditional methods.

Planning and monitoring roles

Traditional methods tend to be centred on the monitoring stages of scheduling by focusing on a representation of progress in terms of activities' precedence relationships and their related statistical fluctuations of the time for delivery rather than identifying and mitigating the schedule risks. Moreover, the performance of scheduling plans using traditional methods is routinely controlled by a conformance measure of the as-built schedules against the as-planned schedules. In opposition to this, newer methods allow planners or schedulers to focus on both the planning and controlling stages of the schedule by taking into account all potential constraints on both the activity and project levels. Consequently, these key features, if they are properly used, can inform project stakeholders on the optimal delivery time of the project in the most cost-effective manner.

2.2.4 The PMPQ (Project Management Planning Quality) model

The PMPQ model evaluates the overall quality of project planning. It is based on the processes to be performed during the planning phase of a project, by both the project manager and the organization to which the project manager belongs. The model analyses project planning processes that are defined by the Project Management Body of Knowledge (PMI Standards Committee, 2004), which is recognized as the main body of knowledge in the project management area, and is accepted as a standard by the American National Standard Institute. It is assumed that the more frequent a certain process is performed by an organization, the more competent the organization is in that process. Since a process has products to be achieved at its end, a major product was identified for each of the 16 planning processes. For example, the major product that project managers should generate as an output for the "scope definition" planning process is a work breakdown structure (WBS) chart. The frequency, in which a planning product is generated, is easy to estimate and, therefore, was used to estimate the frequency in which a process is performed – the maturity level of that organization on that specific process. Yet, the quality of planning is not impacted only by processes that are performed by a project manager, but also depends on organizational support. Therefore, the second group of items in the PMPQ model includes 17 organizational support processes. Altogether, there are 33 products in the PMPQ model.

The model's validity was evaluated by comparing the overall project planning quality indicator derived from the model, with the projects' success, as estimated by a separate set of questions. It was found that quality of planning index was highly correlated with the perception of projects' success, as measured by cost, time, performance envelope and customer satisfaction, as well as with the perceived quality of planning. The correlation remained very high and significant for several other options of weighting. The quality of planning was correlated with each of the project's final results and with the subjective assessment of the project manager regarding the quality of planning. The conclusion from the above statistical analysis is that the PMPQ model is reliable and valid and can be used to evaluate the quality of project planning. In order to explore the differences in project success among the industries, results were separated accordingly and it can be observed from Table 2 that construction and engineering organizations finish their projects with significantly (p-values, 0.01) lower cost and schedule overruns, compared to other organizations belonging to the other three industries. These results fit findings quoted of other studies (Pennypacker and Grant, 2006; Ibbs and Kwak, 2000), in which construction and engineering organizations have the highest level of project maturity.

Table 2. Project success indices for four industry types (Ofer Zwikael, 2009)

Industry type	Number of questionnaires	Cost overrun (percent)	Schedule overrun (percent)	Performance envelope (1-10 scale)	Customer satisfaction (1-10 scale)
Construction and engineering	35	17	19	8.1	8.1
Software and communications	98	27	33	8.2	8.3
Services	58	23	27	8.3	8.3
Production and maintenance	10	26	32	7.9	7.9

Software and communication organizations, as well as service organisations, usually do not reach cost and schedule targets. However, performance envelop of their projects is relatively high and their customers are more satisfied. These results may derive from the customer service orientation of these companies. Production and maintenance organizations were found to be the poorest performer in all four criteria, which may result from the fact that projects are not part of the regular operation of such companies as they focus on operations. The next section will evaluate the ability of companies within each industry to plan the project and relate their planning ability to their end results in project execution.

Planning processes analysis

The quality of planning was calculated as the weighted average of the frequency in which each of the planning products was executed, as execution frequency is an indicator of quality of planning. Figure 1 shows the quality of planning of the four industries. Similar performance ranking on project success that was found among industries was repeated in ranking the industries on the level of quality of planning. Construction and engineering organizations, which scored the highest on project success, also obtained the highest score on quality of planning. Production and maintenance organizations, which scored the lowest on project success, received the lowest quality score as well. This performance deviation among the industries is probably due to the difference in the nature of their operations. While construction and engineering companies are project oriented, as most of their work involves initiation and execution of new projects, production and maintenance organizations are engaged mostly with day-to-day operations, and their planning is oriented to that rather than to project planning. It may be surprising to note that despite a high quality level of planning in software and communications organizations, these organizations still often conclude projects with poor results. The reason for this may be due to a riskier technology and environment, poor control or too ambitious commitments taken during the initiation phase.

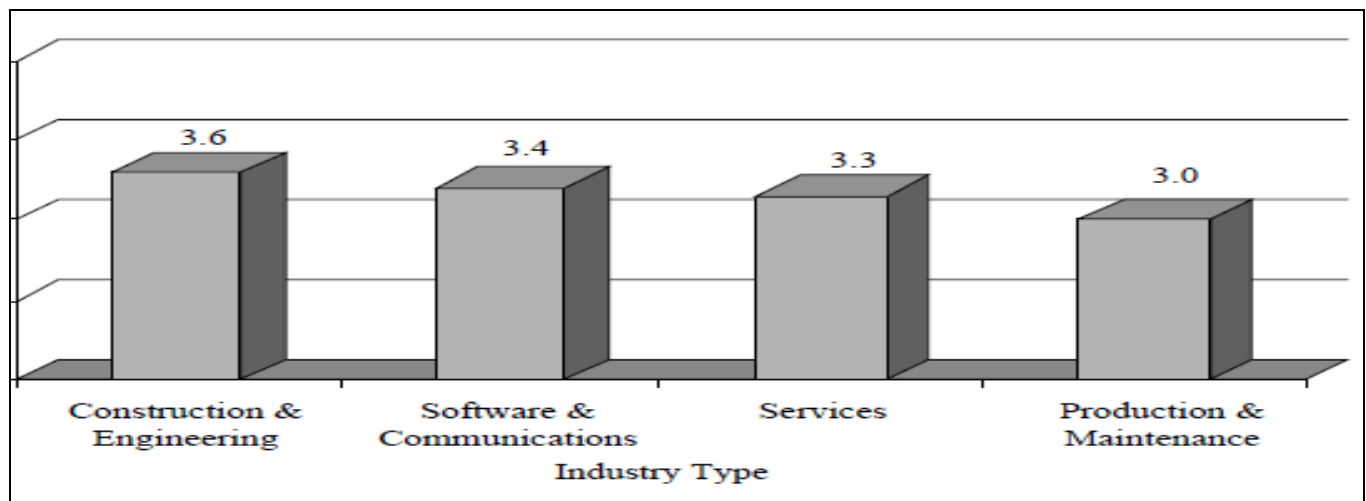


Figure 1: Quality of planning, by type of industry (Ofer Zwikael, 2009)

By analysing the quality of project planning in different industries, it was found that construction and engineering organizations maintain the highest quality of planning, both in the organization level and the project manager level. It is probably due to the project-oriented nature of these organizations. Its greatest weakness is risk management, which may stem from lack of managerial know-how. The other extreme industry is production and maintenance organizations, which plans their projects at the lowest level of quality, perhaps due to the difficulty

they have in comprehending the basic difference between managing a project and carrying out their day-to-day tasks. The organizational support processes were found to have a great influence on the quality of the processes performed by project managers. An organization that does not make enough effort to support its projects gets in return low-quality project plans, such as the situation in the production and maintenance industry. On the other hand, construction and engineering organizations that support projects effectively, obtain higher quality project plans from their project managers. A correlation between the quality of planning and the success of the project at its conclusion was also found. For example, construction and engineering organizations have the greatest project success, compared to other industries. Finally, the impact of improving project plan may improve project management at the entire life cycle of the project. Once processes are performed correctly at the planning phase, it will be easier for the project manager to continue managing the other project phases at the same level of quality, until the project's successful conclusion.

Infrastructure Development Projects

According to Renee Pillay (2006), in a competitive business climate, an organisation's ability to efficiently align resources and business activities with strategic objectives can mean the difference between succeeding and just surviving. To achieve strategic alignment, organizations are increasingly managing their activities and processes as projects. In essence, they are projecting their businesses, to monitor performance more closely and make better business decisions about their overall work portfolio. By planning and tracking projects with clarity and precision, organizations can respond with greater agility to the demands of a fast-changing business environment. Whether delivering products or services, all organizations need to meet project deadlines, budgets and stakeholder expectations. To maintain customer satisfaction and meet customer expectations, no room exists for project errors or delays. To stay competitive, companies are increasingly implementing initiatives to improve their project delivery by continually reducing cycle times, minimizing costs and controlling quality.

2.2.5 Processes or shortcomings of establishing projects within Transnet

The Project Management Institute defines Project Management as "The process that is used to initiate, plan, execute, monitor, control and close out projects by applying skills, knowledge and project management tools and techniques to fulfil the project requirements", (PMBOK Guide, 2004). Project Management duties occur from the foetal stages of a project and encompass such things as feasibility studies, stakeholder analysis, cost and time deliverables, design life and many other forecasting and actuarial functions. There exist multitudes of grey areas in the project management concept within Transnet that only become apparent at project termination. There exists no clear framework for the implementation of a structured approach to project management according to

the (PMBOK Guide, 2004). It is, therefore, necessary to understand the shortcomings of the Transnet project management process and to evolve a strategy for the amalgamation of the conventional Transnet concept of project management with the modern business functions of project management more closely associated with the PMI approach.

2.2.6 Interpretation of failure

Heldman (2004) describes the following project endings: addition, starvation, integration, and extinction. However, the principal reason for termination of a project earlier in its life cycle is when the project results no longer have a strategic fit with the enterprise's future. In practice, however, a project that achieves the planned outcomes within the allocated time, scope, quality and budget constraints could still be perceived as a "failed project". There is generally much ambiguity associated with what the project entails measures of success and the stakeholders involved. Projects often become the victims of perceived failure if the project boundaries, constraints, deliverables, measure for success and communication methods are not clearly defined at the onset.

2.2.7 Enhancing project success

The Project Management Institute emphasizes the importance of planning in project success. Planning is important, but proper planning alone cannot ensure project success. An article on Identifying Business Needs for Success (Pillay, 2006) states that simply identifying one's business need at any point in time is not enough to ensure the success and sustainability of operations, services and benefit. Public and private sectors have attempted to improve project management through various techniques. The reality is that any business has limited borrowing resources that should be allocated to the best investment alternatives. Management must, therefore, carefully decide whether a project is economically acceptable. To take this decision, a sound procedure to evaluate, compare and select projects is needed. This procedure is called *capital budgeting*. These initiatives require skilled people, standardized processes and superior technology unified and driven by effective project management.

2.2.8 Decision Making Model for Infrastructure Projects Selection in Developing Countries

The publication deals with the process followed to select investment projects within the construction industry with emphasis on the characteristics of infrastructure projects in developing countries. It presents an overview of the current practices in the main areas concerned with the process, namely project evaluation and decision-making. A project is, in general terms, an attempt to find a solution to a problem that has to be solved. This attempt involves investment, technology and human resources. In the area of concern within this research,

projects are considered schemes or parts of them, for investing resources in order to satisfy a need or provide a solution to a problem of social or environmental nature. In the literature projects are defined as the building blocks of an investment plan (Little and Mirless 1974). An investment project may be defined as the application of resources which are saved to generate future resources. The definition of project given by the World Bank (1994) is broader and even includes the function of project evaluation and choice.

The economic aspects of projects have always been considered as a fundamental part of the process of evaluation and decision making, probably due to the close relation between economics and the massive allocation of monetary resources into projects. A probable justification for the overwhelming importance given to economic matters while evaluating a project can be found in the words of Remer and Nieto (1995) when saying that *“Profitable capital investment leads to the growth and prosperity of an economy. If profitability is low investment will shrink”*. While the authors are not completely wrong in stating this, there are several arguments against it. In the first place, if the growth and prosperity of an economy depend on profitable capital investment, then social benefits projects would be excluded from the national accounts on the basis of being non-profitable.

Additionally, if the evaluation of projects is seen from the private viewpoint, then the economy of a country or a region is not the most important issue when appraising an investment option. In recent years, organisations have started to realise that projects cannot be classified and treated as rigidly as before. This has given origin to schemes such as privatisation and concession of public benefit to projects, partnerships between public and private organisations, strategic alliances, and alternative financial schemes for projects. Consequently, the scope of project evaluation has also changed and examples of broader and more careful estimation of non-economic factors are becoming more common (Ackerman and Heinzerling, 2002). Generally, however, organisations are still reluctant to look at social and environmental issues as carefully as they look at financial matters. In engineering generally and in construction particularly there are numerous areas in which decision-making methods are being applied such as the selection of locations for Industrial plants or the selection of investment projects. The selection of investment projects involves the use of techniques from a number of disciplines, namely those related to decision-making and project evaluation.

Whilst numerous efforts have been made towards the development of these disciplines, the practical aspects of it still remain quite unstructured and lacking strong foundations. One of the possible causes of this problem lies in the difficulty faced by engineers when trying to understand and apply the theory of decision making. The changing conditions in the construction world have forced organisations to change the way projects are structured and their life cycle carried out. However, recent experiences in developing countries show that the

appraisal and selection of investment projects still have several areas that require improvement to catch up with the needs of society and natural environment.

In most cases investment projects in developing countries have different characteristics than those in industrialised countries where economic and political conditions are more stable. Also the scarcity of economic resources, so common in developing countries, and the need to maximise welfare of the population require different types of appraisal methods for the process of selecting projects in these countries. While the basic principles of project selection remain the same, both conditions require a different approach. Several reasons of practical and ethical character stand up for the development of decision- making methodologies for developing countries (Kerali, 2003). Such methodologies would include financial, economic as well as socio-economic appraisals in order to efficiently allocate the scarce resources in the best possible ways for that reason, the methodology included criteria that should be taken into account when analysing the effects of projects on the population and their well-being. Although two major areas such as the private benefits (i.e. profit, capital payback, etc.) and social benefits (i.e. number of beneficiaries, social costs, etc.) are covered by the new methodology, it is recognised that they are not the only ones a decision-maker would consider while appraising a project. In fact, the methodology was designed in such way that, should the proposed social and economic models not satisfy the needs of a particular organisation, they can be replaced with more suitable models and proceeds as before. It is also recognised that the particular models developed by this research are not infallible and therefore might be subject to modifications and improvement over time.

In recent years, organisations have started to realise that projects cannot be classified and treated as rigidly as before. This has given origin to schemes such as privatisation and concession of public-benefit projects, partnerships between public and private organisations, strategic alliances, and alternative financial schemes for projects. Consequently, the scope of project evaluation has also changed and examples of broader and more careful estimations of non-economic factors are becoming more common (Ackerman and Heinzerling, 2002). Generally, however, organisations are still reluctant to look at social and environmental issues as carefully as they look at financial matters. In engineering generally and in construction particularly there are numerous areas in which decision-making methods are being applied such as the selection of locations for industrial plants, or the selection of investment projects. The selection of investment projects involves the use of techniques from a number of disciplines, namely those related to decision-making and project evaluation.

2.2.9 Infrastructure Development in South Africa and Gauteng

Infrastructure forms the backbone of any economy and when extensive and efficient, it is critical for ensuring the effective functioning thereof. The development of infrastructure includes the building of roads, ports and telecommunication, amongst others. This development has the potential of changing the physical, economic and social structure of a country with little or no reliance on international trade. This is a critical time to consider infrastructure development in Gauteng, South Africa and the rest of the world. The 2012 Medium Term Budget Policy Statement (MTBPS) has reiterated government's plans to strengthen infrastructure investment developments in order to address growth constraints. Events relating to economic uncertainty globally are driving most countries to seek strategies to grow their economies internally. It is unlikely that exports will contribute as much to the Gross Domestic Product (GDP) with the Euro zone¹ debt crises currently suppressing the demand for South African goods and services. Infrastructure development becomes one of the options to be pursued to enhance structural change of the economy in the country. The government is embarking on an infrastructure drive in order to stimulate economic growth and promote employment.

The Honourable President Jacob Zuma, in his 2012 State of the Nation Address (SONA), mentioned how the exit of the country from the 2009 recession was assisted by the 2010 Fédération Internationale de Football Association (FIFA) World Cup infrastructure drive. There is a need for some level of economic certainty in South Africa and for efforts to address structural unemployment. To achieve these objectives, the government intends to focus on growing the economy internally, for example, the infrastructure drive that has been planned for 2012 and beyond. In the SONA, the President announced that to direct the infrastructure drive, a Presidential Infrastructure Coordinating Commission (PICC) had been set up to coordinate and assist with infrastructure development on a national, provincial and local level. The extensive infrastructure drive will seek to develop and improve rail, road, water, electricity, ports, telecommunication, science & technology, schools and hospital infrastructure. These infrastructure development projects have the potential to clear bottle necks in economic growth, to reduce unemployment as well as to transfer skills to those who will be working on the various projects.

Some of the current infrastructure projects that the province has already embarked on include the expansion of health institutions, development of an aerotropolis² around the OR Tambo International Airport, a telecommunication project called the G-link, providing support to farms in the form of water tanks, irrigation equipment & generators, roads and public transport. The global infrastructural overview section compares several indicators within the Brazil, Russia, India, China and South Africa (BRICS) group of countries. The infrastructure strategies and programs by selected leading regions like, China and India provide a benchmark for the country's initiative to improve infrastructure. The paper provides comparisons of infrastructure development

internationally, nationally and where possible at the Gauteng provincial level. This is in order to investigate progress made towards improving the provision of public goods such as health, education, energy, water & sanitation, transport and the telecommunication sector.

2.2.10 Global Infrastructure Overview

The Oxford Dictionary of Economics (2009) defines infrastructure as; “The capital equipment used to produce publicly available services, including transport and telecommunications, and gas, electricity and water supplies. These provide the essential background for other economic activities in modern economies; the fact that they are not available or reliable is a characteristic of less developed countries (LDCs), and handicaps their development. Infrastructure services are generally either provided or regulated by the state.” The Economist’s online dictionary, Economics A-Z (2012), describes infrastructure as “The economic arteries and veins”. The World Economic Forum (WEF) 3 backs this definition of infrastructure as it argues that extensive and efficient infrastructure is critical for ensuring the effective functioning of an economy. With this definition in mind it is not surprising that the private sector and governments around the world focus on infrastructure development. The private sector stands to gain profits from directly participating in infrastructure development and benefits indirectly from its availability as this lowers operating costs of companies.

Infrastructure is also known in economic terms as gross fixed capital equipment or formation. Gross fixed capital formation is the addition of fixed assets less the disposal thereof. Fixed capital formation is fixed assets bought with the purpose to produce more goods and services and is used over the longer term. Gross fixed capital formation indicates the addition of fixed assets over a certain period such as a financial year. During periods of high unemployment and depressed economic growth, governments tend to fund infrastructure projects that are labour intensive. Great economists, such as John Maynard Keynes, supported moves that increase spending on infrastructure development. His theory was that an increase in capital formation, through public works, during times when employment is low having a greater impact than when the country is near full employment.

Due to the global financial crisis of 2008/09 and the current global economic uncertainty which stemmed from the Euro zone debt crisis⁶, GDP forecasts have been downgraded and unemployment levels have risen. Thus, countries like South Africa have embarked on infrastructure drives to counter these negative effects, as suggested by the theory. The national 2012 MTBPS, tabled by Finance Minister, Honourable Pravin Gordhan, forecasted infrastructure programmes by government to cost in the region of R3.2 trillion over the next 20 years, financed through a variety of options which include retained earnings and balance sheets of State-Owned Enterprises (SoE), supplementing the fiscus. An amount of R250 billion is said to be earmarked for implementation-ready

projects in the immediate short term, next three years. Europe, the second biggest trading partner of South Africa, plays a significant role that has an impact on the economic outlook of the country. Often when economic growth cannot be expected from the exporting of goods and services, countries look internally to expand their economies. Infrastructure development strives to increase employment and lay the foundation for future economic development by providing the veins for growth.

The rationale behind the targeting of infrastructure programmes by many governments and private companies alike is to facilitate and improve the movement of all goods and services. Such infrastructure determines the location of economic activity and sectors that can develop. It reduces the distance between regions, integrating markets with other countries and regions. Therefore, the WEF argues that improved infrastructure development has the potential to decrease income inequality and poverty. Well-developed transport and communications infrastructure networks are essential for less-developed communities to enable them to access economic activities and services.

Transport, including quality roads, railroads, ports and air transport, enable entrepreneurs to get their goods and services to the market places in a secure and timely manner and facilitates the movement of workers to their places of employment. Solid telecommunications networks allow for a rapid and free flow of information. Economies also depend on electricity supply that is free of interruptions and shortages so that businesses and factories can work unimpeded. To this end, the Global Competitiveness Index (GCI) (2011-2012) has included an infrastructure pillar which measures the effectiveness of countries' infrastructure (The Economist, 2012). Many discussions have been held around infrastructure development in developing countries, including South Africa. Some of the discussions in the country were about deteriorating infrastructure in municipalities. Economic efficiency in developing and underdeveloped countries is often hindered by lack of sufficient and quality infrastructure. Another topic of discussion regarding infrastructure development globally has been the financing of projects. It is argued that financing should be acquired in domestic currency, as this limits unexpected additional expenses that may occur due to exposure to volatile exchange rate markets. The most conventional way of achieving this is acquiring financing domestically. Other mechanisms could be by making agreements with international lenders that their loans be denominated in domestic currencies of countries that borrow the money. The BRICS9 nations are in the process of setting up their own multinational development bank which will facilitate loans that will be denominated in the currency of the borrowing countries

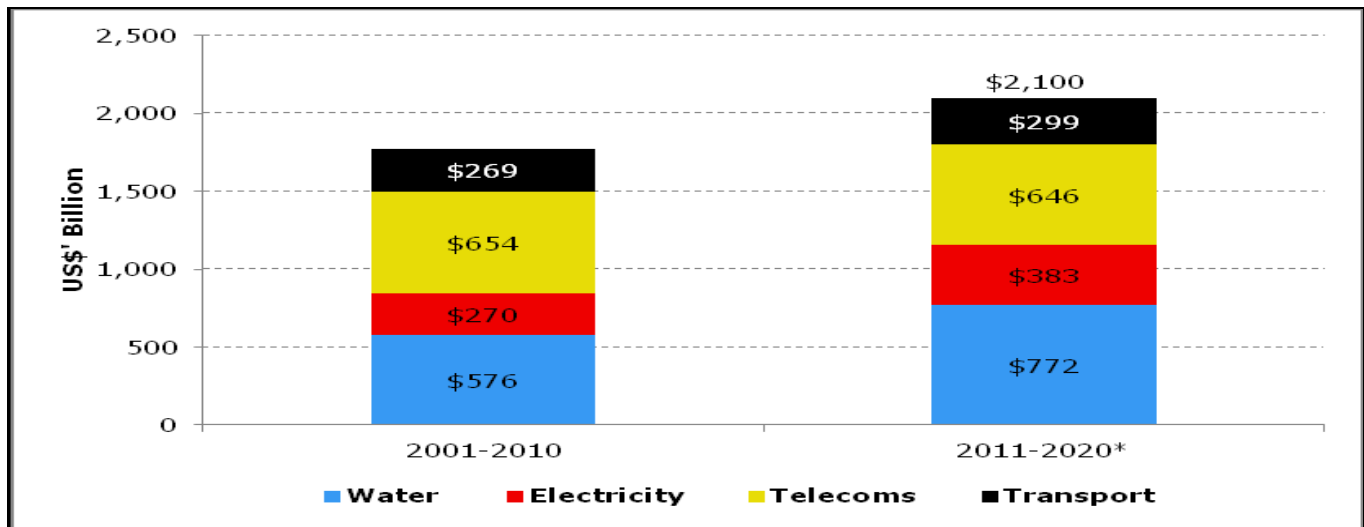


Figure 2: Global Investment on Infrastructure, 2001–2010, 2011-2020*

Source: The Economist, 2012

Note: * Indicates forecasts

Figure 2 shows investments that have been made globally in infrastructure development from 2001 to 2010 and projections from 2011 to 2020. The telecoms category had the largest share (37 %) of global infrastructure investment in the 2001 to 2010 period. It is anticipated that in the 2011 to 2020 period, its share of global investment on infrastructure will reduce by 1.2 % to US\$646 trillion. Investment in water had the second largest share (33 %) in the 2001 to 2010 period at US\$576 trillion. This amount is forecast to increase by 34 %, resulting in the category accounting for the largest share (37 %) of the global infrastructure investment in 2011 to 2020. Infrastructure investment in transport will increase by 11 %, while investments in telecoms are expected to decrease by one %. Overall, it is expected that global infrastructure investment will increase by 19 % over the latter ten-year projection.

2.2.11 Challenges and Opportunities in Infrastructure Development

According to Deloitte & Touch Report (2012), infrastructure remains the biggest obstacle towards Africa achieving its economic growth potential. Competitiveness and efficiency continue to be hampered by inadequate development in transport, communications, water and power infrastructure. The paper also points-out that about six of the world’s fastest growing economies are situated in the Sub-Saharan Africa region. The table below lists some of the challenges faced by the country in developing its infrastructure.

Table 3: Challenges in Infrastructure Development

Challenge	Description
Funding	Funding remains a key challenge facing infrastructure investment. Most infrastructure projects are financed on loans and this has led to budgetary constraints in the majority of the projects.
Approval Process	According to a KPMG survey of 2011, public sector officials have cited the slow approval processes as a challenge in spending infrastructure funds quickly and effectively.
Delivery Models	More delivery models and investment solutions make it difficult to identify the most efficient approaches.
Policy	In the absence of clearly defined policy directions, there is lack of interest to initiate new projects.
Skills Shortage	Skills shortage remains one of the biggest challenges facing most economies in Africa. In the case of South Africa, an example would be the welders from China working at current Eskom projects because the country lacks skill in these fields.

Table 4: Some of the opportunities of investing and developing infrastructure include, job creation, social development, economic efficiency and skills development as listed below.

Opportunity	Description
Job Creation	As in the example of Keynes mentioned above, infrastructure projects tend to be labour intensive and require both skilled and unskilled labour to implement them. The impact of jobs created through infrastructure projects tend to stimulate employment opportunities more during times of high unemployment, such as those being experienced in South Africa currently. The NGP says that infrastructure development has the potential to create 25,000 jobs by 2015. In the Ingula Pumped Storage Scheme, which is discussed in section 3.2.2, about 3,000 jobs were created at the height of construction.

Economic Efficiency	Infrastructure provides the backbone of any economy. This is particularly true for improvements in rail and pipelines. When managed, these types of transportation modes have the capacity of moving bulk goods in a cheaper way for society. They have the potential to reduce road traffic and thus also limiting damages done on road surfaces by heavy trucks. They limit the amount of carbon emissions in the environment. Multinational companies often look at the state of infrastructure before investing in a country.
Skills Development	With the construction of roads, power stations and dams, expertise is brought in from different countries or sectors. People that are employed in infrastructure projects gain work experience which they can then use in other employment opportunities or when starting up their own business.

2.3 Failures of Infrastructure Projects

Time Overruns

Logically, any delay in implementation in itself should cause cost overrun for the project. This should happen simply on account of inflation. In most cases, initial cost estimates are arrived at using the current input prices. If there are delays, inputs will become more expensive and, in turn, will cause an increase in the project cost. Moreover, certain overhead costs have to be met as long as the project remains incomplete. Delays should increase these costs also. Also, a long delay may cause depreciation of project assets, necessitating expenses on repairs or replacements. This means that in addition to the above factors, time overrun on account of any other factor is also an underlying cause for cost overruns.

Economic Factors

Each project is located in some state(s). Several departments of the concerned state government play a rather crucial role in project implementation. After all, activities like land acquisition, shifting of utilities, etc., are performed by the concerned state government. Moreover, economic and geographical features of the state may affect the project time and costs. For example, it is easier to execute projects in a state that has better transport, power and tele-communication infrastructure in place. Generally, richer states are said to possess superior infrastructure. The following chapter will be outlining the proposed method of research to be employed in this study including all assumptions, ethical considerations, data collections method, whilst also referring to other related research methods previously used in other studies.

The economic challenges that are faced by countries during this period of global economic uncertainty caused many of those countries to look internally for economic growth. History has shown that one of the most effective tools that can be used to promote growth internally is investment in infrastructure. Following the great depression example of the 1930s in the USA, a countercyclical approach by governments in the form of infrastructure investment has proven it can offset low economic growth. South Africa is no exception to this global economic uncertainty currently being experienced, as its economic performance correlates highly with global trends. Thus, as the country engages in infrastructure development projects, this will create employment and translate into the multiplier effect to other industries in the economy.

Once a construction project is completed it can leave long-term employment opportunities because the infrastructure requires maintenance and generally improves the efficiency of the market, facilitating long-term economic growth. The South African government has many ambitious and necessary infrastructure plans across all sectors of the economy and different levels of government. To address the infrastructure challenges that are faced by the country, the PICC was established. The PICC has identified 17 Strategic Integrated Projects for South Africa which it hopes will not only change the physical landscape of the country but also change the quality of life for all South Africans. South Africa's infrastructure is ranked highest amongst the BRICS nations, thus a foundation for spring boarding potential economic growth has already been laid. The tertiary sector invests the most in infrastructure development and is also the highest contributor to economic growth in the country.

Within the telecommunications industry, the public and private sectors are working together to improve access to this technology. There has been underinvestment in electricity in the country and by 2008, demand exceeded supply. This led Eskom to aggressively invest in electricity generation capacity, leading to some big infrastructure development projects such as the Ingula Pumped Storage Scheme, Kusile and Medupi power stations. In the transport sector, there are many sub-industries, with government agencies that assist or are responsible for the running of such industries. These include state owned enterprises such as Transnet and PRASA, whose capital projects are set to improve on their respective infrastructure asset base. There are still challenges that are faced particularly by the rail and seaport sector which has very high capital costs.

Infrastructure plans by the GPG for the near future include Gauteng Schools Programmes and the G-link project. Various metros have plans in place to build low cost housing, improvements and or construction of new libraries and local health facilities through their respective IDPs and infrastructure programmes. Of the metro municipal projects, one of the biggest is the development of the aerotropolis in Ekurhuleni. Despite the challenges faced by the country in infrastructure development, the GPG believes that pursuing down this road will benefit the

economy during these tough and uncertain economic times. The opportunities provide hope to both the unemployed, unskilled labour and entrepreneurs entering into the market.

Efficient, well planned and well managed infrastructure development projects are very essential and crucial for economic growth as they are not dragged beyond the envisaged completion and their realization dates whilst reducing cost overruns on projects thus creating opportunities for more infrastructure development projects. Market efficiency provided by good infrastructure creates an environment for further investment and incentivizes participation by the foreign investors and the private sector. Transnet also mandated with similar infrastructure development projects by the South African government must ensure efficiency of their project teams in planning and managing these projects.

2.4 Critical and essential findings from the literature review.

There is a correlation between the quality of planning and the success of the project at its conclusion, whilst planning and tracking projects with clarity and precision can assist organizations to respond with greater agility to the demands of a fast-changing business environment. It is found that planning is important, but proper planning alone cannot ensure project success i.e. project must be resourced properly, stakeholders must be involved at early stages of the project and project teams must be well informed of the processes. The impact of improving project plan may improve project management at the entire life cycle of the project. Once processes are performed correctly at the planning phase, it will be easier for the project manager to continue to manage the other project phases at the same level of quality, until the project's successful conclusion.

It is also found that Construction and engineering organizations maintain the highest quality of planning, both in the organization level and the project manager level. It is probably due to the project-oriented nature of these organizations. Its greatest weakness is risk management, which may stem from lack of managerial know-how.

The organizational support processes have a great influence on the quality of the processes performed by project managers and organizations that do not make enough effort to support its projects gets in return low-quality project plans whilst on the other hand, organisations that support projects effectively, obtain higher quality project plans from their project managers and projects success criteria should be agreed upon with the stakeholders at repeated points throughout the project.

A collaborative working relationship between the sponsor and project manager should be maintained. Empowered with flexibility to deal with unforeseen circumstances, the project manager should receive guidance

from the project sponsor and the sponsor should take an interest in the performance of the project. This approach suggests a shift of considerable responsibility for project success to the project owner.

Chapter 3 below presents the research design methods used in this study.

3 CHAPTER 3: THE RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this chapter is to outline the research method, plan and procedure which will be followed to respond to the research problem and questions. This chapter will be structured and will deal individually with the following topics:

- Research Design
- Research Philosophy/ Approach
- Research Methodological Choice
- Research Strategy
- Data Sourcing / Sampling
- Data collection techniques and Analysis
- Delineations
- Ethical considerations and Confidentiality

3.2 Research Design

A research design is a bridge between the research questions and the data as well as the tools and techniques used to analyse the data (Ritchie, 2013).

In order for the researcher to meet the objectives, the study employed both qualitative and quantitative research approaches whilst the collection of data was by means of a survey questionnaire. Collection of data took a long time and has been costly but I had to devise cost efficient means to collect data. Statistical methods of analysis were employed in analysing quantitative data, while notes and summary of participants' responses from interviews were used to analyse qualitative data. This is a similar method to the one that was employed by Rene Pillay (2006) in her study, *An Investigation into the Criteria for Project Success within Transnet*. The researcher interviewed and collated information from company employees such as Project Managers and Senior Managers using the survey questionnaires for both quantitative and qualitative data with an understanding and agreement that the information provided will only be used for the purpose of the study and cannot be shared with anyone else without prior agreement.

3.3 Research Philosophy

A research philosophy is a reflection of the researchers' assumptions based on the research strategy (Malins & Gray, 2013). To develop a philosophical approach to research, the researcher must come up with underlying assumptions on the nature of the population and the nature of the science under which the research falls, that is, either subjective or objective. However, there are other research philosophies although they are not as widely used as the ones above. These philosophies include pragmatic and participatory research philosophies (Malins & Gray, 2013). Social constructivist philosophy is founded on the premise that people make realism of the world through contact with other people (Creswell, 2013). This paradigm further argues that people develop particular understandings and meanings of their experiences through social cultural interactions. This paradigm is widely used in subjective studies, which are mostly qualitative. Positivist or post positivist paradigm advocates for deductive reasoning to support the existing theory (Creswell, 2013). A positivist philosophy is used for quantitative research. In this study, the researcher will adopt a positivist and interpretive research philosophy due to it being a methodical and subjective approach and that it is purely based on facts and that the researcher will receive human experience information thus enhancing/ assisting a suitable environment for a deductive approach.

3.4 Research Methodological Choice

For the purposes of this study the researcher adopted a deductive methodological approach because according to Babbie (2010), deductive approach involves having expected pattern, which is tested against observations. A deductive methodological approach is the best approach for answering quantitative research objectives and hypothesis. If the deduction is based on the true propositions, the researcher is assured of the truth of the conclusions (Creswell, 2013).

3.5 Research Strategy

To gain an in-depth understanding of the problem in question, the researcher used a mixed method approach (Quantitative and Qualitative) to explore the research objectives. Qualitative research is viewed as subjective and affected by personal bias while quantitative research is regarded as being scientific and objective (Creswell, 2013). To ensure reliability in qualitative research, it is advisable to draw as large sample as possible to ensure that the selected sample is representative of the entire population, otherwise, the research would be biased and non- objective. Since the study involves a collection of both primary and secondary data, a survey questionnaire

was seen as an appropriate tool to collect primary data whilst information from interviews will be collected as secondary data.

3.6 Data Sourcing / Sampling

It was intended to collect data from a target of 40 respondents who work within the Projects environment in the Transnet Group and also other stakeholders including Project Sponsors, Engineers and End Users across the Group whilst the selection of respondents for secondary data collection via interviews would be based on availability of the such individuals and their willingness to respond to the survey.

3.7 Data collection techniques and analysis

The researcher developed a research questionnaire based on the research problem and questions and collected data in two phases namely:

- Phase 1 involved undertaking a survey using a questionnaire for quantitative data (Primary) from internal sources i.e. Project team members, internal stakeholders etc. The results of quantitative data were measured within a 5-point Likert scale, and
- The second phase involved collecting qualitative data (secondary) through interviewing Project Team members within the Transnet projects environment using the same questionnaire as per the primary data.

A draft questionnaire was developed and the recorder were pre-tested / piloted with 10 participants, 5 of them filled the questionnaire whilst the other 5 were interviewed. These were senior managers (sponsors), managers, project managers, engineers as well as planners. The pilot presented the researcher with information to proceed with the finalisation of the questionnaire in order to continue with the main data sourcing.

The quantitative data collected was analysed using statistical tools, MS Excel and SPSS version 32. The collected data was subjected to different detailed and statistical analysis to help in making submissions that can address the objectives of this research whilst postulation testing was done at a significance level of $\alpha = 0.05$ which is widely accepted in science and business research (Ritchie, 2013). Descriptive analysis focuses on means, mode and frequencies whilst correlational analysis focuses on establishing a relationship between the study variables. Since this is a fact-finding research, it required data from human experience, which was provided by employees in Transnet's project teams.

The researcher prepared the questionnaires containing open ended as well as closed ended questions. The responses to these are presented in Chapter 4 (pages 81-84). The questionnaires were so designed as to elicit information on various aspects of the participants' involvement with the project management departments in Transnet. The questionnaire covered the following:

- Age of the respondent
- Educational background
- Length of experience in industry
- Understanding of Project Management principles and methodology
- Understanding of Project Management Knowledge Areas
- Knowledge and understanding of project budgeting/ Business cases
- General views about the industry
- Difficulties encountered in the project management space
- What should improve in the work or business
- Whether there are problems from the management relating to respondent's work, and
- The relationship between respondents and the project sponsors or other stakeholders in their environment

The questionnaires were sent through emails unless otherwise requested by the respondents and all respondents were provided a time frame of three weeks to respond adequately to the questions and provide the researcher with appropriate information so that a realistic evaluation of the problem can be made about the experiences of participants in the Transnet Project Management environment.

The selection of respondents was carefully made such that it ensured that all of them had characteristics which covered the design of the questionnaire in that they covered all demographics such as age, experience, education levels and hierarchy. It also ensured that the selection was also diversified and integrated with all participants playing a certain or different role in the project.

The following titles of respondents were considered and this was done in order to ensure credibility and reliability of the findings;

- Chief Engineers
- Contracts Managers
- Cost Engineers

- Document Controllers
- Project Engineers (Civil, Electrical, Structural etc.)
- Project Planners
- Principal Project Managers
- Programme Manager
- Project Administrators
- Project Managers
- Quantity Surveyors etc.

The questionnaire was presented and focused on the following questions or statement of facts:

1. Summary of Respondent's general profile - Here the focus was on the profiles of the participants i.e. their Age, their level of education and their Work Experience within the projects industry.

2. Project Team members' understanding of Project Management Principles, Methodologies and Knowledge Areas - Here the focus was to analyze the participant's understanding of the principles and methodologies and statistically show results in relation or addressing the following statement:

When the scopes of these projects are poorly planned, the results are mostly negative in that they are not delivered in planned time and have huge cost overruns.

3. Transnet Project management Processes - Here the researcher looked into the Project Management processes in Transnet Environment and the intention was to address the following statement and question:

Statement

Transnet Project Management processes are concise and clearly defined

Project Team members are well trained on the processes.

Ensuring adherence to processes is a function of only the Project Manager

Question

Can non-adherence to Management Processes increase risk of project failures?

4. Do Transnet Project Teams enjoy support from Senior Management/ Project Sponsors during project Initiation Phase in order to ensure clear objectives and effective planning? Here the researcher focused into whether project teams receive adequate support from Sponsors or Senior Management in Transnet and the intention was to address the following statements:

- Project goals and objectives are linked to Transnet MDS Strategy
- Project Sponsors provide adequate support and tools to project teams during Initiation Phase of every project.
- Transnet Management has an open-door policy on consultations with Project Teams during Scope planning for Initiation Phase
- Communication between Project Teams and Sponsors/ senior managers is a two-way process.
- Project scope and objectives are clearly defined

5. Identification of Key Project Stakeholders and their roles for scope planning during Initiation Phase in Transnet projects Summary – Here the researcher looked into the facts and or stats around identification of key stakeholders and their roles and intended to address the following statements:

- Key Stakeholders are identified during project Initiation Phase in all Transnet Infrastructure development projects
- Roles and responsibilities are clearly defined
- All Project team members are dedicated solely on projects
- A Statement of Works (SOW) is created to establish clear expectations among all project stakeholders.

Section 4.6: Scoping of project success – The Business Case Summary, where the investigation is to evaluate the level of scoping and business case development by addressing the following statements and question(s):

Statements

- All business cases include the expected savings or revenue increases that will occur/ are anticipated once the project is completed.
- The analysis of the high-level project risks happens at this stage.

- A high-level study of costs and schedule is undertaken at this stage
- The Project cost benefit analysis is calculated

Questions

- How would you rate the Business Case development process during the project Initiation Phase?
- Generally, how would you describe the project scope planning process during Initiation Phases of projects in Transnet?
- Would you suggest ways of improving/ enhancing Transnet's project teams' approach to scope planning during project Initiation Phases?

All responses received from participants were collated and tabulated. At the end of the three-week period all recipients of the questionnaire who had not responded were contacted to establish when they could respond taking into consideration the duration constraint of the study. A maximum of one-week extension was afforded to those respondents who needed more time and the evaluation and tabulation of data resumed thereafter. The researcher further identified 10 respondents for the purposes of interviewing them and explained to them the purposes of the study whilst emphasising the importance of the confidentiality of their responses and the researcher's adherence to ethical research principles. The answers to questions above were analysed in Chapter 4 on Page 81-83.

3.8 Delineations

It must be noted that even though the study is about Infrastructure Development Projects, it narrows down and only focuses on construction related projects within Transnet which are accessible to the researcher.

3.9 Ethical considerations and Confidentiality

It is important to adhere to research ethics when conducting any form of research and since this study involves collection of confidential information such as company information and other company strategies on managing projects, it was necessary to adhere to research principled standards and it is for the same reason that universities, government agencies and professional bodies emphasize adherence to clearly set out research ethics. The researcher guaranteed the respondents confidentiality of the information they shared before they gave it. The respondents were also assured that all data collected is and will always be used for academic purposes only and would not be shared with any unauthorized parties without written consents from

respondents and the data will further be destroyed once the study is completed to ensure none of it is accessible to other parties.

3.10 Summary

Chapter 3 discussed research methodology to be used to conduct this study and mixed method approach (Quantitative and Qualitative) was adopted. Questionnaires were disseminated to 30 respondents for quantitative feedback and 10 earmarked for interviews for qualitative feedback.

The following Chapter 4 analyses collected data and presents findings of the research study.

4 CHAPTER 4: FINDINGS

4.1 Introduction

This study investigated challenges encountered by project teams when planning project scope during the Project initiation Stages in Infrastructure development projects and aims to propose measures to address these challenges for initiation of future Infrastructure Development Projects in Transnet SOC LTD. The analysis of the data collected and findings below is the catalyst in proposing these measures.

This research focuses on project teams that are often confronted with challenges in planning the scope of Transnet SOC infrastructure development projects during Initiation Stages. The project scope is often revised or changed either because there are financial constraints, political interference, economic challenges faced by the government or administrative changes.

The following sections are discussed in accordance with the questionnaire used to solicit data from participants:

Section 4.1.2: Summary of Respondent's general profile

Here the focus is on the profiles of the participants i.e. their Age, their level of education and their Work Experience within the project's industry.

Section 4.1.3: Project Team members' understanding of Project Management Principles, Methodologies and Knowledge Areas

Here the focus is to analyse the participant's understanding of the principles and methodologies and statistically show results in relation or addressing the following statement:

When the scopes of these projects are poorly planned, the results are mostly negative in that they are not delivered in planned time and have huge cost overruns.

Section 4.1.4: Transnet Project management Processes Summary.

Here the researcher examined the Project Management processes in Transnet Environment with the intent to address the following statement made in the introduction of this report.

Furthermore, examine Section 4.1.5: Do Transnet Project Teams enjoy support from Senior Management/ Project Sponsors during project Initiation Phase in order ensure clear objectives and effective planning summary.

Highlights on Section 4.1.6: Identification of Key Project Stakeholders and their roles for scope planning during Initiation Phase in Transnet projects summary, which looks into the facts and or stats about identification of key stakeholders and their roles and,

Section 4.6: Scoping of project success – The Business Case Summary, where the investigation is to evaluate the level of scoping and business case development.

4.1.1 Specific objectives for the study are:

- To identify the challenges faced by project teams when planning the scope of infrastructure development projects at the Initiation phases.

To propose ways to mitigate the challenges encountered by Project Teams or to make recommendations on ways to improve the process of project scope planning during initiation phases in the organisation in order to consistently achieve successful projects delivery.

4.1.2 Section One: Frequency Table General Profile Information Summary

Table 5: General profile information

1. Gender * 2. Age in years Cross tabulation						
Count						
		2. Age in years				Total
		25 - 35	35 - 45	45 - 50	50 +	
1. Gender	Male	7	7	2	1	17
	Female	7	2	0	0	9
Total		14	9	2	1	26

The findings in Table 5 above show that there more males (65%) than female (35%) as illustrated above, where 17 males and 9 females participated in the study.

The results in Figure 3 below show the age group of the participants. Of the 26 valid cases who took part in the survey, 53.8% were between 25 to 35 years of age followed by 34.6% between 35 to 45 years. There were 7.7% of participants who were over 50+ years of age.

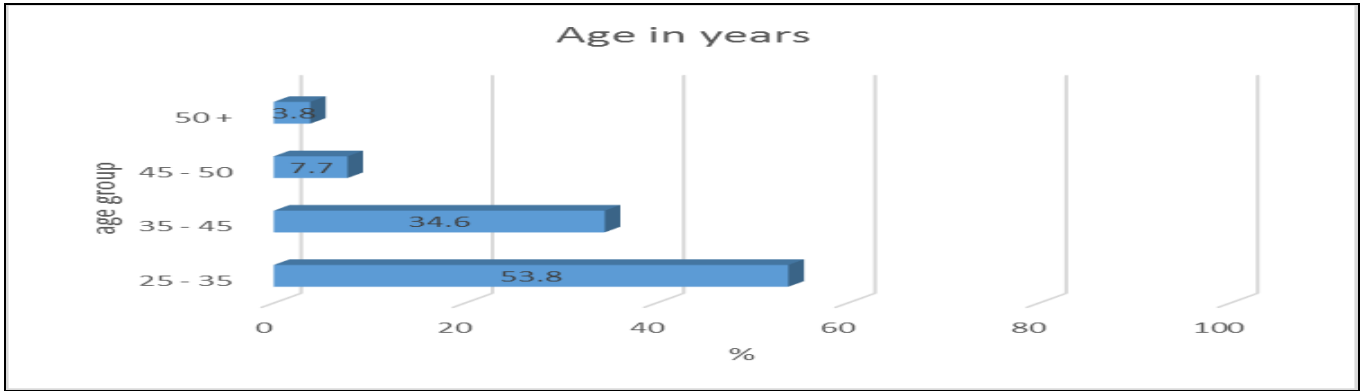


Figure 3: Age in years

Table 6: Spatial cross tables on education, gender and scope planning initiatives

1. Gender * 5.3. Would understanding of Project Management Principles and Methodologies assist in more effective scope planning during initiation stages of a project? * 3. What is your highest Level of education?
Cross tabulation.

3. What is your highest Level of education?			5.3. Would understanding of Project Management Principles and Methodologies assist in more effective scope planning during initiation stages of a project?		Total
			Yes	Total	
College	1. Gender	Male	Count	3	3
			% within 1. Gender	100.0%	100.0%
	Total		Count	3	3
			% within 1. Gender	100.0%	100.0%
University	1. Gender	Male	Count	14	14
			% within 1. Gender	100.0%	100.0%
	Female	Count	9	9	
		% within 1. Gender	100.0%	100.0%	

	Total		Count	23	23
			% within 1. Gender	100.0%	100.0%
Total	1. Gender	Male	Count	17	17
			% within 1. Gender	100.0%	100.0%
		Female	Count	9	9
			% within 1. Gender	100.0%	100.0%
	Total		Count	26	26
			% within 1. Gender	100.0%	100.0%

According to the findings in Table 6 above the researcher shows cross tabulation in participants for the question, *Would understanding of Project Management Principles and Methodologies assist in more effective scope planning during initiation stages of a project?* and when education is considered.

It also serves to provide perspective to the following statements:

Company Policy encourages development of project team members by providing required training courses and workshops in Project Management Principles and Methodology.

Project Team members are suitably and adequately qualified.

The findings in Table 7 below shows percentages from four categories on level of education, Secondary, College, University and Others. The Table shows the overwhelming majority 88.5% of participants had a university background. This was followed by 11.5% who had been to college, none who had either secondary or other qualifications.

Table 7: Highest Level of education

. What is your highest Level of education?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	College	3	9.1	11.5	11.5
	University	23	69.7	88.5	100.0
	Total	26	78.8	100.0	
Missing	System	7	21.2		
Total		33	100.0		

Table 8: Level of working experience in the Project Management environment

4. What is your level of working experience in the Project Management environment in Transnet and or Industry in general? (in Years)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 5 years	3	9.1	11.5	11.5
	5 - 10 years	10	30.3	38.5	50.0
	10 - 15 years	7	21.2	26.9	76.9
	15 - 20 years	4	12.1	15.4	92.3
	21 years and above	2	6.1	7.7	100.0
	Total	26	78.8	100.0	
Missing	System	7	21.2		
Total		33	100.0		

Table 8 above present the number of respondents with 0 - 5 years (11.5%), 5 - 10 years (38.5%), 10 - 15 years (26.9%), 15 - 20 years (15.4%), and 21 years and above (7.7%) of *working experience in the Project Management environment in Transnet and or Industry in general*. Findings show that 26 valid cases were recorded.

Table 9: Company policy encourages development of project team members

5.1 Company Policy encourages development of project team members by providing required training courses and workshops in Project Management Principles and Methodology.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	6.1	7.7	7.7
	Neutral	13	39.4	50.0	57.7
	Agree	10	30.3	38.5	96.2
	Strongly Agree	1	3.0	3.8	100.0
	Total	26	78.8	100.0	
Missing	System	7	21.2		
Total		33	100.0		

The findings in Table 9 above illustrate that 50.0% remain neutral, 39% agree and 8% disagree on company policy encourages development of project team members by providing required training courses and workshops in Project Management Principles and Methodology from 26 valid cases.

Table 10: Project Team members are suitably and adequately qualified

5.2. Project Team members are suitably and adequately qualified.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	12.1	15.4	15.4
	Neutral	9	27.3	34.6	50.0
	Agree	12	36.4	46.2	96.2
	Strongly Agree	1	3.0	3.8	100.0
	Total	26	78.8	100.0	
Missing	System	7	21.2		
Total		33	100.0		

Findings in Table 10 above show that 50% of participants agree that *Project team members are suitable qualified*, 35% are neutral whilst only 15% disagree

Table 11: Understanding of project management principles and methodology

5.3. Would understanding of Project Management Principles and Methodologies assist in more effective scope planning during initiation stages of a project?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	78.8	100.0	100.0
Missing	System	7	21.2		
Total		33	100.0		

The findings in Table 11 above show and illustrate that, participants understand project management principles and methodologies especially on how it assists in more effective scope planning during initiation stages of a project. All of the 26 participants agreed they understand project management principles and its methodologies.

Table 12: Transnet Project Management Processes.

6.1. Transnet Project Management processes are concise and clearly defined					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	6.1	8.0	8.0
	Neutral	12	36.4	48.0	56.0
	Agree	10	30.3	40.0	96.0
	Strongly Agree	1	3.0	4.0	100.0
	Total	25	75.8	100.0	
Missing	System	8	24.2		
Total		33	100.0		

Table 12 above shows that from a total number of 25 valid cases a significant number 48% is neutral to the statement *Transnet Project Management Processes are concise and clearly defined* whilst 44% agrees and a mere 8% disagrees. This may suggest that there are certain areas of the processes which may be unclear to project teams whilst it may also mean that there is some work needed to be done to clarify or streamline these processes.

Table 13: Project team members training on Process

6.2. Project Team members are well trained on process					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	3.0	4.0	4.0
	Disagree	4	12.1	16.0	20.0
	Neutral	10	30.3	40.0	60.0
	Agree	10	30.3	40.0	100.0
	Total	25	75.8	100.0	
Missing	System	8	24.2		
Total		33	100.0		

Table 13 above shows that Project Team members are well trained on process. The table shows that 80% of respondents agree with the statement or are neutral. Whilst those that are neutral may not necessarily be viewed as agreeing or disagreeing, they may not be in a position to give an opinion on the basis that they are unsure or

there are other factors which contributes to them being neutral and therefore it would help to find their reasoning behind the neutrality.

Table 14: Rating project process effectiveness for scope planning

8. Please rate Project Process effectiveness for scope planning in Transnet during Project Initiation Phase					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	1	3.0	3.8	3.8
	Good	11	33.3	42.3	46.2
	Fair	8	24.2	30.8	76.9
	Poor	6	18.2	23.1	100.0
	Total	26	78.8	100.0	
Missing	System	7	21.2		
Total		33	100.0		

According to the findings in Table 14 above, participants were requested to rate *Project Process effectiveness for scope planning in Transnet during Project Initiation Phase*. The results of the ratings are shown in the chart below and are based on the cross tabulation per Table 15 above. The highest ranking of the valid cases is 42,3% and shows the rating Good followed by Fair at 30,8% whilst only 23,1% rated as Poor and 3,8% rated as Excellent. This results is an indication that most participants agree that the Project Process is somewhat effective during initiation stages of the project. The result is also illustrated by the graph below.

Rating: Excellent Good Fair Poor

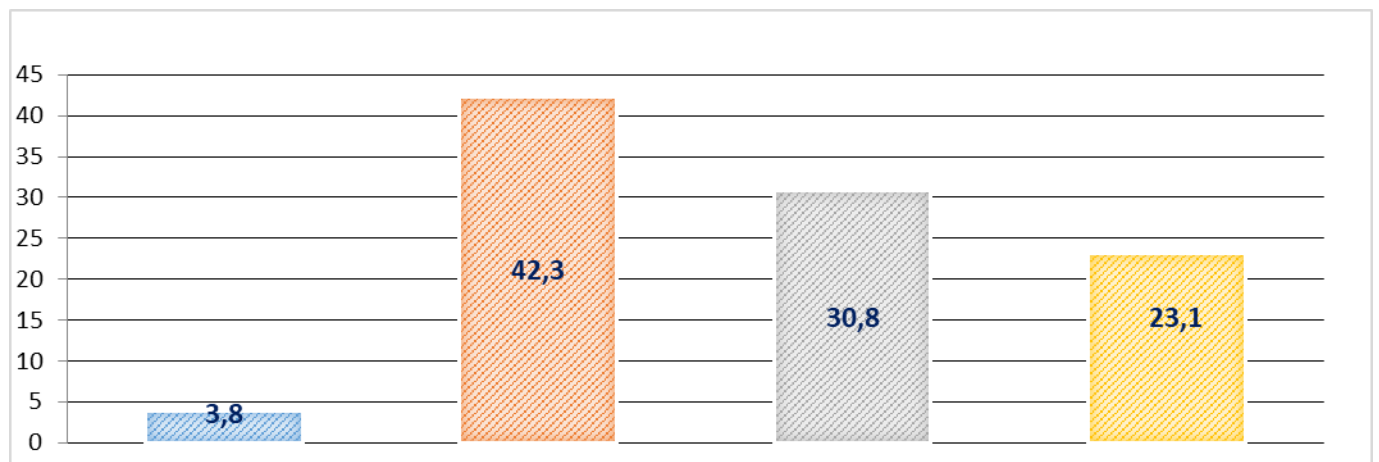


Figure 4: Project Process Ratings

4.1.3 Section Two: Project Team members’ understanding of Project Management Principles, Methodologies and Knowledge Areas Summary.

Table 15: Project team members’ understanding of project management principles

Crosstab								
4. What is your level of working experience in the Project Management environment in Transnet and or Industry in general? (in Years)				5.1 Company Policy encourages development of project team members by providing required training courses and workshops in Project Management Principles and Methodology.				Total
				Disagree	Neutral	Agree	Strongly Agree	
0 - 5 years	2. Age in years	25 - 35	Count		2	1		3
			% within 2. Age in years		66.7%	33.3%		100.0%
	Total		Count		2	1		3
			% within 2. Age in years		66.7%	33.3%		100.0%
5 - 10 years	2. Age in years	25 - 35	Count	1	4	1	0	6
			% within 2. Age in years	16.7%	66.7%	16.7%	0.0%	100.0%
	35 - 45	Count	1	0	2	1	4	
		% within 2. Age in years	25.0%	0.0%	50.0%	25.0%	100.0%	
	Total		Count	2	4	3	1	10
			% within 2. Age in years	20.0%	40.0%	30.0%	10.0%	100.0%
10 - - 15 years	2. Age in years	25 - 35	Count		3	1		4
			% within 2. Age in years		75.0%	25.0%		100.0%

		35 - 45	Count		1	2		3
			% within 2. Age in years		33.3%	66.7%		100.0%
	Total		Count		4	3		7
			% within 2. Age in years		57.1%	42.9%		100.0%
15 - 20 years	2. Age in years	35 - 45	Count		1	1		2
			% within 2. Age in years		50.0%	50.0%		100.0%
		45 - 50	Count		0	1		1
			% within 2. Age in years		0.0%	100.0%		100.0%
		50 +	Count		0	1		1
			% within 2. Age in years		0.0%	100.0%		100.0%
	Total		Count		1	3		4
			% within 2. Age in years		25.0%	75.0%		100.0%
21 years and above	2. Age in years	25 - 35	Count		1			1
			% within 2. Age in years		100.0%			100.0%
		45 - 50	Count		1			1
			% within 2. Age in years		100.0%			100.0%
	Total		Count		2			2
			% within 2. Age in years		100.0%			100.0%
Total	2. Age in years	25 - 35	Count	1	10	3	0	14
			% within 2. Age in years	7.1%	71.4%	21.4%	0.0%	100.0%
		35 - 45	Count	1	2	5	1	9

		% within 2. Age in years	11.1%	22.2%	55.6%	11.1%	100.0%
	45 - 50	Count	0	1	1	0	2
		% within 2. Age in years	0.0%	50.0%	50.0%	0.0%	100.0%
	50 +	Count	0	0	1	0	1
		% within 2. Age in years	0.0%	0.0%	100.0%	0.0%	100.0%
	Total	Count	2	13	10	1	26
		% within 2. Age in years	7.7%	50.0%	38.5%	3.8%	100.0%

4.1.4 Section Three: Transnet Project management Processes Summary

The results above on Table 15 and below analysis explain the examined 25 valid cases for a statement Company Policy encourages development of project team members by providing required training courses and workshops in Project Management Principles as follows:

A majority (67%) of the participants with 5-10 years of working experience in the category of 25-35 years of age also remained neutral whilst an equal number of Participants (17%) of each agree and disagrees respectively. 75% of the ages 35-45 with 5-10 years working experience agree whilst 25% disagree. This means 40% of participants with 5-10 years of experience agree, 40% is neutral and only 20% disagree.

75% of those participants with 10-15 years of working experience in the age category of 25-35 years of age remains neutral with the statement and 25% agree whilst 67% of participants aged 35-45 years in the same work experience bracket agree, 33% remain neutral and none disagree. A total of 57% in the experience bracket of 10-15 years of work experience are neutral whilst 43% agree and none disagree.

At a category of 35-45 years of age with 15-20 years of working experience, 50% of the participants were neutral and 50% agreed whilst category of 45-50 years and 50+ years agreed unanimously (100%). The total of all ages with 21+ years' experience agreed unanimously (100%) with the statement.

From the above analysis it can be noted that a majority of participants in lower ages and experience remained neutral whilst others in mid ages agree and those in higher ages agreed unanimously. This may be attributed to experience or an inflow of new team members coming into the organisation with new ideas whilst on the other hand it might be that there is a working formula in the environment which the experienced teams have been using and are reluctant to change.

4.2 Transnet Project Management processes are concise and clearly defined * 2. Age in years

Table 16: Transnet project management processes matrix

Crosstab						
Count						
		2. Age in years				Total
		25 - 35	35 - 45	45 - 50	50 +	
6.1. Transnet Project Management processes are concise and clearly defined	Disagree	2	0	0	0	2
	Neutral	9	2	1	0	12
	Agree	3	5	1	1	10
	Strongly Agree	0	1	0	0	1
Total		14	8	2	1	25

The findings in Table 16 above shows age category of those who were participants in the survey on statement; *Transnet Project Management processes are concise and clearly defined* and how they compare in terms of their age. Out of 25 valid cases a majority (12) is neutral whilst 11 agree and 2 disagree.

4.2.1 Project Team members are well trained on process * 2. Age in years

Table 17: Project Team members are well trained on process matrix

Crosstab						
Count						
		2. Age in years				
		25 - 35	35 - 45	45 - 50	50 +	
6.2. Project Team members are well trained on process	Strongly Disagree	0	1	0	0	
	Disagree	4	0	0	0	

	Neutral	5	4	1	0
	Agree	5	3	1	1
Total		14	8	2	1

Table 17 above shows age category of those who were on *Project Team members are well trained on process* in years of selected participants.

Table 18: Project Team members are well trained on process scale

Crosstab		
Count		
		Total
6.2. Project Team members are well trained on process	Strongly Disagree	1
	Disagree	4
	Neutral	10
	Agree	10
Total		25

The findings on Table 18 above shows that out of 14 Participants at age category 25-35, only 5 agree and 4 disagree whilst the remainder of 5 is neutral. At age category 35-45, out of 8 participants, those who agrees are tied with those who are neutral at 4 each respectively whilst at the category of 45-50+ with 3 participants, 2 agree and one is neutral. These findings which are mostly dominated by a combination of those who are neutral and disagree, suggest a need for further investigation of the reasons for the high level of disagreements or neutral stand and how the situation could be improved.

4.3 The roles and responsibilities are clearly defined

* 2. Age in years

Table 19: The roles and responsibilities matrix

Crosstab					
Count					
		2. Age in years			
		25 - 35	35 - 45	45 - 50	50 +
6.3. The roles and responsibilities are clearly defined	Strongly Disagree	0	1	0	0
	Disagree	2	0	0	0
	Neutral	7	5	2	0
	Agree	5	2	0	1
Total		14	8	2	1

The findings in Table 19, above, shows age category of those who were on *the roles and responsibilities are clearly defined* in years of selected participants.

Table 20: The roles and responsibilities are clearly defined scale

Crosstab		
Count		
		Total
6.3. The roles and responsibilities are clearly defined	Strongly Disagree	1
	Disagree	2
	Neutral	14
	Agree	8
Total		25

The findings in Table 20 above show that a majority (14) were neutral with the statement of *the roles and responsibilities are clearly defined* whilst only 8 agree and 3 disagree. This clearly shows that a need is there for a thorough investigation into the category of those that are neutral in order to establish the reasons for their

neutrality which may be attributed to a lot of factors which may not be speculated nor assumed but rather investigated further in order to find a solution to whatever the reason and that may improve this result.

4.3.1 Ensuring adherence to processes is a function of only the Project Manager

* 2. Age in years

Table 21: Ensuring adherence to processes

Crosstab					
Count					
		2. Age in years			
		25 - 35	35 - 45	45 - 50	50 +
6.4. Ensuring adherence to processes is a function of only the Project Manager	Strongly Disagree	1	3	0	0
	Disagree	7	3	2	1
	Neutral	3	1	0	0
	Agree	3	1	0	0
Total		14	8	2	1

The findings in Table 21, above, shows age category of those who were agreed *ensuring adherence to processes is a function of only the Project Manager* in years of selected participants. The majority (8) out of 14 valid responses disagree with the statement and are between the ages of 25-35 whilst age category 35-45 is (6) out of 8 valid responses, (2) for 45-50 category and (1) for 50+ category.

The findings in Table 21 above shows that a majority of participants (13) in 25 valid responses disagrees with the statement *ensuring adherence to processes is a function of only the Project Manager* whilst 12 are split at 4 each amongst neutral, agree and strongly agree. This therefore emphasizes a need or requires that a solution which will influence those who agree to disagree and those who are neutral be found in order that their reasoning be analysed and clarified.

4.3.2 Non-adherence to Project Management Processes.

2. Age

Table 22: Cross tabulation for non-adherence to Project Management Processes by age.

Crosstab						
Count						
		2. Age in years				Total
		25 - 35	35 - 45	45 - 50	50 +	
6.5. Can non-adherence to Project Management Processes increase risk for project failures?	Yes	14	9	2	1	26
Total		14	9	2	1	26

The findings in Table 22 above shows age category of those who participated in *Can non-adherence to Project Management Processes increase risk for project failures?* And how they compared in years of age. Out of 26 valid cases, 100% agrees that non-adherence to Project Management Processes increases risk for project failures.

Table 23: Understanding of Project Management Principles and Methodology vs Age in Years vs Level of education

3. What is your highest Level of education* 5.3. Would understanding of Project Management Principles and Methodologies assist in more effective scope planning during initiation stages of a project? * 2. Age in years					
				5.3. Would understanding of Project Management Principles and Methodologies assist in more effective scope planning during initiation stages of a project?	Total
				Yes	
2. Age in years	3. What is your	University	Count	14	14

25 - 35	highest Level of education?		% within 3. What is your highest Level of education?	100.0%	100.0%
	Total		Count	14	14
			% within 3. What is your highest Level of education?	100.0%	100.0%
35 - 45	3. What is your highest Level of education?	College	Count	2	2
			% within 3. What is your highest Level of education?	100.0%	100.0%
		University	Count	7	7
			% within 3. What is your highest Level of education?	100.0%	100.0%
	Total		Count	9	9
			% within 3. What is your highest Level of education?	100.0%	100.0%
45 - 50	3. What is your highest Level of education?	College	Count	1	1
			% within 3. What is your highest Level of education?	100.0%	100.0%
		University	Count	1	1
			% within 3. What is your highest Level of education?	100.0%	100.0%
	Total		Count	2	2
			% within 3. What is your highest Level of education?	100.0%	100.0%
	3. What is your	University	Count	1	1

50 +	highest Level of education?		% within 3. What is your highest Level of education?	100.0%	100.0%
	Total		Count	1	1
			% within 3. What is your highest Level of education?	100.0%	100.0%
Total	3. What is your highest Level of education?	College	Count	3	3
			% within 3. What is your highest Level of education?	100.0%	100.0%
		University	Count	23	23
			% within 3. What is your highest Level of education?	100.0%	100.0%
	Total		Count	26	26
			% within 3. What is your highest Level of education?	100.0%	100.0%

The findings in Table 23 above show that a majority from 26 valid cases, 100% unanimously agreed with the statement, *would understanding of Project Management Principles and Methodologies assist in more effective scope planning during initiation stages of a project*. The selected participants above were examined on spatial age group and their highest level of education.

Table 24: Spatial cross tables on education, age and project risk

				6.5. Can non-adherence to Project Management Processes increase risk for project failures?	
2. Age in years				Yes	Total
25 - 35	3. What is your highest Level of education?	University	Count	14	14
			% within 3. What is your highest Level of education?	100.0%	100.0%
	Total		Count	14	14
			% within 3. What is your highest Level of education?	100.0%	100.0%
35 - 45	3. What is your highest Level of education?	College	Count	2	2
			% within 3. What is your highest Level of education?	100.0%	100.0%
		University	Count	7	7
			% within 3. What is your highest Level of education?	100.0%	100.0%
	Total		Count	9	9
			% within 3. What is your highest Level of education?	100.0%	100.0%
45 - 50	3. What is your highest Level of education?	College	Count	1	1
			% within 3. What is your highest Level of education?	100.0%	100.0%
	University	Count	1	1	

			% within 3. What is your highest Level of education?	100.0%	100.0%
	Total		Count	2	2
			% within 3. What is your highest Level of education?	100.0%	100.0%
50 +	3. What is your highest Level of education?	University	Count	1	1
			% within 3. What is your highest Level of education?	100.0%	100.0%
	Total		Count	1	1
			% within 3. What is your highest Level of education?	100.0%	100.0%
Total	3. What is your highest Level of education?	College	Count	3	3
			% within 3. What is your highest Level of education?	100.0%	100.0%
	University	Count	23	23	
		% within 3. What is your highest Level of education?	100.0%	100.0%	
	Total		Count	26	26
			% within 3. What is your highest Level of education?	100.0%	100.0%

The findings in Table 24 above show that a majority from the selected sample of 26, 100% unanimously agreed that non-adherence to Project Management Processes does increase risk of Project failures in the organization. The selected participants above were examined on spatial age group, highest level of education.

4.3.3 Section Four: Do Transnet Project Teams enjoy support from Senior Management/ Project Sponsors during project Initiation Phase in order ensure clear objectives and effective planning?

Table 25: Spatial cross tables on gender, age and Transnet Strategy

Crosstab									
1. Gender				7.1. Project goals and objectives are linked to Transnet MDS Strategy					Total
				Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Male	2. Age in years	25 - 35	Count	0	0	3	4	0	7
			% within 2. Age in years	0.0%	0.0%	42.9%	57.1%	0.0%	100.0%
		35 - 45	Count	1	1	1	3	1	7
			% within 2. Age in years	14.3%	14.3%	14.3%	42.9%	14.3%	100.0%
		45 - 50	Count	0	0	1	1	0	2
			% within 2. Age in years	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
		50 +	Count	0	0	1	0	0	1
			% within 2. Age in years	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	Total	Count	1	1	6	8	1	17	
		% within 2. Age in years	5.9%	5.9%	35.2%	47.1%	5.9%	100.0%	
Female	2. Age in years	25 - 35	Count		1	2	4		7
			% within 2. Age in years		14.3%	28.6%	57.1%		100.0%
		35-45	Count		0	0	2		2
			% within 2. Age in years		0.0%	0.0%	100.0%		100.0%

		Total		Count	1	2	6	9	
				% within 2. Age in years	11.1%	22.2%	66.7%	100.0%	
Total	2. Age in years	25 - 35	Count	0	1	5	8	0	14
			% within 2. Age in years	0.0%	7.2%	35.7%	57.1%	0.0%	100.0%
	35 - 45	Count	1	1	1	5	1	9	
		% within 2. Age in years	11.1%	11.1%	11.1%	55.6%	11.1%	100.0%	
	45 - 50	Count	0	0	1	1	0	2	
		% within 2. Age in years	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%	
	50 +	Count	0	0	1	0	0	1	
		% within 2. Age in years	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	
	Total		Count	1	2	8	14	1	26
			% within 2. Age in years	3.8%	7.7%	30.8%	53.8%	3.8%	100.0%

Analysis -Table 25

Males

Age category 22-25 – in response to the question “Do project teams enjoy support from Senior Management during project initiation phase in order to ensure clear objectives and effective planning?” About 57% of the 7 participants in this age category agree that Project goals and objectives are linked to MDS Strategy whilst about 43% are neutral about it and none disagree.

Age category 35-45 – a majority of the 7 participants 57% agree with the statement, 28% disagree whilst only 14% is neutral about it.

Age category 45-50 – the two participants in this category shared their responses equally with 1 agreeing whilst the other is neutral.

Age category 50+ – the 1 participant in this category was neutral about the statement.

From the total of 17 participants in the male category about 53% (9) agree with the statement that Project goals and objectives are linked to the MDS Strategy, 35,2% (6) are neutral whilst 11,8% (2) disagree with the statement.

Females

Age category 25-35 – 57% of the 7 participants in this category agree with the statement whilst 28,6% is neutral and 14,3% disagree.

Age category 35-45 – 100% of the 2 participants unanimously agree with the statement.

A total count of 9 female participants (all age categories) presents that 66,7% agree with the statement whilst 22,2% (2) is neutral and only 11,1% (1) of the participants disagreed.

All Participants (Male & Female)

Age 25-35 – 57,1% of 14 participants agree, 35,7% is neutral whilst only 7,2% disagreed with the statement.

Age 35-45 – 66,7% of 9 participants agree, 22,2% disagreed whilst 11,1% remained neutral.

Age category 50+ - 100% (1) of the participant was neutral.

The findings in Table 25 above show that of the 26 participants, a majority of 57,6% (15) agree with the statement whilst only 11,5% (3) disagreed and 30,8% (8) remained neutral about the statement. From the results we can deduce that although the majority of valid cases agreed to qualify the statement, there is equally a good number of those disagreeing and those who are neutral and therefore there may be more to be done to align these with the group which agrees. The valid cases above were examined on spatial gender and age group.

4.3.4 Section Five: Identification of Key Project Stakeholders and their roles for scope planning during Initiation Phase in Transnet projects Summary.

Table 26: Spatial cross tables on gender, age and project initiation phase

Crosstab									
1. Gender			9.1. Key Stakeholders are identified during project Initiation Phase in all Transnet Infrastructure Development Projects					Total	
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
Male	2. Age in years	25 - 35	Count		1	2	4	0	7
			% within 2. Age in years		14.3%	28.6%	57.1%	0.0%	100.0%
		35 - 45	Count		2	1	4	0	7
			% within 2. Age in years		28.6%	14.3%	57.1%	0.0%	100.0%
		45 - 50	Count		0	0	2	0	2
			% within 2. Age in years		0.0%	0.0%	100.0%	0.0%	100.0%
		50 +	Count		0	0	0	1	1
			% within 2. Age in years		0.0%	0.0%	0.0%	100.0%	100.0%
		Total	Count		3	3	10	1	17
			% within 2. Age in years		17.6%	17.6%	58.8%	5.9%	100.0%
Female	2. Age in years	25 - 35	Count	1	1	5		7	
			% within 2. Age in years	14.3%	14.3%	71.4%		100.0%	
		35 - 45	Count	0	1	1		2	
			% within 2. Age in years	0.0%	50.0%	50.0%		100.0%	
		Total	Count	1	2	6		9	

		% within 2. Age in years	11.1%	22.2%	66.7%			100.0%	
Total	2. Age in years	25 - 35	Count	1	2	7	4	0	14
			% within 2. Age in years	7.1%	14.3%	50.0%	28.6%	0.0%	100.0%
		35 - 45	Count	0	3	2	4	0	9
			% within 2. Age in years	0.0%	33.3%	22.2%	44.4%	0.0%	100.0%
		45 - 50	Count	0	0	0	2	0	2
			% within 2. Age in years	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
		50 +	Count	0	0	0	0	1	1
			% within 2. Age in years	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
	Total	Count	1	5	9	10	1	26	
		% within 2. Age in years	3.8%	19.2%	34.6%	38.6%	3.8%	100.0%	

The findings in Table 26 above show that of the 26 participants a majority from the selected sample, 42,3% agree that key project stakeholders and their roles for scope planning are identified during initiation phase in Transnet projects, 34,6% are neutral whilst only 23% disagreed. The valid cases above were examined on spatial gender and age category. The perform similar treatment to the following case statements below and noted the same spatial significant on roles and responsibilities are clearly defined, all Project team members are dedicated solely on projects and also on a Statement of Works (SOW) as it is created to establish clear expectations among all project stakeholders.

Table 27: Rating overall process for stakeholder identification and role definition

10. Please rate overall process for stakeholder identification and role definition in scope planning during initiation phase in Transnet Projects.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	1	3.0	3.8	3.8
	God	5	15.2	19.2	23.1

	Fair	10	30.3	38.5	61.5
	Poor	10	30.3	38.5	100.0
	Total	26	78.8	100.0	
Missing	System	7	21.2		
Total		33	100.0		

The finding in Table 27 above rate the overall process for stakeholder identification and role definition in scope planning during initiation phase in Transnet Projects. The findings which translate to rating overall process and are illustrated below:

Excellent Good Fair Poor

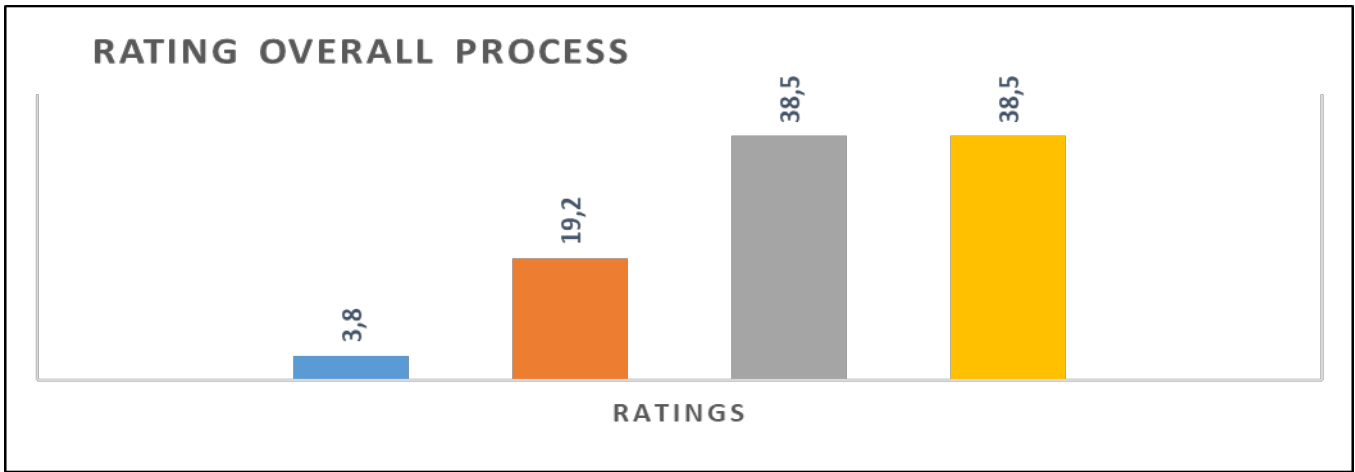


Figure 5: Rate overall process

The findings in Figure 5 above show the cross tabulation illustrated above by rating Project Process effectiveness for scope planning in Transnet during Project Initiation Phase and following the responses when rating overall process indicate 3.8% excellent, 19.2% good, 38.5% fair and 38.5% poor from the selected sample of 26 participants.

4.3.5 Section Six: Scoping of project success – The Business Case

Table 28: Key Stakeholders are identified during project initiation phase

3. What is your highest Level of education? * 9.1. Key Stakeholders are identified during project Initiation Phase in all Transnet Infrastructure Development Projects * 2. Age in years Cross tabulation									
2. Age in years				9.1. Key Stakeholders are identified during project Initiation Phase in all Transnet Infrastructure Development Projects					Total
				Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
25 - 35	3. What is your highest Level of education?	University	Count	1	2	7	4		14
			% within 3. Level of education?	7.1%	14.3%	50.0%	28.6%		100.0%
	Total		Count	1	2	7	4		14
			% within 3. Level of education?	7.1%	14.3%	50.0%	28.6%		100.0%
35 - 45	3. What is your highest Level of education?	College	Count		0	0	2		2
			% within 3. Level of education?		0.0%	0.0%	100.0%		100.0%
		University	Count		3	2	2		7
			% within 3. Level of education?		42.9%	28.6%	28.6%		100.0%
	Total		Count		3	2	4		9
			% within 3. Level of education?		33.3%	22.2%	44.4%		100.0%
45 - 50	3. What is your highest Level of education?	College	Count				1		1
			% within 3. Level of education?				100.0%		100.0%
		University	Count				1		1
			% within 3. Level of education?				100.0%		100.0%
	Total		Count				2		2
			% within 3. Level of education?				100.0%		100.0%

			% within 3. Level of education?				100.0%		100.0%
50 +	3. What is your highest Level of education?	University	Count					1	1
			% within 3. Level of education?					100.0%	100.0%
	Total		Count					1	1
			% within 3. Level of education?					100.0%	100.0%
Total	3. What is your highest Level of education?	College	Count	0	0	0	3	0	3
			% within 3. Level of education?	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
		University	Count	1	5	9	7	1	23
			% within 3. Level of education?	4.3%	21.7%	39.1%	30.4%	4.3%	100.0%
	Total		Count	1	5	9	10	1	26
			% within 3. Level of education?	3.8%	19.2%	34.6%	38.5%	3.8%	100.0%

The findings from table 28 above indicate on highest Level of education * *key stakeholders are identified during project initiation phase in all Transnet Infrastructure Development Projects* * and record age of participants in years. The cross table above illustrates that a majority from the selected sample unanimously (100%) understood Project Management Principles and Methodologies, which assist in more effective scope planning during initiation stages of a project. The results above illustrate that 23.0% disagree and 42.3% agreed whereas 34.6% remain neutral that key stakeholders are identified during project Initiation Phase in all Transnet Infrastructure Development Projects.

4.4 Summary of quantitative data findings

The first objective of this dissertation was to investigate and identify challenges faced by Project Teams when planning the scope of Infrastructure development projects during initiation stages.

The findings were:

Half of respondents remain neutral on company policy that encourages development of project team members by providing required training courses and workshops in Project Management Principles and Methodology.

The majority of participants agree that Project team members are suitable and adequately qualified.

All (100%) of the participants agree that they understand project management principles and its methodologies, especially on how it assists in more effective scope planning during initiation stages of a project.

Transnet Project Management processes is concise and clearly defined.

Project Team members are well trained on process

Majority from the selected sample were agreeing that key project stakeholders and their roles for scope planning are identified during initiation phase in Transnet projects.

The overall process for Stakeholder Identification is poor but can improve.

Majority agree that project goals and objectives are linked to Transnet MDS Strategy

4.4.1 Other interesting key findings are indicated below;

- All business cases include the expected savings or revenue increases that will occur/ are anticipated once project is completed,
- The analysis of the high level project risks happens at this stage,
- A high level study of costs and schedule is undertaken at this stage, and
- The Project cost benefit analysis is calculated.

4.5 Qualitative data presentation and analysis

This study used quantitative and qualitative methods to collect and analyse data. The previous section presented the discussion and findings of the quantitative data whilst this section focuses on presenting data of a qualitative nature obtained from the interviews with the different participants who form part of project teams i.e. Project Managers, Cost engineers, Document Controllers etc. The following questions were posed to participants in line with the questionnaires distributed with a view to collecting the quantitative data presented in above Section 4.1;

4.5.1 Question 1: Would Understanding of PM Principles & Methodologies assist in more effective scope planning during initiation stages of a project?

Participant 1: An environment like that of Transnet which has a lot of stakeholders who are either external or internal require that processes be followed at all times to achieve success in projects.

Participant 2: Project management processes guide and protect project teams against deviation from Company policies.

Participant 3 and 4: Clear understanding and application of PM Methodologies will lead to effective project initiation process.

From the above statements by Participants, it is clear that the participants are working in a projects environment and that they have some experiences and understanding of Project management and its methodologies.

4.5.2 Question 2: Can non-adherence to PM processes increase risk of project failures?

Participant 1: Non-adherence to any process poses a risk to desired outcomes.

Participant 2: Failure to adhere to processes is a major cause of project failures at Transnet and it is a serious offence in the organization to not follow processes and therefore all project team members are required to adhere to processes.

Participant 3: Majority of failed projects are as a result of lack of or non-adherence to Project Management processes.

Participant 4: It causes deviations to project scope and may cause non-achievement of project objectives.

The four participants above unanimously agreed that non-adherence to Project Management Processes does increase risk of Project failures in the organization.

4.5.3 Question 3: Generally, how would you describe the Project Scope planning process during Initiation Phases of Projects in Transnet?

Participant 1: It is very long and red taped with no real powers given to the project manager to lead it.

Participant 2: Organised and involved but there is still room for improvement.

Participant 3: It is a developing process with more positives than negatives and in time it will be well received.

Participant 4: Tedious and needs to be improved for efficiency.

From the above, two participants feel the Project Scope planning process in Transnet is very tedious, red taped, non-efficient and the Project Manager has none or little authority to lead the process whilst the other two participants feel that the process is organized but still developing and will improve in time for the better.

4.5.4 Question 4: How would you rate the Business Case development process in Transnet during the Project Initiation Phase?

(Excellent, Very Good, Good, Fair, Bad or Very Bad)

Participant 1: Excellent

Participant 2: Very Good

Participant 3: Very Good

Participant 4: Bad

It is clear from the majority of participant's responses above that the business case development process in Transnet is very good although one of the participants suggests that it is bad. It is therefore important to note that 75% of the participants are in agreement the process is very good and they are a majority hence the researcher also concludes that the process is very good.

Question 5: Would you suggest ways of improving/ enhancing Transnet's project teams approach to scope planning during initiation phases of Projects?

Participant 1: Train project team members in accordance with industry norms and dedicate enough resources for projects only.

Participant 2: Transnet should invest in training of more project resources.

Participant 3: Involve all stakeholders in the process from the beginning of the process.

Participant 4: Stakeholder / Sponsor involvement very key to improvement of Transnet project team's capability to plan and execute project scopes.

There is a strong view from the two participants above that there is a need to provide more training to Project Team members on processes, methodologies etc. in order to improve their approach to the scope planning process during initiation phases of the project. There is also a view from the other two participants that all project Stakeholders should be involved from the beginning through the process.

4.6 Summary of qualitative data findings

From the above statements by Participants, it is clear that the participants are working in a projects environment and that they have some experiences and understanding of Project management and its methodologies,

The four participants above unanimously agreed that non-adherence to Project Management Processes does increase risk of Project failures in the organization,

From the above, two participants feel the Project Scope planning process in Transnet is very tedious, red taped, non-efficient and the Project Manager has none or little authority to lead the process whilst the other two participants feel that the process is organized but still developing and will improve in time for the better,

It is clear from the majority of participant's responses above that the business case development process in Transnet is very good although one of the participants suggests that it is bad. It is therefore important to note that 75% of the participants are in agreement the process is very good and they are a majority hence the researcher also concludes that the process is very good, and

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4.7 Summary

This chapter presented both quantitative and qualitative data.

The first section discussed **quantitative data** which was obtained from the self-administered questionnaires to 30 Project Team members, Senior Managers and Stakeholders in Transnet and 22 responses were received. The results which were analysed and interpreted, were presented in tabular and graphic forms. The demographic variables of the respondents included age, gender, level of education and level of experience. The most common and outstanding findings are that almost all participants agreed that there is a clear and concise Project Management process in Transnet, the business case process is good and that there is vast understanding of the Project management processes amongst the teams.

Qualitative data were presented and interpreted in the second section. Whilst the target for personal interviews was 10 participants only 4 participants agreed and availed themselves for the interviews. Interview questions probed the understanding and importance of project management methodology and processes whilst participants were also given an opportunity to express their views on the status quo with regards to the current

Project Scope planning processes applied during initiation phases and also make suggestions for improvement. The most outstanding findings are that the business case development process is good, that there is a need for training of Project teams, that stakeholder involvement is key to successful project initiation planning and that non-adherence to processes increases risk to project failures.

The questionnaire was designed to answer the research questions and achieve the research objectives.

Chapter Five below provides the conclusion and recommendations for this study.

5 CHAPTER 5: RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

The previous chapter discussed data analysis and its interpretation and findings. The study objectives were:

- To identify the challenges faced by project teams when planning the scope of infrastructure development projects at the Initiation phases.

To propose ways to mitigate the challenges encountered by Project Teams or to make recommendations on ways to improve the process of project scope planning during initiation phases in the organisation in order to consistently achieve successful projects delivery

This chapter serves to draw conclusions and make recommendations to the Transnet Management and staff on what will need to be done further (if any) in order to circumvent any challenges faced by project teams during scope planning at initiation stages of their Infrastructure development projects.

A summary of all preceding chapters is done followed by revisiting of the research objectives to ensure alignment of the study. Recommendations as well as any suggestions for further studies are made.

5.2 Conclusion

The analysis of objectives and discussions thereafter indicates that while there are shortcomings in Transnet project scope planning process, the organisation has somehow embraced the benchmark of the industry advocated by PMI and is improving quite well and the future looks bright. There is also a general consensus that Project Team members are well aware of the process and feel positive about the future.

From the findings/ results of the study and the reviewed literature one can deduce that as much as there are positives identified, the recommendations made above may need to be revisited with another follow up study in order to improve and further assist those project team members who may have been neutral and those who disagreed. However it is also pleasing to find that there are areas where most participants gave positive responses about how the organisation does things during Project Initiation phases of the project and one certainly hopes that the positives do continue to other project stages and that the company will look into the negatives and correct them as required or suggested.

5.3 Recommendations

Objective 2 of the study was to propose ways to mitigate the challenges encountered by Project Teams or to make recommendations on ways to improve the process of project scope planning during initiation phases in the organisation in order to consistently achieve successful projects delivery. The recommendations are as follows;

It is recommended that Transnet continuously embark on training team members on project processes, stakeholder selection and management, business case development to ensure their effectiveness and that those team members who are not sure of the processes and those who are not in agreement with them are well informed and equipped and that will improve team work and ensure project success.

It is also recommended and encouraged that Transnet Management continue to provide adequate support project teams, have an open-door policy, improve communication with project teams and clearly define project objectives not only for the initiation phase but for the overall project lifecycle process.

Although the objectives of the study were met, the researcher further recommends that a further study on effectiveness of the planning process in other phases of Projects in Transnet be conducted and to determine whether these phases are a continuation or improvement of the successes achieved in the initiation phases. This will enable a clear picture of the planning process of Projects within the Transnet and demonstrate any shortcomings or need for intervention.

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7. LIST OF ANNEXURES

7.1 Annexure 1: Survey Questionnaire

7.2 Annexure 2: Ethical Clearance Certificate

7.3 Annexure 3: Survey Consent Letter