

UNIVERSITY OF KWAZULU-NATAL

**Root cause analysis of Project Gate Review Failures when evaluated  
against a Project Lifecycle Process Methodology.**

**(A Transnet Capital Projects Case Study)**

By

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of

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## Declaration

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## **Abstract**

Many organisations are integrating project management as a best practice for building core competencies in the manner in which they manage and operate their businesses. Projects are initiated out of a strategic necessity, in the quest to capitalise on opportunity to advance profitability or to increase market share by providing a new value proposition. These initiatives require the investment of capital and hence it is imperative to evaluate the feasibility and sustainability of the investment before committing substantial expenditure to the project initiatives. Transnet, a state owned enterprise, embraced the project management philosophy in the management of the delivery of their capital investment infrastructure programme. Transnet developed a generic standardised Project Management Process Methodology (PLP) based on industry best practice as implemented on project phases, divided and controlled by sequences of stage gate evaluations. The company is currently experiencing a major conundrum since the inception of the PLP stage gate review methodology, in which many of the capital projects that have been evaluated against this criterion have failed. The study was undertaken to gain an understanding of the root causes and factors influencing project gate review failures through an exploratory mixed qualitative and quantitative methodology. The target population was project managers and engineers who are the users of the PLP methodology in which data was collected through interviews and a survey research instrument. The main conclusions are that the PLP methodology lacks support in the form of training, provision of sample documentation, standard templates and guidelines on how to prepare project deliverables. The gate review panel members are inconsistent in rigour, objectivity and lack competence to undertake reviews. A large proportion of the project managers and engineers (approximately 36% on average) are not competent and have a low maturity level in successfully managing large infrastructure projects. The study also attributed low quality, insufficient and incomplete business cases, project execution plans, owner's requirement specifications, risk management plans and operational readiness plans as possible causes of gate review failures. Recommendations in the form of a project management academy which focusses on training and other development initiatives for gate review panel members and project management resources are proposed together with process and procedure reengineering. In doing so, project management processes can be improved and skills competency levels be uplifted, resulting in a lower gate review failure rate. Scope for further research in examining the role of a Project Management Office (PMO), the use of organisational project management maturity model (OPM3) and extending the study to include other industries is proposed.

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## **List of Abbreviations**

<b>Abbreviations</b>	<b>Meaning</b>
PLP	Project Lifecycle Process
MDS	Market Demand Strategy
LTPF	Long Term Planning Framework
IPMA	International Project Management Association
ICB3	International Competency Baseline
APM	Association for Project Management
CSF	Critical Success Factors
PMI	Project Management Institute
PMBOK	Project Management Body of Knowledge
IIA	Institute of Internal Auditing
CBOK	Common Body of Knowledge
APB	Auditing Practice Board
UN	United Nations
PwC	Price Waterhouse Coopers
IPA	Independent Project Analysis
CII	Construction Industry Institute
NASA	National Aeronautics and Space Authority
PFMA	Public Finance and Management Act
IT	Information Technology
OECD	Organisation for Economic Cooperation and Development
PRINCE2	Projects in a Controlled Environment 2

# CHAPTER ONE

## Introduction

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### 1.1 Introduction

This chapter provides an introduction for the study. Firstly, the background in context is set for the study, followed by the motivation for the study. The focus for the study will then be provided followed by the problem statement of the study. Thereafter the objectives of the study and the research questions will be highlighted. An overview of the research methodology will be presented together with an outline of the subsequent chapters of the research and finally the chapter will conclude a summary.

### 1.2 Background in Context

The postmodern era has been characterised as volatile and uncertain, full of complexity and ambiguity, forcing businesses to become more agile and yet more resilient in response to the turbulent forces of the environmental factors (Horney, Pasmore and O'Shea, 2010). In order to become profitable and competitive in the international frontiers, organisations must look to advance and expand their internal processes and systems (Buckley, 2016). Project management has been identified as a potential solution if applied within the organisation ingeniously (Swain and Lightfoot, 2016). Many organisations are integrating project management as a best practice and building core competencies in the manner in which they manage and operate their businesses (Marcella and Rowley, 2015). Whilst this trend is growing daily, only a few have been out rightly successful (Hubbard and Bolles, 2015).

In order to remain competitive and sustainable, Transnet, a state owned enterprise, is one such organisation that has embraced the project management philosophy as a best practice in the management of the delivery of their capital investment programme in infrastructure projects (Ainscough, Neailey and Tennant, 2003) . One of the critical success factors of a company is its ability to produce and sustain positive cash flow. When the returns on invested capital is greater than the cost of capital, companies start to demonstrate growth and long term prosperity for shareholders (Epstein and Buhovac, 2014). It is therefore essential to consider the economic benefit and impact of major investment decisions in the long run. Projects are spawned and initiated out of a strategic necessity, in the quest to capitalise on

opportunity to advance profitability or to increase market share by providing a new value proposition (Kerzner, 2013). These initiatives require the investment of capital and therefore it is imperative to evaluate the feasibility and sustainability of the investment before committing substantial expenditure to project initiatives.

### **1.3 Motivation for the Study**

Transnet is an intermodal logistics service provider that provides carriage solutions from “pit to port” of various mining and containerised commodities. The South African government is the only shareholder and the company is administered through the department of Public Enterprises (DPE) (Hausmann, Rodrik and Velasco, 2008). Transnet owns and operates the main rail, port and pipeline corridor infrastructure of South Africa. As a State Owned Enterprise (SOE), it is instrumental in driving economic growth within the republic and contributes to the gross domestic product, employment and other relevant socioeconomic levers for South Africa (Teer-Tomaselli, 2004).

Transnet has embarked on an aggressive capital investment programme to reduce the cost of doing business in South Africa. This initiative is one of the key pillars of the ambitious market demand strategy which the company is currently executing. The capital investment programme is centred in improving and replacing old and aged railway, port and pipeline infrastructure in order to improve operating efficiencies. The company is also providing new infrastructure in unexploited localities and markets to increase cargo carriage volumes to make a meaningful contribution and to drive economic growth in South Africa. The capital investment programme is a 10 year rolling plan and the company forecasted an expenditure of R 312 billion over this period (Foulds, 2014). The company plans to fund 30% this programme from its balance sheet with the remainder sourced through the sales of bonds and other financial instruments on the international financial market. A strategic specialist department, referred to as Transnet Capital Project was setup in an endeavour to manage and execute the Transnet group capital investment programme (TCP, 2014).

The growth of the economy through the investment of infrastructure projects is pivotal to the South African Government’s growth path strategy. The country plans to spend R827 billion on infrastructures projects as part of its national infrastructure plan (Commission, 2013). Transnet will spend 38% of this budget, with an attempt to elevate poverty by creating jobs and reducing unemployment, reducing the cost of doing business, improving

skills by training and development linked to projects and finally increasing foreign direct investment in the country.

In recent times according to Foster and Briceño-Garmendia (2010) capital infrastructure projects in South Africa are failing because they are not adequately delivered on time, on budget and at the appropriate quality. This phenomenon has impacted the execution of the national infrastructure plan and has exposed a weakness in government departments and SOE’s in their ability to plan, manage and execute capital infrastructure projects efficiently and effectively. This chronic and pandemic enigma is a critical factor that is impeding the government’s ability to create economic prosperity for all the citizens of South Africa.

There is a need within Transnet to incessantly and systemically advance in the level of uniformity in their methodology to the formulation and management of investment capital projects. This is to ensure steadfastness and consistency in the results achieved. Projects are managed according to their significance, complexity, risk and value of the investment. Therefore, Transnet has developed a generic standardised Project Management Process Methodology (PLP). This methodology is based on industry best practice as implemented to the project phases, divided and controlled by sequences of stage gate evaluations. Figure 1.1 below provides a high level overview to the PLP methodology.

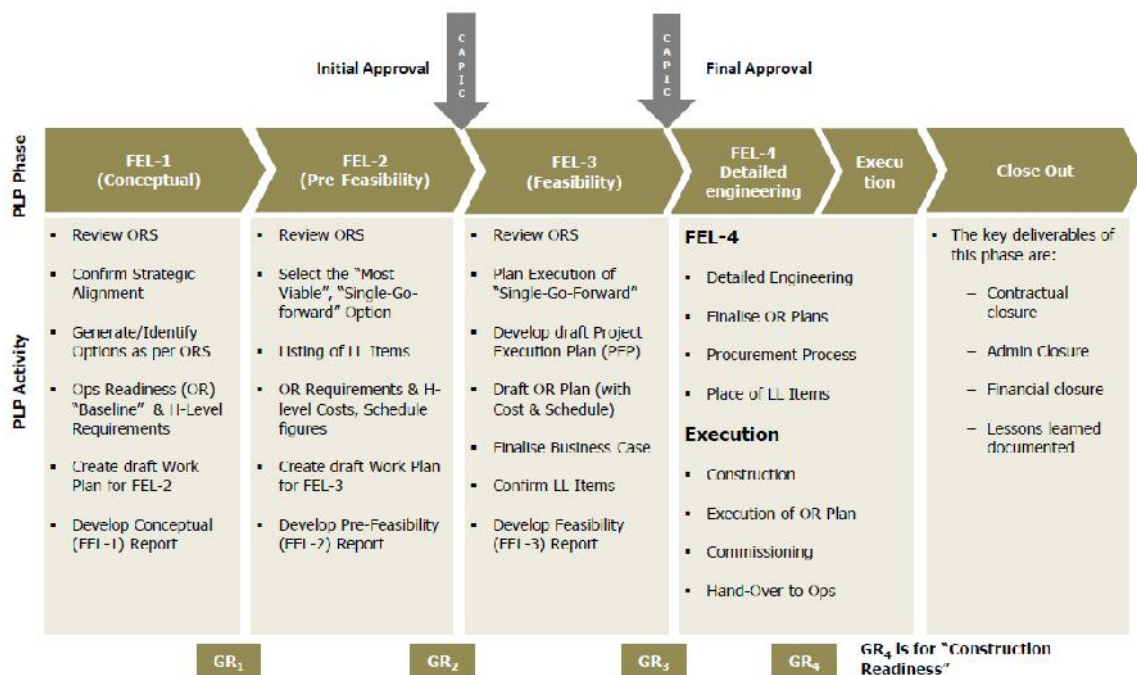


Figure 1.1 High level overview of the PLP Methodology

Source: Adapted from Transnet 2014

Due to the variable nature and size of projects, with each individual project demanding different approaches and levels of expertise in order to address and solve the many varied issues that may arise, it is not reasonable to expect a single guideline with which to govern all capital investments as defined in financial terms. In these cases “one size does not fit all”. In addition, the PLP’s purpose is to differentiate the different “classes” of projects and to define “specialist” skills, experience, expertise and individual strategies required.

Enhanced stakeholder expectation and new legislation have forced organisations to develop and refine systems and processes to ensure good and responsible corporate governance. In South Africa, section 51(1) of the Public Finance Management Act (PFMA), 1999, legislates that large investments of a capital nature, must be thoroughly evaluated against a governance process system, before being granted authority to proceed by the board of directors (Nair, 2008). This is to give the assurance that good and sound corporate governance was embedded in the decision making process (Labuschagne and Brent, 2005).

According to Brown and Grant (2005), successful project governance is a subsection of corporate governance and projects are instruments through which organisations achieve greater efficiencies, change and new revenue streams which drive overall growth and meet shareholder’s expectations (Turner, 2006).

This research aims to explore the interaction and dependency of successes in projects when managed against a governance control system. It will further identify and quantify through empirical studies the root causes of why there is a high rate of gate review failure of projects at Transnet Capital Projects.

### **1.3 Focus of the Study**

The focus of the study was to gain an understanding of the root cause analysis of Project gate review failures when evaluated against a Project Lifecycle Process Methodology. The responsible investment in infrastructure projects in South Africa is a critical success factor for economic growth. To this, the department of public enterprises has embarked on a programme of realigning all state owned enterprises. Transnet is one such organisation to realise this goal. Transnet’s capital investment programme contributes to 38% of the national infrastructure plan of South Africa. The execution of large capital infrastructure projects are complex and high rates of failure is evident, where projects run well over their budgets and are delivered fashionably late. Understanding the reason why projects are not

successful when reviewed against the Project Life Cycle Process is crucial for South Africa to meet its infrastructure plan and socioeconomic objectives (Pinto and Prescott, 1993).

In addition, this study will most certainly add to the body of research work done to date in the field of project management relating to large infrastructure projects. Of particular interest is the area of using front end loading and stage gate review appraisals of project management resources maturity for large capital investment projects.

In order for Transnet to realise its strategic vision of being a world class intermodal logistic service provider, it would need to align its infrastructure plan to be more efficient and effective. The outcome of this study will provide a deeper knowledge on how project management processes can be improved and skill sets uplifted, in so doing, have a lower failure rate when evaluated against the PLP methodology. This study will further unlock the challenges associated with the high levels of gate review failures and provide procedure and process modifications to improved success rates going forward.

Further, this study may influence public interest and policy, in that other state-owned organisations can optimise the use of revenue received from the South African taxation system to realise a greater benefit to all citizens.

According to Stark (2014), the attraction and retention of suitably qualified and skilled resources are a challenge in South Africa, and the outcome of this study will create a deeper understanding on what are critical attributes and competencies which are required for delivering mega projects (Van Der Westhuizen, 2007). It will further provide solutions to make a positive contribution in moving South Africa's economy to a double digit growth rate for the gross domestic product measure.

This study will also provide insight and knowledge for Transnet to better deliver on its capital investment programme, thereby improving on potential operational losses, better governance framework, performance management and line of sight of infrastructure projects and realising the growth objectives of the market demand strategy.

#### **1.4 Problem Statement of the study**

Transnet is currently experiencing a major conundrum since the inception of the PLP stage gate review methodology, in which many of the capital infrastructure projects that have been evaluated against this best practice criterion have failed (Xaba, 2011). According to Transnet

(2015) approximately 90% of projects reviewed at the respective stage gate, fail on first assessment and do not proceed to the next level of front end engineering timeously. This poor first time success rate is impeding the delivery of key strategic initiatives and projects, thereby delaying the return on investment. The implications are that additional costs and time are expended on rework. Capital investment is delayed or differed impacting the cost of capital and priority of the investment programme. Logistic infrastructure corridors remained constrained and limit the volume throughput hence restricting the volume flows of commodities for export and import through to neighbouring countries. The situation is further compounded, in that the economic growth of South Africa with respect to inter model logistics of freight goods and cargo is being impeded and employment opportunities delayed. Reduced volume of cargo has a consequential impact on Gross Domestic Product (GDP) growth and finally the profitability and sustainability of Transnet. The unit cost of logistics increases because of no economies of scale and hence this cost is burdened on the final consumer as an inflationary related costs.

## **1.5 Objectives**

The fundamental goals of this research is to undertake a theoretical plus a pragmatic study to establish the root causes of project gate review failure when reviewed against the Project Lifecycle Process Methodology at Transnet Capital Projects. In order to realise this objective the following secondary objectives must be met:

- i. To establish if the Project Lifecycle Process methodology is fit for purpose.
- ii. To evaluate the effectiveness of the stage gate audit review process.
- iii. To establish the root causes of the project gate review failures.
- iv. To review the maturity levels of the project managers and engineers in terms of competencies, experiences and skills sets in the field of project management.

## **1.6 Research Questions**

This research aims to pull together empirical data to provide passable solutions to the following questions:

- a) Is the PLP methodology fit for purpose?
- b) Is the stage gate audit review process flawed?
- c) What are the root causes of project gate review failure?

- d) What is the maturity level of the project resources?

## **1.7 Research Methodology**

The research design adopted for this study was an exploratory sequential mixed method. The data was collected over two distinct phases with the intention of having the qualitative results explaining more details of the quantitative results. Face to face interview techniques through a semi structured interview questionnaire was used to solicit qualitative data. The data together with findings from the literature review was used to construct a survey instrument for the cross sectional collection of quantitative data, which was deployed through “survey monkey” as a medium for the data collection. The TCP population sample frame was stratified into project management and engineering personal forming a homogeneous and non-overlapping subgroup or strata. A simple random sample was drawn from this stratum of 200 objects. The respective data was scrubbed and analysed using NVivo software and interpreted complementary to the quantitative results that was analysed in STATA version 14. Various statistical analysis was undertaken and the results are presented in graphical and tabular format in chapter four for interpretation and discussion.

## **1.8 Proposed Outline of the Research**

### **Chapter One: Introduction:**

This section introduces the research problem by setting the context and background to the scope of the study. It presents the motivation, focus area and problem statement of the research. The study objectives and the research questions are unpacked into primary objectives, which would be solved as the main outcomes of the study.

### **Chapter Two: Literature Review:**

This chapter provides a comprehensive review of the literature pertaining to the study. It will present a comprehensive review of the thematic philosophies and major tenets associated with the concept of project management, governance, project life cycles processes, maturity models and evaluation of audit frameworks. Critical success factors that enhance successful project outcomes would be presented and used to solve the research question. In this chapter the theoretical framework to the research problem is explored and developed and is used to under pin the study.

### **Chapter Three: Research Methodology**

This chapter presents the selected methodology chosen to execute the study. It defines the approach and presents the blue print of how the study was undertaken. It also presents the rationale to the development of the research instruments for the collection of data that was used to answer the research questions.

### **Chapter Four: Presentation of Results and Discussion**

This chapter shall present the results collated from the research instrument. The results are statistically analysed and graphically presented. These are used to verify the research objectives derived in Chapter One. The qualitative results and quantitative results are interpreted and linked to the foundation literature and finally mutually triangulated to increase the reliability and validity of the results. Summary findings of the study is discussed and presented.

### **Chapter Five: Conclusions and Recommendations**

This chapter presents the conclusion drawn under the findings of each objective. Recommendations are proposed to solve the challenges experienced by Transnet. The recommendations are directed at process reengineering, process alignment and focused training and capacity building initiatives. Finally the limitations of the study is discussed and recommendations for further research work is proposed.

## **1.9 Chapter Summary**

The study undertook to investigate the Root causes of Project Gate Review Failures when evaluated against a Project Lifecycle Process Methodology. In order for Transnet to realise its strategic vision of being a world class intermodal logistic service provider it would need to align its infrastructure plan to be more efficient and effective. The outcome of this study will provide a deeper knowledge on how project management processes can be improved and skill sets uplifted, in so doing have a lower failure rate when evaluated against the PLP methodology. This study will further unlock the challenges associated with the high levels of gate review failures and provide procedure and process modifications to improved success rates going forward. Given the problem that TCP has, it was interesting to see what literature stated on the topic. The following chapter presents a review of literature.

## CHAPTER TWO

### Literature Review

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#### 2.1 Introduction

This chapter presents the literature review pertaining to the themes of the study and the latest trends in the project management community. A contextual background is presented on how strategy is translated into portfolios and the implementation through the use of programmes and projects. The link between corporate strategy and the translation to portfolio management is described in which programmes and projects become instruments of realising strategic objectives via transformation management. .

The thematic area of corporate governance and its relation project governance is reviewed and its applicability to project organisations is presented. The concept of front end loading is unpacked and it's appropriateness to the Project Lifecycle Process (PLP) methodology is verified as industry best practice and the associated benefits that are realisable from this framework.

An in-depth literature review with respect to the evolution of project life cycle management as a thematic area is evaluated and its association with the PLP methodology is appraised. An assessment of the generally accepted auditing principles is presented and the key ingredients of good auditing practices are understood to solve the research objectives.

An exhaustive literature review on the project resource competency thematic area is presented. The competency framework for project managers from different institutions and project management fraternities are investigated. Detailed analyses into the building blocks of the project manager behavioural attributes are evaluated. The IPMA (International Project Management Association) competency standard (ICB3.0) is unpacked and its appropriateness in the development of the research instrument is investigated and understood with the objective to assess the project management competency maturity.

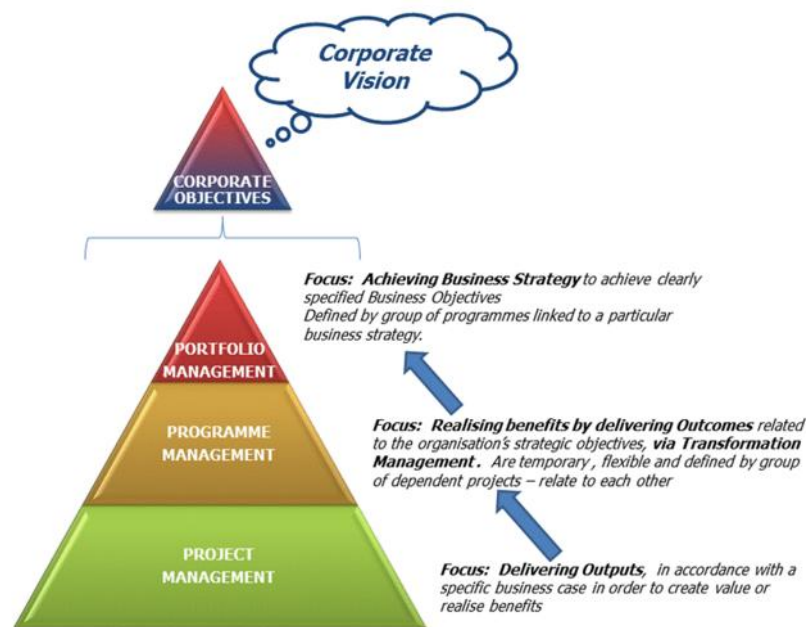
Finally a literature review of the thematic area of critical successes and failure factors in project is evaluated together with a high level overview on the key reasons for why projects fail.

## 2.2 Governance Framework

In order to improve Transnet SOC, project delivery, a guideline in the form of the Project Lifecycle Process (PLP) Methodology was developed to manage Transnet’s projects according to their significance, complexity, risk and value of the investment (Transnet, 2014). Due to the variable nature and size of projects, with each individual project demanding different approaches and levels of expertise in order to address and solve the many varied issues that may arise, it is not reasonable to expect a single guideline with which to govern all capital investments as defined in financial terms. In these cases “one size does not fit all”. In addition, the PLP’s purpose is to differentiate the different “classes” of projects and to define “specialist” skills, experience, expertise and individual strategies required. Due to the significant scope of the Transnet Market Demand Strategy (MDS), the Programme Governance Framework introduces a three tier governance framework consisting of portfolios, programmes and projects (Transnet, 2014).

## 2.3 The Link between Portfolios, Programmes and Projects

Strategic portfolio management ensures that Capital Investment Programmes are aligned to the business strategy (PwC, 2012).



**Figure 2.1 Relationship between portfolios, programme and project management**

**Source: Adapted from Transnet 2014**

The three tier governance structure of portfolio management ensures that the programmes contained in the portfolio are aligned to a particular business strategy and prioritised according to strategic criteria and priorities. Programme management ensures that programmes meet strategic business objectives necessary for strategy implementation and deliver the benefits required by stakeholders. The model in Figure 2.1 on page 10 illustrates the relationship between portfolio, programme and project management and how the 3 levels align to achieve corporate vision and objectives:

### **2.3.1 Strategic Portfolio Management**

Strategic portfolio management focuses on an organisation's strategic objectives. It is a recurrent process of generating, managing and appraising a portfolio of strategic initiatives (investments). It is an executive directed initiative to deliver future value (objectives) and realise returns from investments. All decisions at this level is understood, prioritised and evaluated against normal business activities and change programme (PwC, 2012).

This is a four stage cyclic tactic:

**Translation of Strategy:** Business requirement planning to develop the Long Term Planning Framework (LTPF). Before a portfolio is developed, the business strategy in the form of corporate strategy informed by the LTPF is translated into a single capital portfolio which is consolidated for evaluation, selection, prioritisation, balancing, review and authorisation.

**Portfolio Planning:** The corporate strategy in consultation with the LTPF, front end research and business operations unpacks into appropriate programmes and projects that are weighted against a multi criteria filter process forming a capital investment portfolio blue print.

**Portfolio Management:** After the portfolio is establish, the implementation progress is measured against performance targets. The plan goes through continuous refinement in which risks, issues and dependencies are synchronised. The plan is executed against the performance measures and outputs are monitored and managed in a coordinated effort.

**Strategy and portfolio re-evaluation:** At this hold point, benefit realisation is evaluated against the plan and the progress in achieving the business strategic objective.

### 2.3.2 Programme Management

According to the Project Management Institute PMI (2013), programmes are constructed of similar, associated and interconnected projects with a common outcome. It is the management and consistent application of specific processes, tools and methods in order to enable the coordinated delivery of projects in a consistent and efficient way with the goal of achieving business benefits or value add, which would not have been possible had the projects been managed as individual pockets of delivery (PMI, 2015).

A fundamental component of programme management is managing and harmonising project interdependencies within programmes.

Key processes include:

**Planning:** This includes both top down planning techniques as well as bottom up, in which projects are sequenced and linked with interdependencies and in which resources are allocated to the different projects.

**Executing:** This involves the enactment of the programme level plan for the various infrastructure through the commencement and closing of various projects.

**Controlling:** This is composed of the chasing up, expediting and reporting on programme activities in terms of risks, issues, changes and benefits to meet the objectives of the baseline strategic plan. Control at the programme level is focused on realization of benefits/value, whereas control at project level is focused on delivery of outputs. Structured, co-ordinated programme closure forms part of the controlling processes.

### 2.3.3 Project Management

Project management is concerned with the processes of planning, executing and controlling of activities that are critical to delivery of project outcomes. When constructed within a broad programme management context, the project is framed within the broader programme management objectives (PMI, 2013).

Projects are spawned as a means of achieving an organization's strategic plan and business objectives. According to PMI (2013) projects are temporary and unique with a definite beginning and a definite end and differ from operations in that operations are on-going and repetitive.

The Project Management Body of Knowledge PMI (2013), advocate that the key characteristics of a project must demonstrate the follow five attributes:

- a) Definitive time frame with start and completion date
- b) Unique novel aspect of the outcome
- c) Involvement of people either on assignment or ad-hoc
- d) Constrained set of resources, funds, materials
- e) Sequential execution of stages, phases and or activities

Organizations undertaking projects usually divided each project into several project phases or stages to improve management control through a review process, and provide for integration into the on-going operations of the performing organization. Collectively, the project phases are known as the Project Lifecycle.

#### **2.3.4 Programme Governance**

Programme governance supports projects and programmes by establishing the leadership arrangements, team member roles and responsibilities and organisational support processes to enhance the delivery of projects outcomes and programme strategic objectives. This creates an environment for effective and efficient delivery of work activities (PMI, 2015).The following are key groups of activities within programme governance:

- Forming leadership structure and appropriate delegation of authority for decisions.
- Creating people team structures with the necessary competencies, motivation and team adhesion and synergy for managing programme delivery.
- Establishment of communication channels within programmes and project teams in the quest of achieving common vision and purpose.
- Staff with the appropriate skills and competencies to meet programme objectives.
- Building the appropriate and basic infrastructure including accommodation, technology, processes and administrative support
- Developing methods and standards as a basis bench mark for all activities including audit assurance.

The governance initiatives as described above must enhance and integrate together to support the delivery of strategy through portfolios, programmes and projects.

## 2.4 Understanding Governance

To achieve one of the objectives of this study, a literature review on the evaluation of governance and governance of multiple projects was undertaken. The pursuit to explain and apply project governance has attracted much consideration and deliberation in project literature ever since the late 1990. This is as a result of large capital project failure and the need for project management at an operational and technical level to be held up and reinforced at a corporate strategic management echelon. The terminology governance comes from the ancient Greeks meaning 'to steer' or 'guide' with associations of 'wise and responsible'. While there is still no agreement amongst scholars on the meaning of governance, the contemporary understanding encompasses the way in which companies are managed and held accountable for actions.

King III Committee (2009) encapsulates the meaning of corporate governance as the transparency, authority, ethical decision making in which managers plan, lead, organise and control activities in different organisations and hope they are held accountable. (Hendricks and Wyngaard, 2009).

While according to Organisation for Economic Cooperation and Development OECD (2004), corporate governance can be described as the controlling structures, processes in realising objectives of the organisation in association with performance measures and the relationship between external stakeholders including shareholders, the management and the board of directors.

The OECD (2014), suggests the following founding principles:

- Basis Framework for corporate governance
- Rights and roles of stakeholders and shareholder
- Fairness in the treatment Shareholders
- Managing Stakeholders expectation and roles
- Admission and transparency of information
- Role and accountability of the board

The Institute of Directors Southern Africa (2009 p5) and the Australian Institute of Company directors (2010 p3) concur with this sentiment and add to the definition the element of monitoring of managerial performance by the board on behalf of the shareholders.

From a public sector perspective, The Independent Commission on Good Governance in Public Service argue to include the dimension of achievement of outcomes in an ethical, transparent, efficient and effective manner to citizens and stakeholder users (The Chartered Institute of Public Finance and Accounting, 2004).

While some of the academic scholar's notion on governance is that different types of governance concepts are required at the various sub levels of an organisation. Some of the different types of governance literature as published include the following

Information technology (IT) governance in which the effective and efficient use of IT solutions to achieve business objectives are presented (Marnewick and Labuschagne, 2011); (Gregor, Martin, Fernandez, Stern and Vitale, 2006); (Sharma, Naiker and Lee, 2009); Wilson and Pollard, 2012). Similarly knowledge governance in which a framework of sharing information and knowledge is governed (Ghosh, Amaya and Skibniewski, 2012); (Eweje, Turner and Müller, 2012) ; (Pemsel and Müller, 2012). While network governance in which inter firm coordination is managed and controlled (Klijn, 2008); (Sørensen and Torfing, 2016) and public governance reflects the changing philosophies, models and standards in the public sector ; (Du and Yin, 2010); (Jonny Klakegg and Haavaldsen, 2011); (Williams, Jonny Klakegg, Ole, Derek, Andersen, Morten Magnussen, 2012) .

Collectively, the views amongst these scholars are that governance is a function of management or any entity responsible for making decisions and or overseeing the work of an organisation or its projects (Too and Weaver, 2014). Each governance practice is independent from the other with no integration of practice.

## **2.5 Governance Applied to Projects**

In a study undertaken by Bekker and Steyn (2009), there was agreement that the values of corporate governance is closely aligned and is applicable to project governance, hence it may be considered a subset.

While the Association of project Management APM (2016), Turner (2006), Müller (2009) and the ISO 21500:2012 standard "Guide on Project Management" collectively agree and define Project Governance as:

"Project Governance may include subjects such as: defining the management structure; the policies, processes and methodologies to be used; limits and delegation of authority for

decision making; stakeholder responsibility and accountabilities; and the interaction such as reporting and escalation of risk” (ISO, 2012 p6).

Müller (2009) expanded this definition: by suggesting that project governance includes procedures, methodologies, value creation systems, rules and guidelines in a corporate structure that allows project in a controlled environment to maximise internal and external stakeholder interest including the organisation’s strategic objectives.

Turner (2006) adapted the OECD corporate governance principles to accommodate projects, while Cooke-Davies (2002) and Crawford (2013) complemented the definition to include a set of philosophies, procedures, methods and arrangements for handling projects (Turner, 2014).

And finally the Project Management Institute PMI (2013) concurs with the approach and defines in their PMBOK as a framework for decision making between the project manager and sponsor to fulfil the objectives of the stakeholders and the organisations strategic objectives. In doing so value is realised from projects that is aligned with business strategy (Too and Weaver, 2014).

According to APM (2016), governance frameworks for project management must cover the following core elements:

- Project role and responsibilities
- Alignment between organisational strategic objectives and project objectives
- Delegation of authority and supporting process.
- Implementation and Execution Methodology
- Resources competencies
- Communication policies and processes
- Controlling and monitoring processes

Dinsmore and Rocha (2012) further propose an “enterprise project governance frame work” that incorporates the core elements of the APM. According to Deneen and Boud (2014), project governance directs the associations between internal and external stakeholder groups define the communication flow of project information amongst them and ensure appropriated review of key deliverables and issues encountered and to warrant the delegated levels of authority for approvals and oversight at each stage of the project life cycle.

## 2.6 Project Lifecycle Process

Projects in a Controlled Environment (PRINCE2) (2002) advocates that a project lifecycle is a series of sequential steps or phases in which projects are developed and executed. Archibald and Voropaev (2003) proposed four broad generic project phases referred to as:

1. Concept (also known as initiation, identification and selection).
2. Definition (also known as feasibility, development, demonstration, design prototype, quantification).
3. Execution (also known as implementation, realisation, production, design construct, deployment, commissioning, installation and test).
4. Close out (also known as termination, post completion evaluation).

While Kerzner (2013) proposed a theoretical framework of five distinct phases as:

1. Conceptual (This phase is where the project objectives are defined and the conceptual aspects of the project agreed. This may be the phase where a problem is identified and potential solutions suggested.)
2. Planning (This phase is where the project is broken down into manageable areas of work and planned in terms of time, cost and resources. This is a continuous process and will extend throughout the execution phase of the project.)
3. Testing (sets the scope of system testing, the overall strategy to be adopted, the activities to be completed, the general resources required and the methods and processes to be used to test the release. It also details the activities, dependencies and effort required to conduct the system test)
4. Implementation or Execution (During this phase the work is implemented, controlled and monitored)
5. Closure (The final phase of the project life cycle is close-out and demobilisation, where resources are reassigned, the project is handed over and the post-project review is carried out.)

Whereas Morris, Patel and Wearne (2000 p160), state “The lifecycle is the only thing that uniquely distinguishes projects from non-projects”. They went further and defined the project lifecycle as “The sequence of phases through which the project evolves. It is absolutely fundamental to the management of projects...It will significantly affect how the project is structured. The basic life cycle follows a common generic sequence: Opportunity, Design & Development, Production, Hand-over and Post Project Evaluation. The exact

wording varies between industries and organisation. There should be evaluation and approval points between phases often referred to as gate.”

The term “gate” is also known as milestones, a point in time when a decision must be made not synonymous with project schedule as it is of a strategic plan displaying sequence (Wideman, 2004). According to Devi and Prabhakar (2015), it is better to plan in small components of activities so that each increment can be appraised and evaluated separately. The concept of Project Life Cycles is not new and Table 2.1 on page 18 provides a summary of the literature with respect to the evolution of project life cycles.

**Table 2.1 Summary of the evolution of project life cycles.**

Original Author	Year First Published	Project Life Cycle Type	Cited in Recent Sources
Youker	1970	Youker’s World Bank Investment project life span	Ika, Diallo and Thuillier, 2012
Wideman	1970	Wideman’s construction bar chart related to generic project lifespan	Del Pico, 2013
Archibald	1976	Archibald’s 6 phase project life span	Archibald, R.D. and Archibald, S., 2016
Stukenbruck	1981	Stukenbruck’s government system life span	Caron and Salvatori, 2015
Cavendish and Martin	1982	Cavendish and Martin’s contract project life span	Florin, 2012
Wideman	1987	Wideman’s corporate business, facility/product and project life span	Wideman, 2004
Boehm,	1988	Boehm’s spiral model of software development	Boehm, Lane, Koolmanojwong and Turner, 2014
Anon	1988	Conventional Waterfall model of software development	Estler, Nordio, Furia, Meyer and Schneider, 2014
Public Works Canada	1989	Public Works Canada’s Facility Life span	Yeheyis, Hewage, Alam, Eskicioglu and Sadiq, 2013
Kerzner	1990	Kerzner’s R and D product life cycle	Kerzner, 2015
Warren Allen	1991	Allen’s generic project life span	Archibald, 2013
Webster	1993	Webster’s comparison of project and product	Davis, 2014
Kapur	1995	Kapur’s information system project life span	Kapur, Pham, Chanda, and Kumar, V., 2013
Dupont and Abitibi	1996	Abitibi’s Front-end loading of project development	Maig, Wolfe, Spicer, and Smith, 2015
PMI	1996	PMI Standard Committee’s sample generic project life span	Turner, 2016
Royce	1998	Royces life span vie of the spiral model	Cantor and Royce, 2014
Morris	1998	Morris’s project life span	Morris, 2013.
Forsberg, Mooz and Cotterman	2000	Business, Budget and Technical aspect of project life span	Stare, 2014.
Cooper	2001	Cooper, Edgbert and Kleinschmidt’s Stage Gate process	Florin, 2012.
Fish	2004	Fish’s Vee model of project life span	Dalcher, 2016
Mochal	2006	Mochal’s view of software development of projects	Susser, 2012

In reviewing the historical development of project life cycles, it is evident that the PLP methodology has alignment with the literature and is an accurate adaptation of Patel and Morris (2013b) in which projects are sequentially developed through a series of phases of progressive elaboration or rolling wave planning usually separated by an evaluation review point referred to as a gate. The gate review often establishes if the project is viable to proceed to the next phase of planning or is terminated.

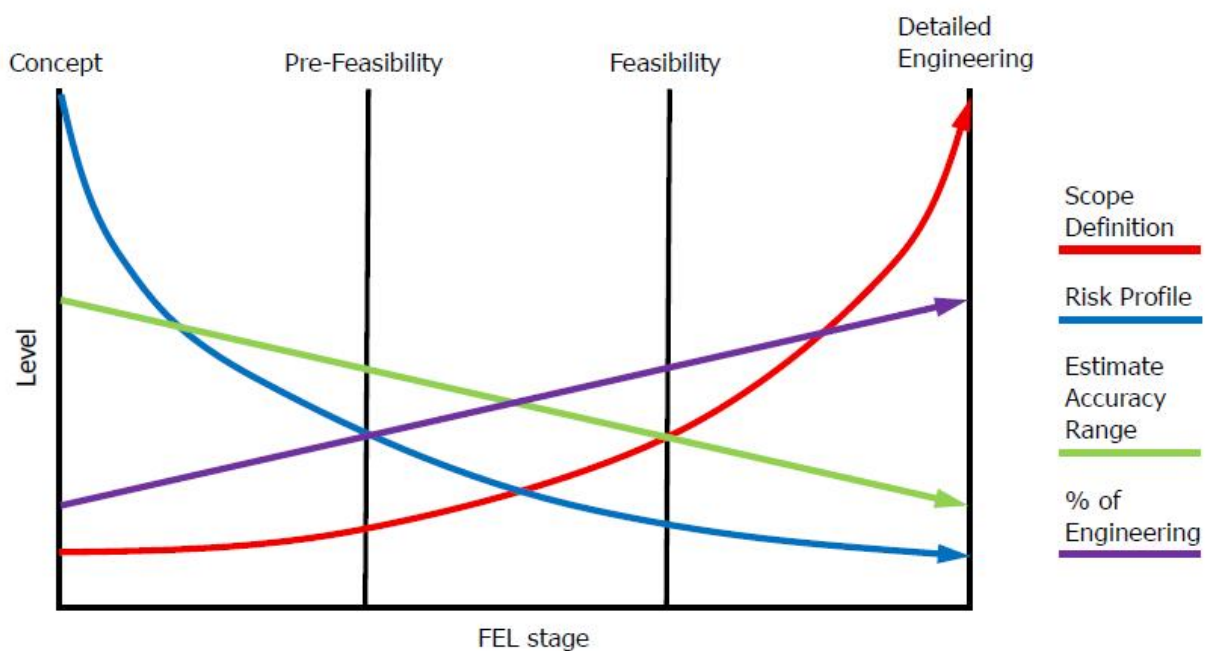
The PLP provides a structure, robust approach to project planning and execution. Organizations such as Independent Project Analysis (IPA) and the Construction Industry Institute (CII) are international in their scope and provide benchmarking and research associated with project execution, utilizing the PLP. They support fully the execution of projects in this manner. The PLP methodology is the result of project experience gathered over time and refined to a set of best industry practices supporting appropriate and critical success factors to project outcomes.

## **2.7 Front End Loading**

The “Front End Loading” terminology is used to demonstrate the value and opportunity that may be capitalised on by doing upfront work in the study phases quite early in the project lifecycle when there is opportunity to enhance the successful outcome of the project. Front end loading is implemented to the first four phases of the PLP methodology to achieve the reduction of risk and increase the certainty in line with increasing investment. Front End Loading (FEL) is important and key in the successful implementation of the execution and finalization of project phases. Archibald, Ivano Di Filippo and Daniele Di Filippo (2012) have argued that the existing body of project management knowledge lack adequate front end standards and descriptions. They have suggested an “incubation phase” that unpacks nascent information and knowledge of the project. While Burke (2013), proposed a front end model that focuses on the decision making processes implying that decision making upfront in projects are complex, biased, unstructured and at time inadequate.

Edkins, Geraldi, Morris and Smith (2013), refers to the front-end as a “preliminary emergence phase” starting with authorisation by management to spend money, time, resources and effort to initiate the development of the project. The front-end phase of the study is complete when the sponsor accepts the outcomes or is terminated and placed in abeyance at a sanctioned gate review. On acceptance, the project undergoes further evaluation and resources are released progressively to crystalize the project outcome in a

more definitive state. Merrow (2012) proposed a three phase front end model similar to the Transnet PLP methodology. Leising, Wessen, Ellyin, Rosenberg and Leising, Adam (2013) developed a method for the measurement and communication of maturity of space mission concepts at NASA, using an eight stage maturity model also aligned to the Transnet PLP methodology. Therefore it can be concluded that the Transnet model is consistent with the current thinking amongst scholars where front end loading ensures that progressive steps of investment is only committed as the level of risk and certainty substantiates it, rather than committing enormous sums of money into a risky uncertain investment at the inception. Figure 2.2 on page 20 presents a graphical representation of how the scope definition, risk profile, estimate accuracy in trade off against the percentage engineering effort and definition.



**Figure 2.2 Front End Loading Stage versus risk and Increasing certainty**

**Source: Adapted from Transnet (2013)**

While project management is obviously a key component of the overall PLP and is the glue that pulls together the various activities that drive successful project outcomes, PLP methodology does not intend to describe all the traditional project manager functions and activities that are common to the various project phases (Transnet, 2013). Rather, they sketch

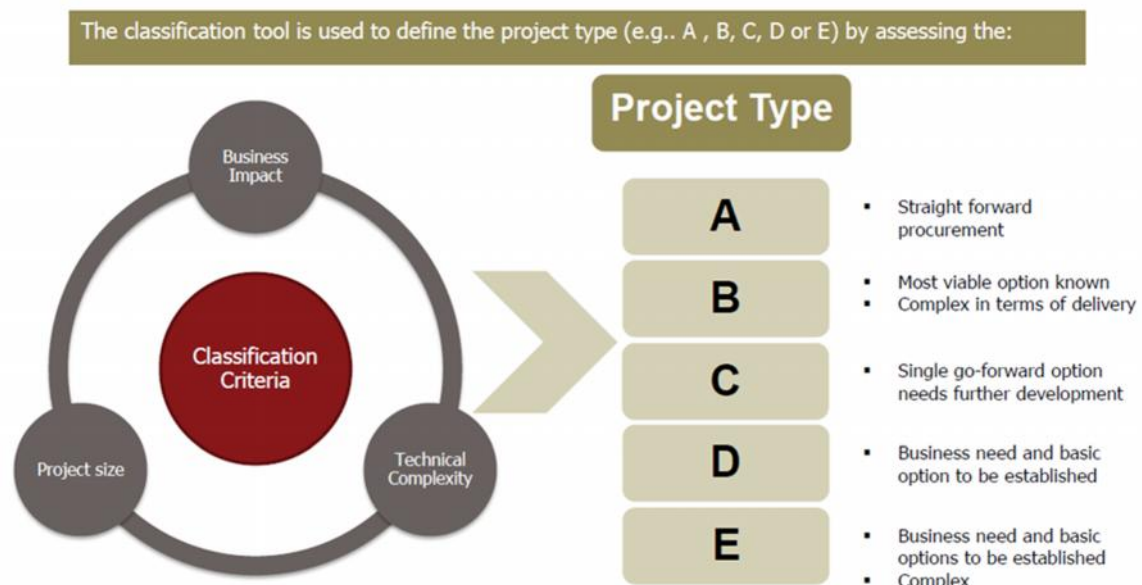
the requirements for project delivery within the project organisation in a manner that allows the project manager and those directly involved in project delivery (whether experienced or new to this field) to gain an understanding of what is required when dealing with projects in the organisation. The PLP methodology, therefore, is intended to supplement and augment the project manager's management skills and guide the broader project team's understanding to improve project delivery (Transnet 2013).

## **2.8 Project Classification and Tailoring of Methodology**

Projects are unique as a fundamental attribute of its definition (PMI, 2013). The uniqueness is associated with some distinguishing characteristics as compared to other projects or services. The case where one size fits all is not applicable to a PLP methodology. The PLP model is fully scalable and customisable to suit the uniqueness of any engineering project within an organisations portfolio. According to Archibald et al. (2012), scholars have agreed and proposed the following dimensions that are used to classify and categorise projects:

- I. Project Size
- II. Project Complexity
- III. External and internal customers
- IV. The amount of involvement of the customer and or client
- V. Risk levels

Most capital infrastructure organisations adopted these principles to develop a project classification tool kit that is aligned with best practice, which tailors, alters and customises a standard methodology according to the project type (Merrow, 2012). Figure 2.3 on page 22 presents a model using these principles to develop a project classification tool kit that is aligned with best practice, which tailors, alters and customises the methodology according to the project type. Transnet has embedded these principles to develop a classification tool that tailors the PLP methodology to be fully scalable to handle a vast array of different project types, sizes, complexities, risk profiles and number of stakeholders.



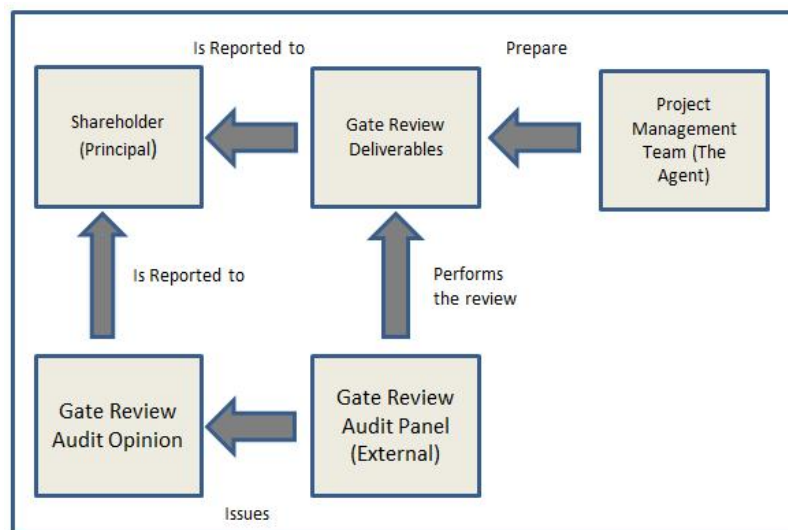
**Figure 2.3 A typical Project Classification Model**

**Source: Adapted from Transnet 2013**

## 2.9 Internal Auditing and Review

Various conundrums ascend from poor reactions to strategic risks. Strategic risks like the inability of an organisation to react to changes of the macro and micro environment or the poor alignment between the business strategic objectives and internal business processes (Knechel and Sharma, 2012). This may result in fraudulent behaviour amongst stakeholders, ineffective decisions, the breakdown of information and incompetency in behaviour that adversely impact the organisation (Elliott, Marquis and Neal, 2013). Control processes within an organisation are a critical success factor in attempting to alleviate these challengers (Knechel and Sharma, 2012). A form of control can be achieved through external and internal audits or other forms of reviews such as peer reviews, validity reviews and stage gate reviews. These are mechanisms of providing assurance in terms of eliminating or identifying roots causes of business and governance related risks. An audit or a review process may also arise out of a regulatory need or compliance to some form of legislation (Elliott et al., 2013). The principal agency predicament is enough of a justification for an audit or a review (Tritschler, 2014). The role of audits and reviews provide assurance in deriving value and credibility of independence in appearance and mind (Subramaniam, Stewart, Ng, and Shulman, 2013). Figure 2.4 on page 23 presents the agency shareholder

relationship and how an audit or review provides assurance to the shareholders that good corporate governance exist in management control.



**Figure 2.4 The agency relationship as applicable to the audit of PLP Gate Review Deliverables**

**Source: Adapted from Messier 2003**

### 2.9.1 Definition of Internal Audits and Reviews

According to Cohen, Krishnamoorthy and Wright (2014) audits and reviews are spawned out of the notion of good corporate governance. They formulated the governance mosaic in which the association between the board of directors and external and internal audit owners and the audit review committee are identified (Cohen et al., 2014).

In order to have a superior understanding and to expand the scope of audit reviews, the Institute of Internal audit (IIA) commissioned the development of a common body of knowledge (CBOK). The main objective was to bring together the different views of internal audits and review amongst scholars and to create and alignment and consistency in the world.

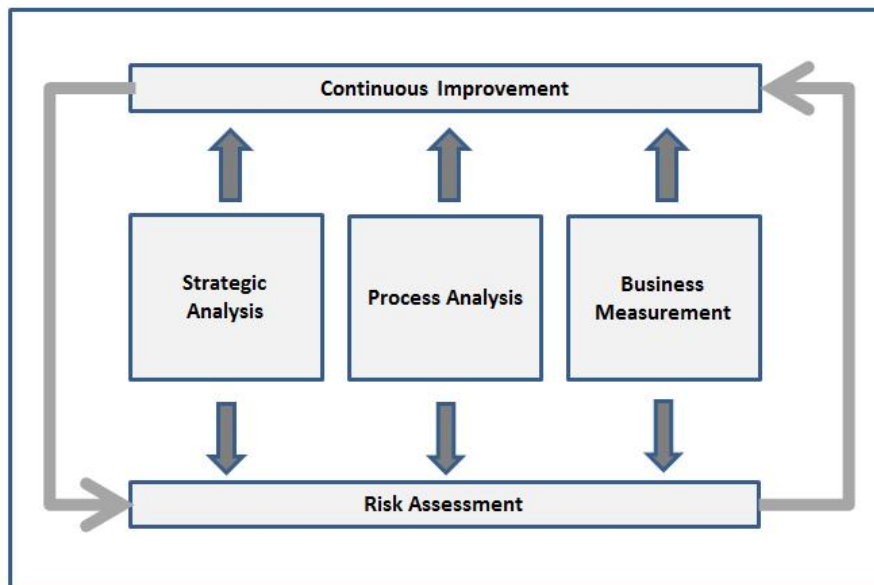
According to the IIA (1999), the universally accepted definition of internal auditing may be defined as “Internal auditing is an independent, objective assurance and consulting activity designed to add value and improve and organisation’s operations. It helps organisations accomplish objectives by bringing a systematic disciplined approach to evaluate and improve the effectiveness of risk management, control and governance processes.” In this definition the concept of independence and objectivity are emphasised. According to IIA

(1999) standards, independence is referred to as “the freedom from conditions that threaten objectivity or the appearance of objectivity. Such threats must be managed at an individual auditor, engagement, functional and organisational levels.”

Similarly the IIA (1999) defines objectivity as “an unbiased mental attitude that allows internal auditors to perform their engagement in such a manner that they have honest belief in their work product and that no significant quality compromises are made. Objectivity requires internal auditors not to subordinate their judgement on audit matters to that of others.”

## 2.9.2 Control, Assurance, Audits and Reviews

According to (Bell and Griffin, 2012) auditing and review is an on-going process that iteratively analyses risks, appraising outcomes, renewing risk assessments and encouraging continuous improvement. It is evident that organisation risk is directly related to audit concerns. Figure 2.5 below presents the audit control process and its intensity for risk identification, risk assessment, continuous improvement and elimination of business risk.

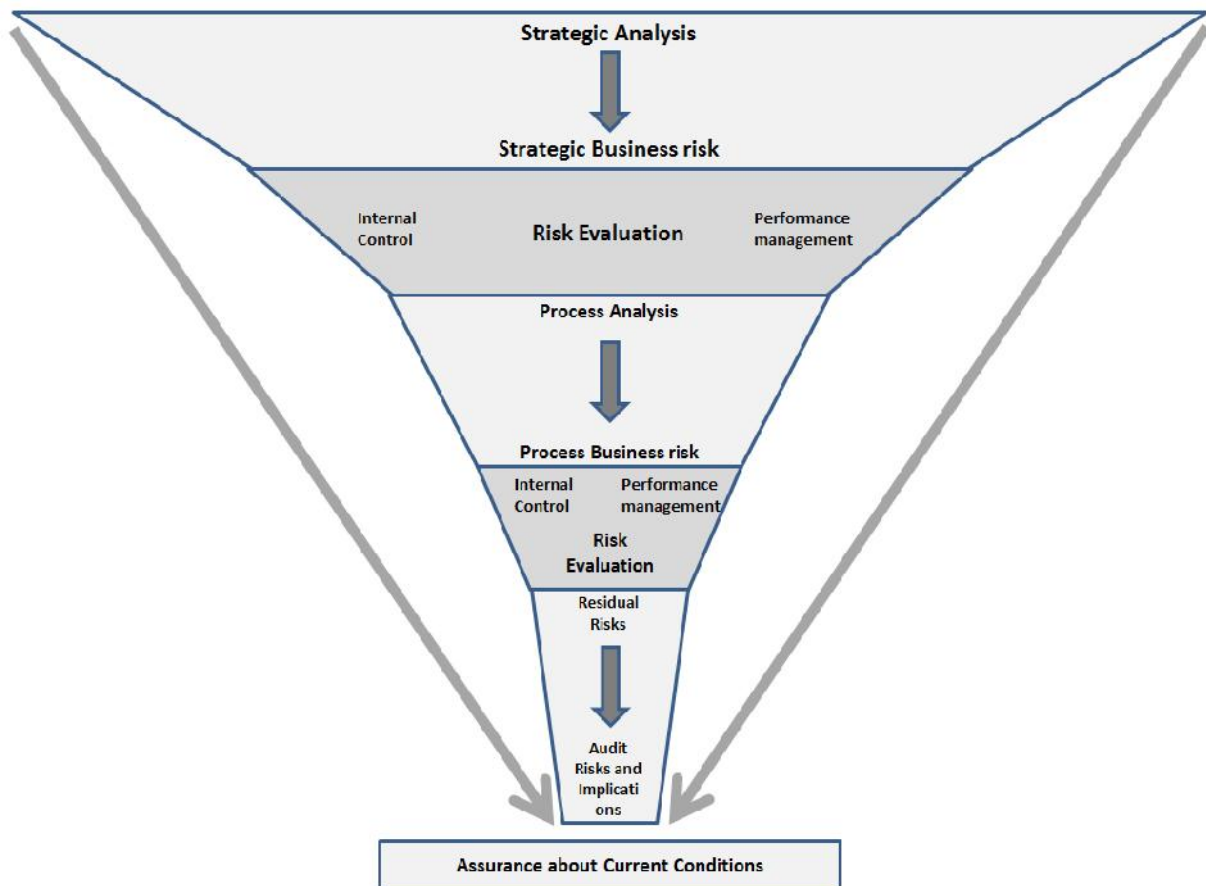


**Figure 2.5 Graphical representation of the Audit control process**

**Source: Adapted from Bell et al. (2002) page 34**

According to Knechel and Sharma (2012) organisations that do not continuously monitor strategic business risks will have a low probability of being successful. He proposes that lingering organisational risks have a serious impact for the bearing of the audit review as

opposed to the process itself. When residual business risks are evidentiary high, it gives an indication that the control environment lacks effectiveness and substance (Bruynseels, Knechel and Willekens, 2013). The probability of manipulating information and miss-reporting critical business information is high and the room for poor business decision making is existent.



**Figure 2.6 Systematic Approach to evidence acquisition in the assurance analysis.**

**Source: Adapted from Knechel 2001**

An auditor or reviewer goes through a systematic knowledge acquisition procedure in analysing residuals business risk. In doing so, he designs a series of substantive tests to appraise the validity of an assertion correctness or whether an assertion has been misstated. In doing so evidence is gathered from the knowledge acquisitions procedure to either support or object to the assentation (Knechel and Sharma, 2012).

Figure 2.6 on page 25, presents the systematic approach to gather evidence and to gain assurance about the current assertion.

### **2.9.3 Fundamental Principles of Independent Audits or Reviews**

The auditors' code 011 titled "Fundamental Principles of Independent Auditing" direct the standard that governs the conduct of an audit process and the auditor. The general spirit of the code that regulates the conduct of an auditor or reviewer is prescribed as follows:

Auditors and reviewers must demonstrate accountability and integrity in discharging their duty by being objective and independent in their audit or review opinion. They must demonstrate competence in their abilities, skills and exercise rigour and good judgement in the assessment of the situations and information free from influence. Their communication must be clear and precise so as to not convey any ambiguity in their finding. Their associations of opinions must be free of any conflict of interest or misleading information towards any biasness. In doing so they must demonstrate and provide value to improve the effective, efficient and transparent running of the company of interest in an ethical manner (APB, 2011).

### **2.9.4 General Principles Governing the Audit of Information**

According to the APB (2011) and the standard as published, auditors should consider the following matters during the review and audit of reports and related documents:

- I. Auditors must execute the procedure designed to interrogate and solicit adequate and purposeful evidence in compliance with the standards. They must, determine with sufficient confidence whether the reports or documents (deliverables) are free of miss- statements (APB, 2011).
- II. Evaluation of the deliverables in order to ascertain whether they are compliant to legislation and the necessary standards and guidelines (APB, 2011).
- III. Issuing an opinion report detailing a clear narrative of the outcomes regarding the deliverables (APB, 2011).

### **2.10 Project Resource Competency**

The competency of project managers and project type resources has received much interest in recent time. According to Crawford (2013), there is a direct relationship between project

management resource competency and company performance. It is increasingly evident that the “accidental project manager” finds themselves in roles of leading and directing projects because of their superior technical or managerial abilities (Ensworth, 2012). In most of these cases the individual has limited prior project management experience or training and are placed in a predicament of either failing from the inception or adapt and develop competence as they move forward.

To compound this situation, these organisations do not have a well-defined framework for the career development of project resources (Pellegrinelli and Garagna, 2010). Those that do have some form of development programme lack sufficient rigour and is not based on modern and cutting edge research. It is also contended that these competency programmes are very subjective in their review and lack substance (Pellegrinelli and Garagna, 2010).

Projects according to the definition by PMI (2013), are unique and have different levels of complexity, risk profiles and uncertainty. Therefore according to Hartman (2008), a generic skill set is impossible to achieve because of this unique changing needs and evolution of project deliverables and outcomes.

### **2.10.1 Challenges of the Future Landscape**

Organisational structure can be defined as how job roles and tasks are separated and compartmentalised into distinct grouping (Basson, Lyons and Nienaber, 2009). Scases (2006) advocates that organisations need to create a happy and pleasurable work environment that facilitates and encourage effective activities and engagement. While Nicholson and Nairn (2006) contend that people are the core assets of an organisation and there is an important focus on their performance.

With the advent of globalisation, increased innovation and increased cost competitiveness, economic conditions are characterised by high volatility, uncertainty, complexity and ambiguity. In response to these challenges, most organisations are resorting to leaner, flexible and responsive business operations to ensure sustainability (Chin and Rasdi, 2014). Traditional hieratical functional organisational structures are moving to more flat, project type structures where people are mobilised for their unique skills, attributes and competency to meet a temporary endeavour.

The changes in the social trend over the past generation are enough to signal that organisations must adjust their operational processes. Younger people are remaining single

with some differing marriage to later in life while approximately half of marriages are separating in divorce resulting in an increasing number of single households (Robbins *et al* 2009). According to the United Nations (2011), the global number of people is aging and is projected to grow to approximately nine billion by 2050. The slowdown in the growth rate has been attributed to couples having fewer and in some cases no children at all (UN, 2011). The aging workforce presents organisational challenges such as lost time due to illness, large accumulation of vacation time and other unique motivational challenges. Knowledge workers that embracing protein careers are retiring later, thereby impacting on jobs for younger individual with even later employment starts (Clarke and Patrickson, 2008).

Increased globalisations are resulting in individuals migrating to other parts of the world. The shifting trend of population from the east to the west is not uncommon resulting in increased cross cultural challenges in the work place. These multiple cultural differences pose a new challenge for project managers (Cleland and Bidanda, 2009).

The variety of generational cohorts in the workplace brings a new set of challenges for organisations. According to Kinoshita and Plaistowe (2009), a new generational cohort “Z” will enter the work place in this era and compound the problem even more. Although the generation “Y” is been characterised as the most demanding and maintenance intensive generation, Martin and Tulgan (2006) suggests that they are likely to be the highest performing of all generations and adds more complexity to the work environment. It is envisaged by Nicholson and Narin (2006) that in the next ten years cohort “X and Y” shall be the dominate role players with the phasing out of the baby boomers. As a result Rasmus (2007), suggest that a balance between technical skills with learning and teach skills is needed by future project managers.

Hargroves and Smith (2013) highlighted the impact of major waves of innovation change and these result in the paradigm of breaking bursts according to Jenner (2010), replacing old theories with newer ones. The ability to manage and navigate change will be a challenge for the modern project manager.

Knowledge management is defined according to Marr, Schiuma and Neely (2004), as the competitive advantage of an organisation through intellectual capital and knowledge assets that are attributed to the organisation . While Jugdev, Muller and Hutchison (2009) points out that intangible resource like tacit knowledge and skills are the ingredients for competitive advantage. Franklin (2009) proposes that modern project managers shall require new

competency to extract knowledge from the abundance of information available in the future. According to Cleland and Bidanda (2009), the single biggest dilemma will be the transfer of skills and knowledge from aged retiring professionals to the next generation of work force.

With the advent of the internet and sophisticated communication technology, the world has become a hyper-connected environment creating a conducive environment for instant and spontaneous communication for collaboration and engagement. Project managers must use this electronic age and social networking media to their advantage to communicate more efficiently and effectively (Weinstein and Jaques, 2010).

The future brings with it a plethora of challenges, which project managers must navigate through in order to be successful and triumphant. As Albert Einstein put it “problems cannot be solved with the same mind-set that created it”. It would take a special type of individual with a unique set of skills and competency profile to be able to adequately deliver on project commitments in the postmodern era.

### **2.10.2 Project Management Fraternities and Standards Debate**

The project management information and technical knowledge is captured in many different sources that have evolved over time and collectively referred to as the “PMBOK”. The PMI, originally an American body but now an international organisation, captured the knowledge and compiled a project management standard that was first released in 1996 and the latest fifth edition was released in 2013. The committee that developed this knowledge and standard comprises, leading academic scholars and researchers, leading knowledge experts and top project management professionals from the world (PMI, 2013).

Similarly the IPMA published their version of the ICB3 competence baseline, of which the third edition was published in 2006. This baseline is the common framework document which all IPMA member associations and certification bodies abide by to ensure that consistent and harmonised standards are applied. IPMA’s approach to project management is broken down into 46 competence elements, covering the technical, the professional behaviour and the relations with the context of the projects, programmes and portfolios (IPMA ICB 3.0, 2006).

Lastly, the APM, originally a United Kingdom body, published their version of the body of knowledge, with its sixth edition 2016. The APM body of knowledge is a key component of the APM 5 Dimensions of Professionalism. It defines the areas required to manage any

successful project and forms the basis of APM's qualifications, accreditation, research, and publications. The APM Body of Knowledge 6th edition has been written to support all those working in the profession. It has seven sections covering 52 knowledge areas (APM, 2016).

There has been a movement to combine all the body of knowledge's and create one universal "World BoK" to make the art of project management more consistent and application easier. In a study undertaken by Alam, Gale, Brown and Kidd (2008), it was established that there was contradiction amongst the standards and disagreements amongst scholars and that the merger would be seen to be detrimental to critical thinking and understanding.

While the standards provide a useful framework and basis with respect to tools and techniques, according to Thomas and Mengel (2014), it lacks the elements of behavioural and interpersonal competencies for the project practitioner in the work environment. PMI's certification has grown international in membership, also adopted by IEEE and ANSI standard authorities. In today's time many organisations are screening potential employees by virtue of their PMI credentials during recruitment processes.

Thomas and Mengel (2014)) criticized this practice because their view is that PMI's certification is poorly represented in soft behavioural competency side of things. While Belzer (2001), explains that the PMBOK is a merely a guide, suggesting processes and methods as part of project management which must also be challenged. Brill, Bishop and Walker (2006) also suggest that the standards are silent on the areas such as leadership, communication, problem solving and expert people skills. Alam et al. (2008) confirms that there are elements missing with respect to people and culture management.

Pollack (2007) highlights the stressful environment that projects are executed in and the PMI standards are elementary with respect to people human resource management, which is a critical competency element, required in order to be triumphant in this era. It would therefore appear from the current debate in literature, that IPMA's ICB 3 is the only comprehensive meaningful recognised standard which focuses on the behaviours aspects of project management resources.

### **2.10.3 Historical Disposition of the Model of Competence**

According to Boyatzis, (1982 pp20-23), the term competence can be defined as "an underlying characteristic of an individual, which is related to effective or superior performance in a job which could be motive, trait, skill, aspect of one's self-image or social

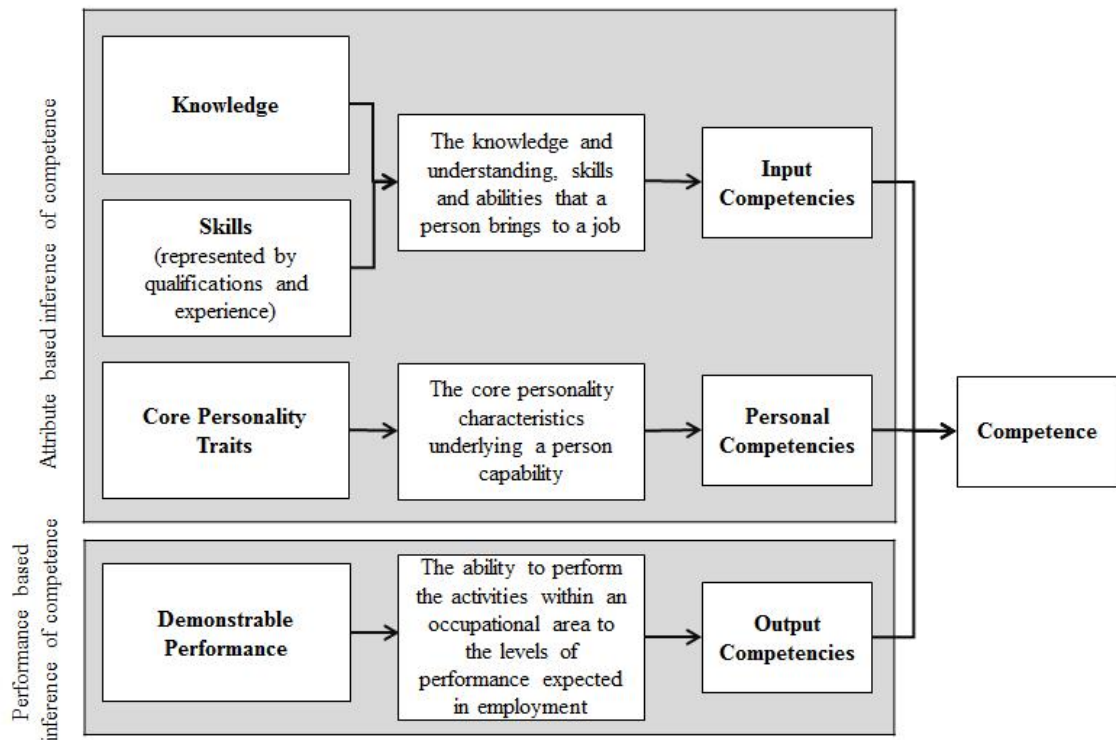
role, or body of knowledge which he or she uses.” Boyatzis (1982) model of competence includes the elements of behaviours, attitudes, skills and knowledge.

While Spencer (1997) proposes competence to be “an underlying characteristic of an individual that relates to criterion referenced and or superior performance in a job or situation.” They argue that this is a component of one’s personality and is a building block of one’s self that can be used to predict future performance and behaviour. Spencer (1997) model of competence include the elements of motives, trait attributes, self-awareness, know-how and skills.

Murray-Webster and Hillson (2011), expanded Spencer and Spencer model of competence to include five elements in assessing project management competence. The framework, also known as PEAKS includes: Personal Characteristics, Experience, Attitude, Knowledge and Skills. They assert that personal characteristic, experiences, attitudes and knowledge are the founding building blocks and when applied with skill, result in behaviours associated with competence.

Project management competency as defined by Goff (2008) is “consistently demonstrated and appropriately used in attitudes, behavioural attributes, skills and knowledge resulting in clear enterprise benefit.” Goff’s model is also known as the CASK ladder model of competency. Goff asserts that the application of knowledge and experience results in skills and if appropriately rewarded, it reinforces the behaviour in which attitudes and attributes are developed. If correctly repeated, growth results and performance will follow from competence. While asserted in Lecomber and Asumadu (2005) model of competence, the knowing what to do, knowing how to do it, the desire to do it and the opportunity of frequency to do it.

The IPMA ICB 3.0 (2006) define competency as “demonstrated ability to apply knowledge and or skills, and where relevant, demonstrated personal attributes”. According to the ICB 3.0 competence is Knowledge plus Experience plus Personal Attributes. Crawford (2013) argues an integrated view of competence and he see’s knowledge and skills as inputs competencies and when combined with personal competencies, they form attribute based components of competency. Figure 2.7 on page 32 outlines Crawford’s view of integrated model of competency:

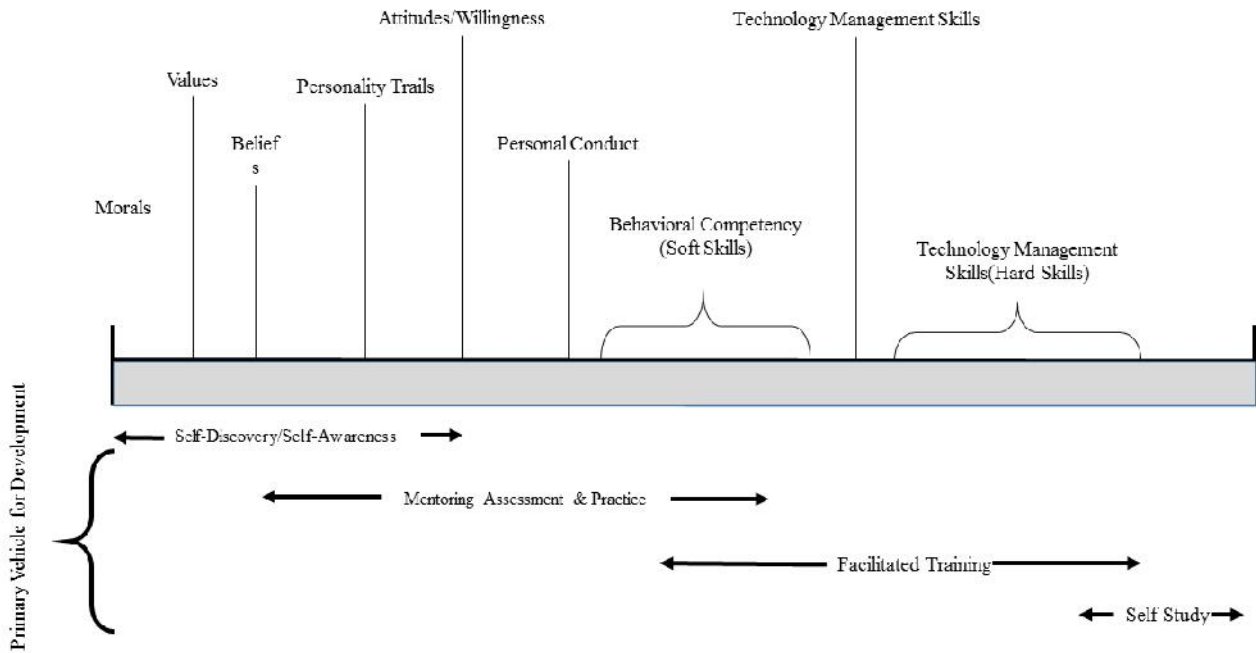


**Figure 2.7 Integrated model of competence**

**Source: Crawford (2005:9)**

Likewise the APM (2016) also asserts that a combination of knowledge, experience and behaviour are key ingredients of effective project management competence. In reviewing the literature it can be seen that there is alignment between, Crawford’s framework, Murray-Webster and Hillson PEAKs model that competency is a multi-facet construct. Alam *et al* (2008) contends that attitudes impress on to behaviours while knowledge and experience impress on to function.

In Heerkens (2002) view as cited by Semple (2011 p81), “ project resources hard skills, soft skills, functional competencies and personal traits that are distributed along a continuum of personal attributes as shown in Figure 2.8 on page 33. Goff (2008) calls this ability as talent, “the right combination of innate abilities, plus the knowledge, skills, attitudes, experience and competence to deliver performance for a specific situation.”



**Figure 2.8 Continuum of personal attributes and competencies and the associated development.**

**Source Adapted from Heerkens (2002:40)**

### **2.10.4 The Ingredient of Soft Skills**

People are the most important component of a project, forming the management resources and other vested stakeholders (APM, 2016). A significant amount of time is exhausted on resolving people challenges rather than the critical path project deliverables (Busch, 2008). The management of this resource according to Busch (2008) can be very complex in meeting expectations, improving efficiencies and resolving issues. Quinn and Wilemon (2009) concur with this and suggested that while technical problems are unavoidable, many issues arise from interpersonal conflict, personality disparities, poor communication and cultural diversities between people and stakeholders. This is also confirmed by Pinto and Kharbanda (1995) that project managers encounter more people behavioural and managerial issues as opposed to technical problems. According to Pinkowska and Lent (2011), soft skills pertaining to project management can be defined as “all interpersonal skill which contribute to higher efficiency of the execution of the human factor related processes of project management”

(Belzer, 2001) argues that the element of “soft skill” is lacking in project management. He contends that the dimension of soft skills includes organisational effectiveness, communication, problems solving, team building, leadership, flexibility, creativity and trustworthiness. While Flannes (2004) advocates that soft skills involve “the abilities to communicate effectively on interpersonal levels, wear different hats, apply a system that identifies individual differences, motivate individuals and teams, productively manage conflict, manage and mediate personal professional stress, and become active in on-going career management”. Heerkens (2002), also asserts that project managers must have a broad knowledge of human behaviour and be able to apply appropriate interpersonal skill in order to get people to do things in the project environment.

It is therefore proposed that while project management technical skills are critical and classified as a baseline competencies, soft skill competency is an attribute that separates good project managers from great project managers.

#### **2.10.5 Behavioural Competence**

According to Mirabile (1997), behaviour can be a definitive expression of competency because behaviour can be defined as “observable demonstration of some competency, skill, ability or characteristic.” While Goff (2008) advocates that project success is dependent on the behavioural attributes of the project manager. Bedingfield and Thal Jr (2008) concurs with this sentiment and indicated that the personality attributes of a project manager is a good predictor for project success since behavioural attributes are a reflection of one’s personality. According to the IPMA (2006) ICB 3.0, project management competency is categorised into technical range comprise 20 competency attributes, behavioural range comprising 15 competency attributes and contextual range comprising 11 competencies. These attributes according to IPMA (2006) are intertwined and must be seen as an integrated facet that is referred to the IPMA “Eye of Competence”. These criteria are used to evaluate and certify the competency level of incumbent project managers and serve as a basis for training and development programmes for project management.

In the PMBOK PMI (2013), interpersonal skills and behavioural competency is classified as a “tool and technique” leverage by project personal to achieve project outcomes. Other areas of PMBOK PMI (2013) that make strong reference to project management interpersonal skill is in the human resource and project communication knowledge area group

While the APMBOK APM (2016) clusters project management soft skills and behavioural attributes in the people and profession sections. APM contends that these sections of the APMBOK must never be used in isolation and all knowledge areas must be assimilated for a particular situational application.

The table 2.2 below present a comparative view of the behavioural competency standards from the different project management fraternity.

**Table 2.2 Behavioural Competency Standards comparison.**

**Adapted from IPMA (2006), PMI (2013) & APM (2016) as cited by Semple (2011).**

IPMA ICB 3.0 (2006) Behavioural Competencies (15)	PMI PMBOK (2008) Interpersonal Skills (8)	APM BOK (2006) People & the Profession (9)
<b>Leadership</b>	<b>Leadership</b>	Communication
Engagement & motivation	Team building	Teamwork
Self-control	Motivation	<b>Leadership</b>
Assertiveness	Communication	Conflict management
Relaxation	Influencing	<b>Negotiation</b>
Openness	Decision making	Human resource management
Creativity	Political & cultural awareness	Behavioural characteristics
Results orientation	<b>Negotiation</b>	Learning & development
Efficiency		Professionalism & ethics
Consultation		
<b>Negotiation</b>		
Conflict & crisis		
Reliability		
Values appreciation		
Ethics		

It is evident that the 3 standards present with an element of similarity and correlation in the behavioural elements.

### 2.10.6 IPMA ICB 3.0 Competence Framework

According to the IPMA (2006) ICB 3.0, “a competence is a collection of knowledge, personal attitudes, skills and relevant experience needed to be successful in a certain function” Competence in the field of project management is broken into 3 competence ranges. Figure 2.9 on page 36 unpacks the different competency attributes that make up the project management maturity framework.

1. Technical competences	2. Behavioural competences	3. Contextual competences
1.01 Project management success	2.01 Leadership	3.01 Project orientation
1.02 Interested parties	2.02 Engagement	3.02 Programme orientation
1.03 Project requirements & objectives	2.03 Self-control	3.03 Portfolio orientation
1.04 Risk & opportunity	2.04 Assertiveness	3.04 Project, programme & portfolio implementation (PPP implementation)
1.05 Quality	2.05 Relaxation	3.05 Permanent organisation
1.06 Project organisation	2.06 Openness	3.06 Business
1.07 Teamwork	2.07 Creativity	3.07 Systems, products & technology
1.08 Problem resolution	2.08 Results orientation	3.08 Personnel management
1.09 Project structures	2.09 Efficiency	3.09 Health, security, safety & environment
1.10 Scope & deliverables	2.10 Consultation	3.10 Finance
1.11 Time & project phases	2.11 Negotiation	3.11 Legal
1.12 Resources	2.12 Conflict & crisis	
1.13 Cost & finance	2.13 Reliability	
1.14 Procurement & contract	2.14 Values appreciation	
1.15 Changes	2.15 Ethics	
1.16 Control & reports		
1.17 Information & documentation		
1.18 Communication		
1.19 Start-up		
1.20 Close-out		

**Figure 2.9 Detailed IPMA ICB3 Elements of competency.**

**Source IPMA ICB3**

### **2.11 Critical Success and Failure Factors in Projects**

Trillions of dollars are invested throughout the world on different types of projects, programmes and portfolios. Therefore the cost of failure can have a disastrous impact on society, the economy and the environment (APM, 2016). Countless of research undertaken by the APM, IPMA and PMI, leading fraternities in the profession of project management reveals that the key to project success is known, however the execution of this practice is flawed (APM, 2016). Research indicates that 80% of projects fail to meet their primary planned objectives (APM, 2016). According to Zuofa and Ochieng (2014), evidence in literature is vague on what makes up successes or failures in project management. There is still disagreement amongst scholars on what factors defines project successes and failures ((Thomas and Fernández, 2008); (Jugdev and Müller, 2005)).

The varying complexity, size and uniqueness that constitute many projects provide a variety of perspectives for stakeholders to interpret if a project is successful or a failure. According to Westerveld (2003) there isn't a common set of criteria to evaluate the project successes or failures. However, the school of traditional project management practitioners used the

iron triangle, also known as the triple constraint of scope, cost, time and quality to measure the success of a project (Cooke-Davies, 2002), (Jugdev and Müller, 2005, Atkinson, 1999). While Lim and Mohamed (1999) proposed project success in terms of micro and macro measure. Schedule, cost, quality, performance and safety make up the micro measures whereas the macro measures comprised the micro measures and the project deliverables during the operational phase. Zwikael and Globerson (2004); Belassi and Tukel (1996) and Raz and Michael (2001), proposed an additional dimension of customer satisfactions to the evaluation criteria while Thomas and Fernández (2008) argue business success and the achievement of organisational goals is imperative in evaluating project success. It therefore can be agreed that the perception of project success can be interpreted differently amongst individuals, industry specific and the project categorisations.

Zuofa and Ochieng (2014) argue that most of these perceptions on project success factors can be categories into two broad types. The first a subjective opinion view and the second is based on objective statistics like on budget, within time at the right quality to the satisfaction of stakeholders. With this in mind project success becomes less debatable. Similarly project failure can be interpreted as the not achieving success in an endeavour (Pinto and Mantel Jr, 1990). There are very few empirical studies in this space and hence the definition of project failure has no agreement amongst scholars (Pinto and Mantel Jr, 1990).

Projects are generally referred to as failed when the targeted cost, completion duration or scope has not been achieved. Ika et al. (2012) suggests, while projects may meet their criteria for scope, cost, time and quality, they can still be identified as failed because the aspiration of the stakeholders such as society have not been achieved. Nelson (2005), together with other researchers support this thinking and equally criticised that traditional indicators as a criteria for measuring project failures do not measure benefit, value add and learning and growth opportunities to the organisation.

Whilst there are many interpretations into the criteria that establish whether a project is a success or a failure, literature review reveals according to Zuofa and Ochieng (2014), it is undisputable that project success or failure is simply a perception of the different stakeholders and Ika et al. (2012) suggest that despite the controversy one must follow a broad definition.

### **2.11.1 Historical Disposition on Critical Success and Failure factors**

The first empirical study of project critical success and failure factors was undertaken by Rubin and Seelig (1967). Their study evaluated the impact of the project practitioner's experience on the successes of a project using technical performance as a measure. According to Rubin and Seelig (1967), the project manager's prior experience had little impact on project performance and whereas the size of prior managed projects influenced the project manager's performance.

In a theoretical study undertaken by Avots (1969), it was revealed that the choice of project manager, unsupportive top leadership and unexpected termination of a project were the foremost reasons for project failure while according to Baker et al. (2008), it was proposed that perceived performance should be used as a critical success factor as opposed to the triple constraint variables. In Hughes et al. (2004) study of factors that affect project performance, it was concluded that basic managerial principles, management systems and the lack of communication of goals were the key factors.

In Morris and Hough (1987), a study of eight large projects that had a significant impact on the economy, they identified that project objectives, technical uncertainty, innovation, politics, stakeholder engagement, compressed schedules, contractual and legal problems were the principal factors that influenced the project outcomes. In an attempt to classify critical success factors, Schultz, Pinto and Slevin (1987) proposed dividing factors into tactical and strategic classification. The strategic group contained project mission, senior executive oversight and project programming whilst the tactical group comprised of training, client engagement and human resource choice. Following on, Pinto and Slevin (1989) further proposed that relative importance of success factors was attributable to the lifecycle stage of the project. Conclusively in a separate study undertaken by (Pinto and Prescott, 1990), success factors varied depending on the stage that the project was in its lifecycle. When a project is assessed by external success factors, planning factors dominate tactical factors throughout the project lifecycle.

Table 2.3 on page 39 presents a comparison of the critical success factors that scholars have developed in the last four decades.

**Table 2.3 Comparison of Critical Success factors developed in literature.**

**Adapted from Belassi and Tukel (1996).**

Martin 16 (1976)	Locke 14 (1984)	Cleland and King 25 (1983)	Sayles and Chandler 26 (1971)	Baker, Murphy and Fisher 9 (1983)	Pinto and Selvin 7 (1989)	Morris and Hough 11 (1987)	APM (2014)
Define goals	Make project commitments known	Project summary	Project manager's competence	Clear goals	Top management support	Project objectives	Effective Governance
Select project organizational philosophy	Project authority from the top	Operational concept	Scheduling	Goal commitment of project team	Client consultation	Technical uncertainty innovation	Capable Sponsor
General management support	Appoint competent project manager	Top management support	Control system and responsibilities	On-site project manager	Personnel recruitment	Politics	Aligned Supply Chain
Organize and delegate authority	Set up communications and procedure	Financial support	Monitoring and feedback	Adequate funding to completion	Technical tasks	Community involvement	Proven Methods and Tools
Select project team	Set up control mechanisms (schedule, etc.)	Logistic requirements	Continuing involvement in the project	Adequate project team capability	Client acceptance	Schedule duration urgency	Appropriate Standards
Allocate sufficient resources	Progress meetings	Facility support		Accurate initial cost estimates	Monitoring and feedback	Financial contract legal problems	Commitment to Project Success
Provide for control and information		Make intelligence (who is the client)		Minimum start-up difficulties	Communication	Implement problems	Supportive Organisations
Require planning and review		Project schedule		Planning and control techniques	Trouble -shooting		Engaged Users and Operators
		Executive development and training		Absence of bureaucracy	Power and politics		Competent Project Professional
		Manpower and organization			Environment events Urgency		Capable project teams
		Acquisition					Secure Funding
		Information and communication channels					
		Project review					

In an attempt to address the gap in the literature, Belassi and Tukel (1996) proposed a new scheme where they grouped the CSF into four fundamental areas as follows:

1. Aspects about the project.
2. Aspect associated with project resources.
3. Aspects about the organisation
4. Aspects about the environment.

According to Belassi and Tukel (1996), this framework groups the critical success factor and also helps the project manager to understand the complexity and the intra relationship between factors in the different groups using a systems engineering approach. This will

assist project managers to monitor projects and evaluate their performance more accurately and have an early line of sight to implement corrective action seemingly and quickly.

### **2.11.2 APM Eleven Critical Success factors**

In a mixed method study commissioned by the APM (2014), researched by Philip Roe, eleven critical factors that contribute to successful projects were identified (Roe, 2014). Exploratory discussion with senior project management professionals and academic scholars followed by a quantitative survey of project manager professionals confirmed these factors. Each of the factors is defined below and a brief alignment to the literature review is presented.

#### **2.11.2.1 Effective Governance**

This refers to the framework that defines the responsibilities, accountabilities and the structure for decision making authority (PwC, 2014). It defines the roles and reporting lines of all stakeholders within a project context and how authority for approval will be made. The concept of effective governance was first identified by Martin and Tulgan (2006) as “organise and delegate authority” and Lock (1984) as “project authority from the top” while Sayles and Chandler (1971) defined it as “control systems and responsibilities”. In Morris (2013a), he agrees with the principle that project governance is a subset of enterprise governance because of considerable amount of assurance measures and instruments such as reviews and audits at stage gates during the late 1990 (APM, 2016). While Pinto and Slevin (1989) proposes that top management support that it is necessary to authorise resources and delegate power for project management successes. According to Deloitte (2007), “governance direction and oversight of projects” is a critical success factor in enhancing project outcomes.

#### **2.11.2.2 Capable Sponsor**

These are the individuals with the ultimate authority for project delivery and execute project outcomes accordingly. In Morris (2013), he asserts that 85% of project success and failures are attributed to the sponsor support in directing and control strategy on programmes and projects. Sponsors are generally senior members of the client organisation and take ownership for the client business case and represent their organisations interests (Morris 2013). The sponsor is also tasked with ensuring good governance of projects and they play the most influential role in the project (Morris, 2013). While Alexandrova and Ivanova

(2012) assimilates the agency administering the operational programme to be the sponsor on a portfolio of European Union project. Price Waterhouse Coopers (2014) also concurs with the role the sponsor plays in driving the programme and advocating sound governance in projects (PwC, 2014). Similarly, Eadie et al. (2013), Steinfort and Walker (2007) and PMI (2013) identify the sponsor as a CSF and the influence in terms of control and direction, exercised to a project.

#### **2.11.2.3 Aligned Supply Chain**

These are referred to as organisations that will supply resources in the form of raw materials, labour, technology and service to a project. They must understand what they are delivering (specification), when they are delivering and quality standard they are delivering to (APM, 2016). According to PwC (2014) “Integrated suppliers” are a critical success factor in delivering a project, while in Morris (2013) he focuses on “just in time” manufacturing and sophisticated systems tools like “Building Information Management” (BIM) that will assist in soliciting good suppliers and managing their outcomes.

#### **2.11.2.4 Proven Methods and Tools**

This is referred to as the best practice techniques, methods, standards and tools frequently applied in project management that are appropriate (APM, 2016). According to Mir and Pinnington (2014), there has not been a significant improvement in project success even though there is a substantive increase in the use of new project management methodologies and tools, however PMI (2013) argues that the use of a variety of methods and tools like agile systems and lean principles have a positive impact on project success. Jugdev and Müller (2005); Barker et al. (1988); Shehu and Akintoye (2009); Alexandrova and Ivanova (2012) all confirm that methodologies and tools are critical in managing projects and are considered as a critical success factor. Pinto (2007); Morris (2013) and Deloitte (2007) went on to further propose methods and tools that yield project successes when appropriately used.

#### **2.11.2.5 Appropriate Standards**

All the industry specific good practice standards applicable to project management in terms of quality, national standards, environmental, corporate social responsibility and health and safety standards that are recognised and adhered to (APM, 2014). The PMI, IPMA and APM all support that using the appropriate standards in plethora of project would most certainly enhance the success of projects.

### **2.11.2.6 Commitment to Project Success**

Alignment and will by all stakeholders for the project to be a success throughout the life cycle (APM 2014). (Eadie et al., 2013) suggests that project professionals and senior team members must be incentivised to improve their long term commitment to project success, while Jugdev and Müller (2005) observe the commitment of senior executives to provide strategic direction to a project is a critical success factor. Similarly Barker *et al* (1983), Steinfort and Walker (2007) and Chang et al. (2010) identify that, the buy in, goal commitment and other softer project characteristics are critical success factors.

### **2.11.2.7 Supportive Organisations**

This refers to the internal organisations structure, culture and environment. For example trade unions, communities, local authorities and project professionals (APM 2014). All must be supportive to the need of the project. In Price Waterhouse Coopers, (2014), it was agreed that in most projects and programmes must identify and manage stakeholders and influencers for benefit realisation and change control. Similarly Alexandrova and Ivanova (2012); Steinfort and Walker (2007); Jugdev and Müller (2005); Morris and Hough (1987) and Pinto and Slevin (1989) highlighted the role of the external environment in terms of politics, economy, social and effective communication amongst project stakeholders and influencers. While Deloitte (2013) and Morris (2013) point out the role of stakeholder alignment and the management thereof in the influencing and meeting of expectation as a critical project success factor.

### **2.11.2.8 Engaged Users and Operators**

These refer to the individuals that will be the final benefactor to the project (APM, 2014). They will use and maintain the final product. They must be engaged in order to develop the design of the project and be communicated on progress throughout the life cycle. This ideology is a top ranking CSF as supported by Jugdev and Müller (2005); Pinto and Slevin (1989); Belassi and Tukel (1996); Abdullah et al. (2009) and Bredillet and DWivedula (2009) highlight the importance of client, customer and user consultation and acceptance of deliverables at various steps and stages of the project life cycle. The Standish Group annual CHOAS report further confirms the importance of engaged users and operators as a critical success factor for project and programmes.

### **2.11.2.9 Competent Project Professional**

These are the individuals that will lead and manage the delivery outcomes of the project (APM 2014). They must be suitably qualified, skilled and have the appropriate experience and personalities to get the job done. Eadie et al. (2013) identified the need of competent project managers in terms of skills and experience. This was also supported by Price Waterhouse Coopers (2014); Alexandrova and Ivanova (2012); Steinfors and Walker (2007) and Pinto and Slevin (1989).

### **2.11.2.10 Capable Project Teams**

This refers to the subject matter experts that support the project in achieving its outcomes. They must be competent, qualified and experienced in their roles within the project (APM, 2016). Similarly this notion is proposed and highlighted as a critical success factor by the following scholars: Alexandrova and Ivanova (2012); Steinfors and Walker (2007) and Pinto and Slevin (1989).

### **2.11.2.11 Secure Funding**

The funding for the project must be secure throughout the life cycle (APM, 2016). The necessary business cases must be supported and approved and that the project cash flow must not be compromised. Necessary contingencies for risk items must be adequately costed and planned for. In Eadie et al. (2013), he argues that major and mega projects require large sums of funding and therefore assurance is critical to assess the readiness for construction execution. Similarly Price Waterhouse Cooper (2014) classify costs, secure funding and financial systems and process as while Martin (1976); Baker et al (1983), Murray et al. (2011) and Steinfors and Walker (2007) confirm that adequate secure funding and sufficient budget is a critical success factor for projects.

### **2.11.2.12 Other Success factors**

The above analysis highlights the eleven top Critical project success factors as directed by the APM (2014), while in literature the following extraneous factors are presented and highlighted by many scholars:

- Early Up front planning and early stage behaviour (APM, 2016).
- Project gate reviews and life cycle front end loading (APM, 2016).

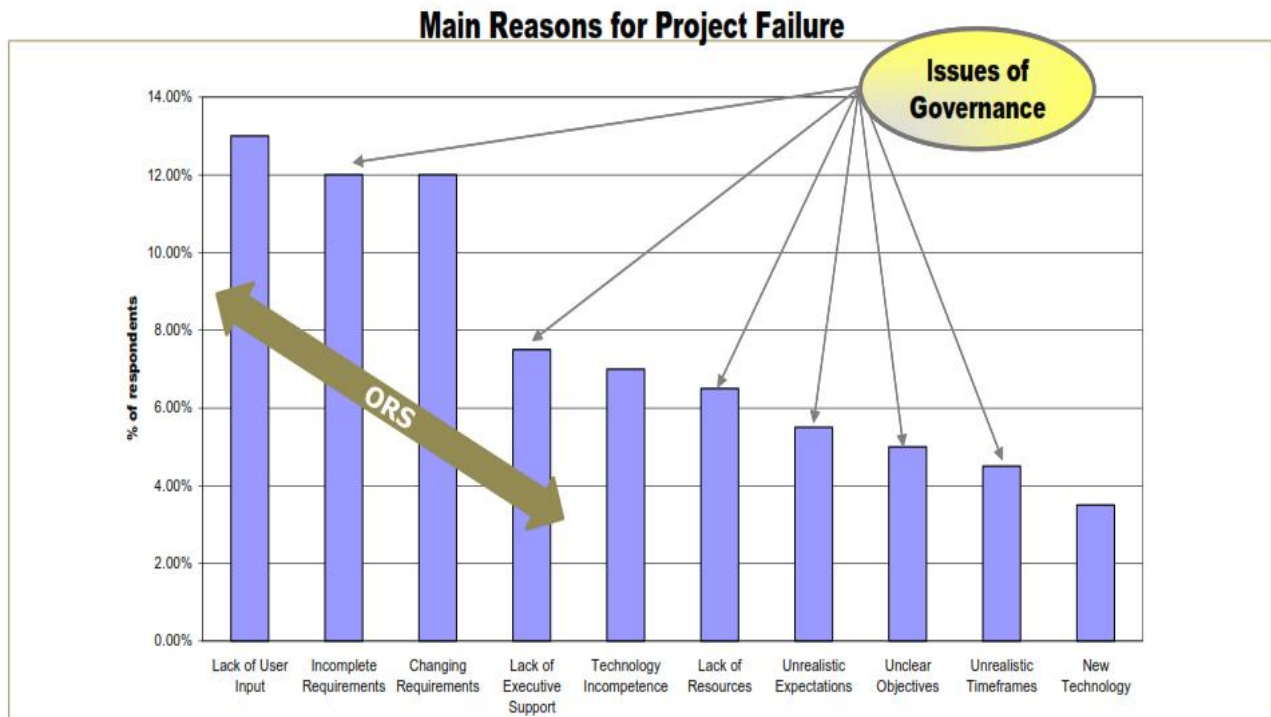
- Integrated risk management (Steinfort and Walker, 2007).
- Clear project objectives and alignment to Vision and Mission (PwC, 2014).
- The role of a project beginning a subset of larger programmes and portfolios (Brown 2014 and Cooke-Davies 2002).

## **2.12 Project Failure**

There is no agreement on the definition of project failure amongst scholars, however Fortune et al. (2011) argues that project failure is very specific to the environment and context of the project and occurs generally when the project critical success factors have not been achieved. A review of the critical success factors was undertaken in the previous section. According to the Standish (2004) Chaos report, reasons for project failure can be categories into macro perspective and a micro perspective. In Figure 2.10 on page 45, the top micro level reasons for project failure is presented and the associate percentage used as a reason for failure.

According to the Standish (2004) Chaos report, the macro perspective includes project failure, project termination, project that never started or have failed. The macro perspective is broadly summarised as follow:

- I. Projects fail because there is not clear company framework or methodology for their execution and the reasons are:
  - a. Inadequate information
  - b. Incompatible projects
  - c. Resources and them being overstretched
  - d. Lack of discipline
  - e. Ineffective resource management
  
- II. Projects fail because there is no clear business strategy and supporting reasons are:
  - a. Strategy is short term focussed
  - b. Misalignment of projects and business strategy
  - c. Inadequate criteria for ranking and making decisions
  - d. No strategic alignment with business plans and objectives
  - e. Functions may reverse previously made decisions.



**Figure 2.10 Main Reasons for Project Failure.**

**Adapted from Standish group, 2004**

### **2.13 Chapter Summary**

The review of literature in all the thematic areas associated with the research questions was evaluated. It provides the definitions of the key terminology as well as explored the theories in the respective areas that support and explain the factors associated with the research problem.

From the literature reviewed, it is evident that projects and programmes are instruments of executing corporate strategy. The PLP methodology is a world class methodology used in the execution of large infrastructure related projects. It is fit for purpose and provides an excellent framework in systematically and accurately evaluating the viability of an infrastructure investment prior to embarking on costly project capital expenditure. The PLP methodology provides a structure for project governance and good decision making. The PLP methodology is the result of project experience gathered over time and refined to a set of best industry practices supporting appropriate and critical success factors to project outcomes.

Literature also indicates that the manner in which Transnet classifies projects into different levels of complexity is in accordance with industry norms. The stage gate review process is aligned to industry best practice in accordance with the auditing practice board. The gate review panel members also subscribe to the general principles of good auditing and the ethical standards thereof.

The literature also provided a framework to evaluate the competency of project personnel and this was benchmarked against the Transnet project manager competency expectation. It is evident that the Transnet's project manager competency standard is aligned with the IPMA ICB3 elements of competency.

Finally the critical success factors influencing project outcomes was explored in the published literature and was used to evaluate and establish if these factors are embedded in the PLP methodology. It was evident that all of the key factors are built into the PLP framework and this therefore enhances the probability of positive project outcomes. Lastly an evaluation of the literature was undertaken to establish the key reasons why projects fail and this was used as a basis to develop the research instrument for exploratory data collection as well as the quantitative data collection instrument. The following chapter presents the rationale for research methodology

## CHAPTER THREE

### Research Methodology

---

#### 3.1 Introduction

This chapter of the report presents the strategy and design of the research study. It will outline the methodology and provide description to the techniques adopted in the design of the research. The target population is described and the indicative sampling technique is illustrated. The research instrument design is depicted for the quantitative data collection portion of the study, while the semi structured interview questionnaire development is defined for the collection of qualitative information for the study. The procedures for the statistical data analysis are described. This is followed by how reliability and validity is embedded into the study and how biasness was eliminated. The chapter finally closes with a review of how good ethical practices have been adopted into the study.

#### 3.2 Research Paradigm

According to Kuhn (2012), paradigms are a set of universally accepted thinking habits of researchers. These paradigms guide the process, the research design and the methods that will be adopted in the research. This study will lean towards a positivist paradigm. It is understood that the answers to the research questions can be objectively measured and discovered through scientific methods of precision and accuracy. Therefore the study would demonstrate purposiveness, rigor, testability, replicability and statistical precision (Sekaran and Bougie, 2013).

#### 3.3 Research Design

A research design can be considered as the blue print for gathering, measuring, evaluation and finally arriving to the explanation of the research problem (Sekaran and Bougie, 2013). Due to the complexity of the research problem, the research design selected for this study is a mixed method research design in which both quantitative and qualitative data is collected. This provides for a more comprehensive and deeper evaluation of the research problem than the individual methods alone. An exploratory sequential mixed method design was executed due to investigative nature of the problems facing Transnet. The root cause of the gate review failures have not yet being researched and identified, and this study will scientifically set out to establish these factors. The study will set to scope out the scale or range of the particular singularity as the area of investigation is fairly new and vague to TCP. In addition

it will test the feasibility and viability of undertaking more comprehensive and specialised studies pertaining to the high failure rate of project gate reviews.

### **3.4 Research Strategy**

The research design adopted for this study is an exploratory sequential mixed method. The data was collected over two distinct phases with the intention of having the qualitative results explaining more details of the quantitative results

#### **3.4.1 Phase 1 Qualitative Data collection**

In this phase a qualitative research questionnaire was developed. This took the form of a semi-structured face to face interview process with open end exploratory type of questions. According to the National Institute for Health Research (2009) face to face interviews are very labour intensive, however they are the best method in achieving high quality data. Respondents were given the opportunity to interpret the questions in their own way. A sample of the seven most senior professionals was solicited from the following occupational employee groups:

- Project Directors : 2 individuals
- Technical Directors : 1 individuals
- Principal Project Managers : 2 individuals
- Engineering Managers : 2 individuals

All individuals were interviewed in a single time frame due to the restricted time and labour intensity of the interview process.

The data was systematically analysed, evaluated and reduced. The data was scrubbed and allocated a numeric code. The responses from each of the participants were captured in tabular format for comparative purposes and all responses were finally summarised. A partial pre-coding system was developed in anticipation of possible responses. Results were analysed using NVivo software and interpreted complementary to the quantitative results.

This data was then used as an input to develop a research instrument together with other theoretical information. These findings were used in a second quantitative phase.

### **3.4.2 Phase 2 Quantitative Data collection**

In this phase, a survey instrument was developed from the results of the previous qualitative phase together with important findings from the literature review. The researcher took advantage of the abundance of the qualitative outcomes in the development of the research instrument. The focus of the strategy is to develop better measurements with the specific sample of the population. The target population was the project management and technical engineering profiled staff members.

The sample of people used in the qualitative phase was not included into the target population of the quantitative phase to prevent any duplication of information. The survey was a cross sectional survey and administrated through electronic medium. “Survey Monkey” was the selected electronic medium as it allowed for a structured interface for the statistical analysis of the data. Various statistical calculations and analyses of the data was undertaken using STATA version 14 statistical software package.

The output of the statistical data analysis was peer reviewed by an independent statistician, to ensure credibility and quality of the data set. The information was then assembled into graphical representation and then inferred and discussed under Chapter four of this dissertation. The validity and reliability of the data was established through triangulation.

### **3.5 Research Setting**

The study was conducted at Transnet Capital Projects, a Subsidiary of Transnet Limited. Transnet Capital Projects comprises of a population of one thousand and fifty (1050) staff members distributed randomly in various geographical towns of South Africa comprising of Durban, Richards Bay, Cape Town, Saladhana, Sishen, Port of Elizabeth, East London and Johannesburg. The staff members are all involved in the development and execution of capital infrastructure related projects in the port, rail and pipeline industry. The employees range from technical engineering personal to project management and project support services. The staff members also come from a mixed ethnic background and present a good reflection of the demographics of South Africa.

### **3.6 The Target Population**

According to the institute of statistics (2009), a population can be defined as a hypothetical set of objects that have similar characteristics and have an interest as a whole group for generalisation. The responsibility and the accountability for the execution of the Project Life

Cycle Process at TCP lay with the project management and technical engineering profiled staff members. Collectively this target population forms two hundred (200) personnel from the total staff complement of one thousand and fifty (1050) people. The 200 project management and engineering personnel are the population of interest for this study.

### **3.6.1 Sampling Strategy**

The survey of the entire population of 200 personnel was impracticable due to geographical dispersion of the population, budgetary and reduced time restrictions (Saunders, 2011). Based on the compromise between the accuracy of the findings and the financial and time constraints a probability sampling technique was selected for this study. According to Gall et al. (2003), probability sampling is a procedure in which every unit in the population has a chance (non-zero probability) of being chosen in the sample and this chance can be precisely determined.

### **3.6.2 Stratified Sampling**

In this study, the TCP population sample frame was stratified into project management and engineering personnel forming a homogeneous and non-overlapping subgroup or strata. A simple random sample will be drawn from this stratum of 200 objects.

### **3.6.3 Confidence Level**

Based on Krejcie and Morgan (1970) table for establishing the sample size of a given population of 200 objects, a minimum sample size of 132 subjects was required for 95% confidence with a 5% margin of error.

### **3.6.4 Sample for Qualitative Interview**

The individuals for the qualitative interview procedure were selected based on the following criteria:

- i. Position and role in organisation: Project Directors, Technical Directors, Principal Project Managers and engineering managers were selected because of their seniority and holistic view within the organisation.
- ii. Years of Experience: Individuals greater than 20 years project and engineering experience were selected.
- iii. Leading, directing and managing resources: Be able to understand the challenges and complexities of problems experienced by their team members.

The numbers of people selected for interview in each of the occupational categories are as follows:

- Project Directors : 2 individuals were required for the study of a population of 6 individuals
- Technical Directors : 1 individual were required for the study of a population of 5 individuals
- Principal Project Managers : 2 individuals were required for the study of a population of 8 individuals
- Engineering Managers : 2 individuals required for the study of a population of 8 individuals

### **3.7 The Research Instrument**

The qualitative data was collected through a face to face semi structured interview process while the quantitative data was collected through an electronic survey technique (Creswell and Clark, 2007a). This section will present the development of interview instrument as well as the survey instrument.

#### **3.7.1 Interview Semi Structured Questionnaire design**

A semi structured interview questionnaire was designed for the gathering of primary qualitative data. The key objective of the face to face interviews was to collate exploratory data from a convenience sample of seven (7) senior staff members. The questions were developed from the literature study and aligned to the main research questions. The main research questions were decomposed into a series of open ended questions. The questions were of an exploratory nature. Respondents were given the opportunity to interpret the questions in their own way and the interviewer probed for further information to draw upon the respondent's attitudes, beliefs, opinions, feeling and experiences that would not be feasible in the collection of other methods. The area of interest was centred on the main research question and key thematic areas arising out of the literature review listed as follows:

- a. Evaluation on whether the PLP Methodology is fit for Purpose. Five (5) sub opened ended questions were developed to collect information to evaluate this objective.
- b. Evaluation on whether the Stage Gate Audit Process is flawed. Five (5) sub opened ended questions were developed to collect information to evaluate this objective.
- c. Evaluation on the root causes of Project Gate Review Failures. Eight (8) sub opened ended questions were developed to collect information to evaluate this objective.

- d. Assessment of the maturity of Project resources. Failures. Eight (8) sub opened ended questions were developed to collect information to evaluate this objective

The questions were purposefully engineered to gather the perceptions and the behaviours of the sample population from the senior staff members. The detailed Qualitative semi structured interview question is presented in Appendix A.

### **3.7.2 Survey Instrument design**

A questionnaire was used as the instrument for primary data collection. This technique allows for rapid response for collection of information from the sample population since time was a constraint. The questionnaire was developed from the outcomes of the interview process and the literature review undertaken. The fundamental objective of the questions was to access the perceptions and the behaviours exhibited by the target population. In doing so, the data was used to answer the main research objectives and triangulate the confirmation of the literature review and the qualitative data. The questionnaire was composed of 56 constructs to assess the perceived importance of the causes of the stage gate review failures of the PLP methodology at TCP.

The questionnaire was structured into two distinct sections. Section 1 of the research instrument comprised five questions that collected the demographic information such as population group, gender, age profile; remuneration grade and occupational category.

Section 2 of the research instrument was used to collect information that would answer the main research questions. This section was further decomposed into four key areas aligned to each of the secondary research questions and thematic areas of interest. The area of interest were as follows:

- a. Evaluation on whether the PLP Methodology is fit for Purpose. Nine (9) statements were developed to evaluate this objective.
- b. Evaluation on whether the Stage Gate Audit Process is flawed. Nine (9) statements were developed to evaluate this objective.
- c. Evaluation on the root causes of Project Gate Review Failures. Eighteen (18) statements were developed to evaluate this objective.
- d. Assessment of the maturity of Project resources. Fifteen (15) statements were developed to evaluate this objective.

A five point “Likert” scale was used to gauge the perceived importance and agreeableness of various statements developed from the qualitative data collection phase and the literature study (Likert, 1932). The questions were purposefully engineered to test the perceptions and the behaviours of the sample population. The detailed research instrument is presented in Appendix 1.

### **3.7.3 Data Collection**

The qualitative research instrument was deployed electronically to the target population group via an email from the researcher containing a hyper link to the survey monkey electronic tool. The email contained a high-level brief of the background to the study and assurance was provided that the responses would be confidential and anonymous. The invitation to the survey and the consent form was also attached as part of the email. A reminder email was sent twice a week to the target population to encourage participation in the survey. The respondents were also invited to attend a workshop presentation on the outcomes of the study. The survey was opened for a duration of two weeks and an email was launched to advise the target group on the closing of the study. A total of 148 responses were accounted for on survey monkey.

## **3.8 Data Analysis**

Analysis of data can be described as the methodical systematic process of inspecting, cleaning, transforming, and modelling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making (Sekaran and Bougie, 2013).

### **3.8.1 Analysing and interpreting Qualitative Data**

Once the qualitative data was collected, a preliminary analysis was undertaken to achieve a general appreciation of the data. All the field notes and observations were analysed and a memo was compiled outlining the initial reflection on the data. A gap analysis was undertaken to establish if additional information was required or further clarity was needed. In this case the researcher contacted the participants for further information and further explanation on the collect data.

The data was then coded using lean coding technique, where a few words that described the phenomena were assigned. The sources of the coding words were solicited from the literature review in chapter two. Qualitative results were analysed using NVivo software and interpreted complementary to the quantitative results. Redundancy in duplicate code were

eliminated and a reduced more manageable list was developed. Codes were grouped into categories of ordinary themes, unexpected themes and social science themes. The codes were finally collapsed into themes which are the major ideas emerging from the data and they are the unique or surprising evidence that support the research phenomenon. The codes and the themes were then built into descriptive passages starting from a broad description and then funnelled into narrow description. In some case where concepts were too abstract, a visual graphical model was developed.

The findings were then presented into comparison tables and in some cases figures and diagrams that presented a visual depiction of the relationship between the themes. The data was then interpreted by contrasting against personal reflection and the literature review perspective. At this point in time the limitation of the study was addressed and any validation and accuracy challenges.

Finally the emerged themes, phenomenon and viewpoints were used as an input and basis to develop the quantitative research instrument.

### **3.8.2 Analysing and Interpreting Quantitative Data**

According to Bryman (2006), quantitative data analysis can be defined as a systematic approach to an investigation during which numerical data is collected and the researcher transforms the observations from the survey instrument into numerical data. Sekaran and Bougie (2013) suggests that before hypotheses testing can commence, the survey data must be captured, cleaned, scrubbed and establish how outliers and incomplete data will be treated and handled in the survey.

#### **3.8.2.1 Getting the Data Ready for Analysis:**

The survey was collected using “survey monkey” as a delivery tool. Survey Monkey was configured such that the participants could not proceed to the next question before answering the current question. This is referred to as modal windows and this prevented the omission of data and incomplete survey questions from being returned. Survey Monkey presents the data in an editable excel format data base and hence there was no need for capturing of the survey. The data was then coded by assigning numbers to the participant’s response. The data was check for inconsistencies and possible coding errors.

### **3.8.2.2 The Data Analysis**

The data collected, was analysed using descriptive statistical techniques. Sekaran and Bougie (2013) suggests that the researcher must obtain a visual summary and check the central tendency for the dispersion of variables before detailed analysis can commence. The mode, median, mean, standard deviation and variance provided a gut feel on how the respondents of the survey have reacted to the questions in the survey instrument. Frequencies indicated the number of time various subcategories of a certain phenomenon have occurred. After this preliminary analysis of the data, a detailed analysis was undertaken to establish the goodness of the data.

STATA version 14, statistical package was used to undertake all statistical calculation for the multiple choice statements. Appropriate inferential statistic calculations were undertaken to establish correlation, regression, principal component analysis testing largely dependent on the amount of variables and the gauge of measurements. The output of the statistical data analysis was peer reviewed by an independent statistician, to ensure credibility and quality of the data set. The information was constructed into graphs and then deduced and discussed under Chapter four.

## **3.9 Validity**

Validity can be defined as a test of how well an instrument that is developed measures the particular concept it is intended to measure (Sekaran and Bougie, 2013). There are several types of validity test that are used to test the goodness of measure. The following 3 broad heading summarise the test methods and their relevance in the study:

### **3.9.1 Content Validity**

This ensures that the measure includes an adequate and representative set of items that tap the concept. The more the scale items represent the domain or universe of the concept being measured, the greater the content validity. It is a function of how well the dimensions and elements of a concept has been delineated (Kidder and Judd, 1986). Face validity indicates that items that intended to measure a concept, do on the face of it, look like they measure the concept.

### **3.9.2 Criterion-related Validity**

This was established when the measure differentiates individuals on a criterion it is expected to predict and is done through concurrent validity or predictive validity (Wainer and Braun, 2013). Concurrent validity occurs when the scale discriminates individuals who are known to be different while predicative validity indicates the ability of the measuring instrument to differentiate amongst individuals with reference to a future criterion (Sekaran and Bougie, 2013).

### **3.9.3 Construct validity**

This testifies to how well the results obtained from the use of the measure fit the theories around which the test is designed (Sekaran and Bougie, 2013). This is assessed through convergent and discriminant validity. The former is established when the scores obtained with two different instruments measuring the same concept are highly correlated. The latter is established when, based on theory, two variables are predicted to be uncorrelated and the data empirically confirm this predication. Construct validity can be established through correlational analysis, factor analysis and multitrait methods.

The goodness of measure for this study will be established through the different kinds of validity and reliability. During the design stage validity was established by selecting the most appropriate methodology, survey instrument, sample size and the target population. At the data collection stage validity was maintained by tailoring the instrument to situational factors, by ensuring a consistent and standard procedure for data collection and limited the non-return of questionnaires and dropout rates by incentivising respondents.

Validity was also be ensured during the data analysis stage by preventing subjectivity in the analysis of data, by using the most appropriate statistical data analysis techniques and tests, by avoiding the selective use of data and making inferences and generalisation beyond the data. All qualitative data was appropriately codified.

Finally at the data report stage validity was maintained by not making claims that were not supported by the data and that the research questions are answered. The research data was also not used selectively and unrepresentatively.

### **3.10 Reliability**

According to Sekaran and Bougie (2013), the reliability of a measure is an indication of the stability and consistency with which the instrument measures the concept and helps assess the “goodness” of measure. For the purpose of this study the split half approach was undertaken to measure reliability (Bollen, 1989).

The calculation of the Cronbach’s coefficient alpha was also used to establish reliability of the data (Cronbach, 1946). The higher the coefficient the better the measurement.

Further the reliability was improved by writing items clearly and well worded, making test instructions easily understood and training participants where possible by making rules for scoring as explicit as possible (Nunnally, 1978).

### **3.11 Triangulation**

According to Collis and Hussey (2013) triangulation refers to the use of different approaches, methods, techniques and their combination thereof in the same study. Jick (1979) suggests that triangulation is used to overcome the dilemmas inherent in the use of a single methodological persuasion and is the fundamental rationale for mixed method research.

While there are four fundamental types of triangulation, this study will adopt methodological triangulation to establish validity or resolve issues around distortion if the conclusions from the qualitative and quantitative methods are the same (Denzin, 1970). This methodological approach will encompass combining the data from interview process element of the smaller purposeful sample of project directors, principal project managers and principal engineers (qualitative data) with the data of the survey from the target population group. (quantitative data) to provide further depth of understanding, explanation of the findings and parity of the outcomes (Creswell and Clark, 2007b).

Denzin (1970) and Jick (1979) both confirm that triangulation in this study will most certainly increase the validity and reliability of the outcomes of the study and therefore foster credibility by stimulating the researcher to look at the research problem from different angles.

### **3.12 Elimination of Bias**

Bias can affect the outcome and distort the results of the study (Penwarden, 2013). The researcher has limited and or eliminated the concerns of research bias in the study. The following presents an account on how research bias has been managed in the study:

#### **3.12.1 Design Bias**

Design bias occurs when the researcher does not factor and account for the inherent biases of the research into the study. Whilst some biases in the study are unavoidable, the researcher made certain to understand all the phenomena associated with biasness and tried to the best of his ability to lessen the impact and to factor it in the analysis and statistical calculation. Another type of design bias that could occur is when the researcher does not report his mistakes and or errors of the study. In this case all misgivings were adequately reported.

#### **3.12.2 Selection Sampling Bias**

Sampling bias is an inherent bias that occurs during the selection and or the omission of selected sample for the study. Certain sample groups can be included or excluded and this could distort the results of the survey. The researcher was aware of this potential problem and incorporated and accounted for this bias in the experimental design and noted that the results could not be extrapolate to fit the entire TCP population.

#### **3.12.3 Procedural Bias**

Procedural bias occurs when the respondents are rushed and pressurised to provide an answer during an interview process or given limited amount of time to answer a survey questionnaire. This was managed by the researcher by ensuring that all participants were given adequate time to answer questions and surveys. The researcher also obtained permission from the organisation for individuals to participate in the survey and interview process, thereby not imposing any time restriction pressure on the individuals.

#### **3.12.4 Measurement Bias**

When errors occur in the process of measuring during the data collect process is referred to as measurement bias. A defective measuring scale in the survey questionnaire can invalidate the entire study. The researcher has ensured that the research instrument is properly calibrated and worded appropriately to prevent any measurement bias. A pilot run of the

instrument was undertaken to eliminate any potential problem. In some cases participants were reluctant to give socially unacceptable answers because of being judged or victimised. In this situation the researcher reassured the participants on the ethical stance of the study in terms of maintaining confidentiality and anonymity of all collected data.

### **3.12.5 Interviewer Bias**

Interviewer biases generally occur in qualitative type research. It occurs when the interviewer either consciously or subconsciously give leading clues in facial or body expressions, that can influence the participant to give a distorted response towards the interviewer's preference. In this study the researcher was mindful of this challenge and maintained composure and did not give any biased expression during the interview processes that could lead the participants.

### **3.12.6 Response Bias**

Response bias occurs when the participants of an interview either consciously or subconsciously provide the researcher with answers that they believe the interviewer wants to hear. Participants feel that they understand the extent of the research and want to adapt responses to suit. In this study the researcher restricted the amount of information shared with the participants to prevent any form of interview response bias.

### **3.12.7 Reporting Bias**

Reporting bias occurs when the favourable outcomes of the study is reported more and find itself in literature more often than the negative outcomes of the study. In some case the negative outcomes are not publicized or buried. In this study the researcher is mindful of this form of bias and has ensured that both positive and negative outcomes of the study are given equal reporting opportunity.

## **3.13 Ethical Stance and Consideration**

The role of ethical conduct was imperative in every step of the research process and the researcher took the necessary care to ensure that no ethical violation occurred. According to Sekaran and Bougie (2013), ethics in business research is defined as an expected societal code of conduct that governs the norms of behaviour while undertaking research. The founding elements of good ethical conduct that the researcher adhered to was maintaining the quality and integrity of the research data and associated outcomes; the maintenance of

informed consent on all respondents of the research; the treatment of information pertaining to the respondents in a confidential and anonymous manner; the assurance that the participants were not coerced to be part of the research; that no harm to individuals or animal have occurred in the research and finally that all steps of process are independent and impartial. A gate keeper letter was solicited from Transnet Capital project granting authority to undertake the research on the organisation and the employees. A final certificate of ethical clearance was granted from the university's ethic committee.

### **3.14 Chapter Summary**

This chapter presented the research paradigm, design and the selected methodology for the execution of the study. The chosen methodology was motivated in terms of its relevance to the research problem. An overview on how the exploratory sequential mixed method procedure was implemented for the gathering and analysis of the data was presented. The chapter also provided information on the population, sample selection, survey instrument design, interview question design and how validity and reliability will be maintained. The elimination of bias was discussed and how it was managed throughout the study. Finally a discussion on how the ethical stance of the study and its relevance to the progressive stages of the research was presented. The next chapter will present the outcomes of the statistical analysis of the data and discussions linking the theoretical literature foundation to that of the findings.

## CHAPTER FOUR

### Presentation of Results and Discussion

---

#### 4.1 Introduction

This chapter presents the analysis, results, interpretation and discussion of the study. This study is a case study that seeks to explore root causes of project gate review failures when evaluated against a project lifecycle process methodology. The study employs both quantitative as well as qualitative design; an exploratory mixed method. Quantitative data was cross sectional and was analysed in STATA version 14. In keeping with the methodology all data was analysed at 95% confidence interval (Norušis, 2012). Analysis took the form of univariate (descriptive), bivariate (correlations) and multivariate (regression analyses). Following descriptive statistics is bivariate statistics, where two or more factors are correlated in order to establish if they are associated, and in what direction they are associated. Multivariate analysis is conducted in form of a Principal Component Analysis (PCA) in order to establish which factors have the greatest relationships. Qualitative results were analysed using NVivo software and interpreted complementary to the quantitative results.

The findings under each of the empirical methods is discussed and evaluated under each of main research questions. This chapter will further triangulate the findings of both the qualitative and quantitative methods. The literature review together with the discussions amongst scholars in the various thematic areas are linked to explain and support the manifesting phenomena where evident.

The chapter will unfold with the qualitative findings and then the quantitative findings, presented in five sections. The first section will be an evaluation of the demographic profile of the sample population and thereafter the finding and evaluation under each of the research objectives.

The results can be generalised to the entire population of Transnet Capital projects because of the probability sampling technique employed.

#### 4.2 Reliability

It is generally agreed that good data collection methods must be reliable and valid. Babbie and Halley (1995) describes reliability as the reoccurrence of the same results after numerous

repetition of the study methodology. Factor analysis generates reliability statistics (internal consistency) that will provide information on the reliability of the instrument used to collect data on bank selection criteria. Internal consistency is used to determine the consistency across items within a test and this will be used for assessing reliability of this study. Bourque and Clark (1994) stated that reliability is assessed for two purposes. Firstly to ensure the reliability of the scale is sufficient, and secondly to determine the effects of each item on reliability (Bourque and Clark, 1994). Sub-scale variance can also influence reliability. Therefore the order of the questions presented can influence the research (Bickart, 1993). To improve instrument reliability the survey will start off with more general questions (Bickart, 1993). For each of the Likert scale sub set of statements a reliability test is conducted.

**Table 4.1 Test scale = mean (unstandardized items)**

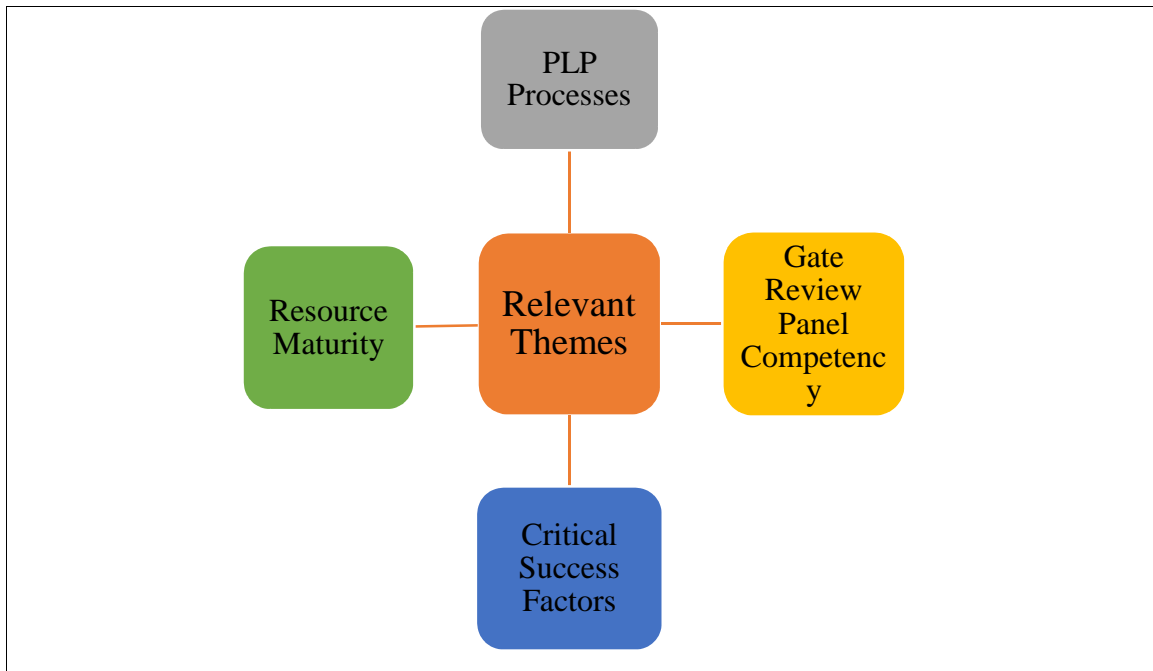
<b>Item</b>	<b>Test scale</b>
<b>Average inter item covariance:</b>	0.30006
<b>Number of items in the scale:</b>	51
<b>Scale reliability coefficient:</b>	<b>0.9521</b>

Table 4.1 shows the internal consistency of the 51 likert scale questions is 0.952, indicating very high reliability of the results.

### **4.3 Qualitative Results**

Semi structured interviews were conducted with seven staff members from whom transcripts were developed. NVivo software was thereafter used by the researcher to explore and present the data. The following four themes arose and are presented in figure 4.1 on page 62.

- PLP Processes
- Gate review panel competency
- Critical success factors
- Resource maturity



**Figure 4.1 Thematic analysis of the study**

**Source: The researcher, summary of NVivo Data (2016)**

#### **4.3.1 Overview of the Relevant Themes.**

Figure 4.1 presents an overview of the four themes that were identified is as follows:

Theme 1: This section evaluated the PLP methodology. The semi structured interviews with the seven staff members resulted in the conception of this theme, namely; PLP processes. This theme gave insight into the intentions of the methodology and its purpose and unpacked any possible problems.

Theme 2: This section evaluated whether the stage gate audit process was flawed. The semi structured interviews with the seven staff members resulted in the conception of this theme, namely; Gate Review Panel Competency. This theme gave insight into the possible problems with the audit review process.

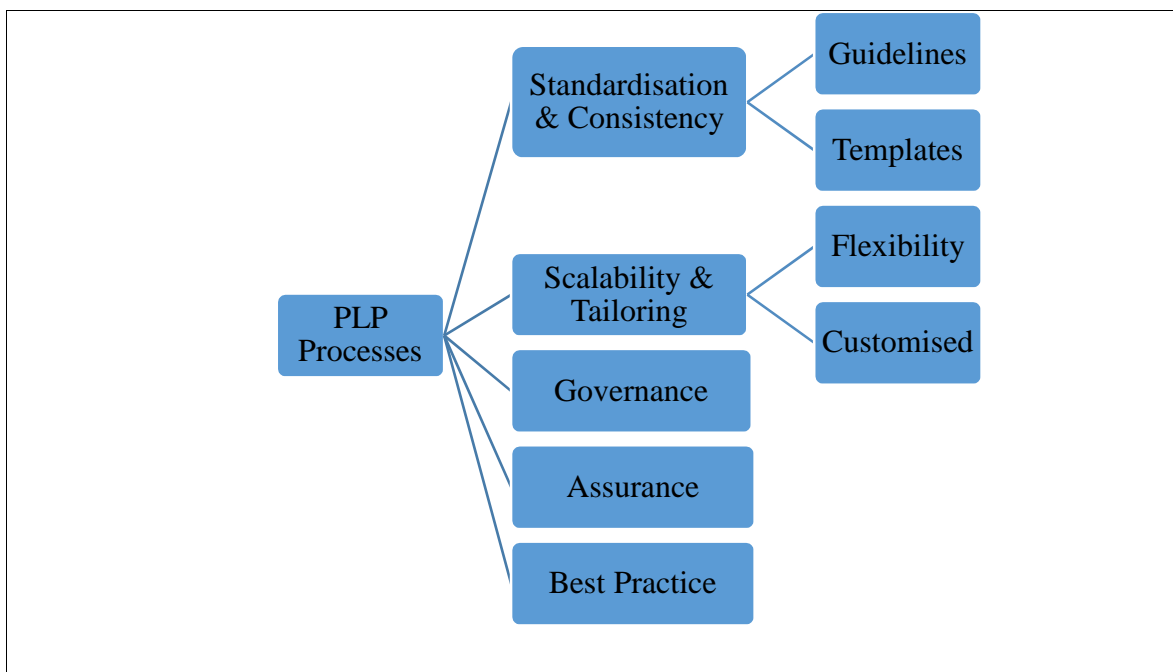
Theme 3: This section evaluated the root causes of project gate review failures. The semi structured interviews with the seven staff members resulted in the conception of this theme, namely; Critical Success Factors. This theme gave insight into the possible reasons for gate review failure at TCP.

Theme 4: This section assessed the maturity of Project resources. The semi structured interviews with the seven staff members resulted in the conception of this theme, namely; project management resource maturity. This theme gave insight into the project management resource maturity and to establish if it is a possible reasons for gate review failure at TCP.

The findings in each of the themes will now be presented and discussed below.

### 4.3.2 PLP Processes

The evaluation of the PLP methodology was the first objective that was investigated by the researcher. The main findings that resulted from this objective are shown in figure 4.2 below, which were standardisation and consistency, scalability and tailoring, governance, assurance and best practise. These findings are presented in figure 4.2 and discussed below.



**Figure 4.2 PLP Process thematic decomposition**

**Source: The researcher, summary of NVivo Data (2016)**

#### 4.3.2.1 Standardisation and consistency

Standardisation and consistency according to respondent 3, “*allowed for the alignment of all stakeholders*”. Respondent 7 in agreement stated that “*It minimises risk to the company*”.

*as we are consistent in our approach*". Respondents 1 and 3 also stated that *"the same standard provided an alignment of the team"*. Respondent 3 further stated that *"templates and guidelines provided employees with a reference to guide them when populating documentation"*.

The terminology, standardisation makes reference to the use of common terminology, processes and procedures. According to PMI (2013), this approach is based on agreed, defined scope level, evaluation techniques, and set deliverables, all executed within the framework of Transnet's minimum requirements for the definition and execution of Capital Investment projects. Therefore, the primary intent is to advise and guide all those directly involved in the development, evaluation and execution of capital intensive engineering projects. PMI (2013) also makes references to organisational process assets and the importance of having standardise, templates, procedures and sample documentation and guidelines. The core purpose of these organisational process assets are to improve consistency, efficiencies and effectiveness in delivering project objectives.

#### **4.3.2.2 Scalability and tailoring**

Scalability and tailoring refers to the ability of the PLP methodology to be adjusted to manage a vast array of different types of projects in terms of different size, complexities, stakeholders and risks.

According to respondent 2, *"the PLP methodology is fully scalable and flexible and can be customised to deal with any project across industry"*. Respondent 1 in agreement stated *"the PLP methodology is very scalable and flexible to suit any possible project at Transnet. It can be tailored and customised to suit"*. Respondent 4 however noted that *"scalability does not reduce effort and work"*.

According to Archibald et al. (2012), scholars have agreed that projects are unique and therefore any methodology used to achieve outcomes must have the flexibility to be tailored and scalable to suit the project. Scholars have agreed that the dimensions which are used to classify and categorise project are size, complexity, customer involvement, stakeholders (internally and external) and levels of risk.

#### **4.3.2.3 Governance**

Governance refers to the management control structure in terms of policies, procedures, responsibilities and accountabilities pertaining to the execution of projects.

When asked to comment on the PLP as a project governance control frame work; respondent 1 stated that the *“PLP is a very good governance framework”*. Respondent 4 in agreement stated *“Yes it is a good governance tool.”* Respondent 2 further stated *“This prevents errors, transparency, corruption, theft and fraud.”*

Both PMI (2013) and APM (2016) supports this notion in which project governance provides a charter for effective decision making on the organisation’s strategic objectives and stakeholders needs, or a situation where is no alignment.

#### **4.3.2.4 Assurance**

Assurance refers to the quality control processes and hold points that would give stakeholders comfort that due diligence was followed and adhered to.

The passing of a gate review according to respondent1 *“In the perfect world ...would give you assurance.”* Respondent 4 in agreement stated *“definitely gives a sense of comfort that you complied with governance framework.”* Respondent 6 further stated that a *“second pair of eyes increase the confidence.”*

According to the IIA (1999), assurance is a pledge, statement or guarantee of confidence, that a proposed plan will be successful. It is evident that there is alignment that the PLP methodology helps TCP achieve governance control and risk management through a structured, methodical and orderly approach.

#### **4.3.2.5 Best practise**

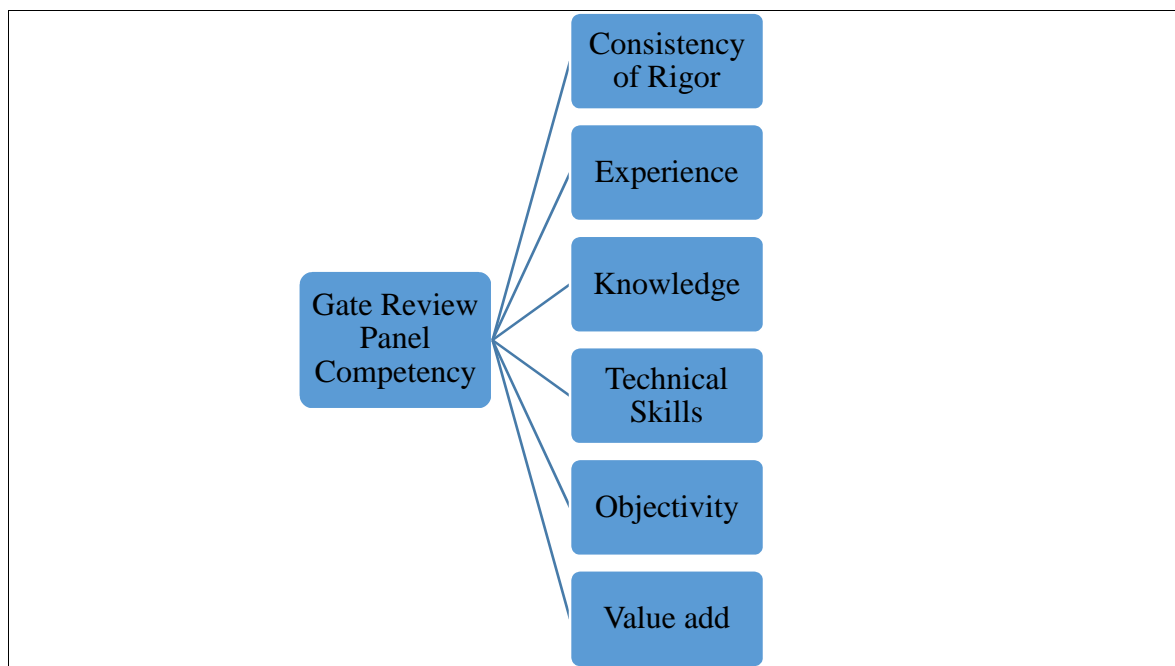
Best practice is related to the manner in which things are commonly done in industry according to accepted standards and norms like the PMBOK. When interviewees were asked to comment on the appropriateness of the PLP methodology; respondent 1 stated that *“The PLP is superior”* and is a *“great improvement to previous methodologies”*. Respondent 4 in agreement stated that the principles of the PLP *“are good industry practice”* and that the PLP was an *“accepted norm or benchmark.”* Respondent 7 however noted that even though the PLP was good *“it lacked detail from a commercial and operational perspective.”*

The project management knowledge is captured in many different sources that have evolved over time and collectively referred to as the “PMBOK”. There are 3 main institutes PMI, IPMA, and the APM and each have published a standard detailing best practice on how

projects are executed. The PLP methodology is built on these principles as directed by these professional bodies and is therefore benchmarked as industry best practice.

### 4.3.3 Gate review panel competency

The evaluation of the gate review panel competency was the second objective that was investigated by the researcher. The main findings that resulted from this objective are shown in figure 4.3 which were consistency of rigor, experience, knowledge, technical skills, objectivity and value add. These findings are discussed below.



**Figure 4.3 Gate Review Panel thematic decomposition**

**Source: The researcher, summary of NVivo Data (2016)**

#### 4.3.3.1 Consistency of rigor

The terminology consistency of rigour refers to the reliable application of the depth of interrogation in the review of gate review deliverables. The comments relating to panel members consistency of rigor in the gate review audit process are as follows:

Respondent 2 stated that “*panel members are not consistent because they are influenced and directed by the chair person*”. Respondent 6 in agreement stated that the “*expectation is to have consistency.*” Respondent 7 also noted that the “*consistency can be approved, but panel*

*members keep changing.*” Respondent 3 further stated that *“panel members must be trained to be consistent and have guidelines and check lists to be consistent.”*

The APB (2011) sets out the principles that guide the conduct of an audit process and the auditor. One of the founding principle is rigour, in which auditors and reviewer ensure that their work maintains thoroughness and professionalism. They critically evaluate all information, evidence and explanations to address the intention and objective of the audit or review (APB, 2011). The respondents are of the opinion that there is no consistency with this principle and therefore this compromises the stage gate audit review process.

#### **4.3.3.2 Experience, knowledge and technical skills**

The remarks pertaining to whether gate review panel members had the necessary experience, knowledge and technical skills; are as follows:

Respondent 4 stated *“no they don’t have the necessary skills, experience, technical knowledge and expertise.”* Respondent 7 in agreement stated that *“some have and some do not have. People that have been evaluated have more experience than panel members.”*

Another critical principle of the auditor’s code is the principle of competence: This is the ability to apply education, skills, knowledge and experience to execute professional duty (APB, 2011). The respondents are of the perception that gate review panel members do not demonstrate competence and therefore this a potential risk that compromises the stage gate audit review process.

#### **4.3.3.3 Objectivity**

The terminology, objectivity refers to an opinion without biasness and influence from third parties. The statements relating to panel member’s objectivity in the gate review process are as follows:

Respondent 3 stated that *“Panel members are not objective and can be easily influenced or swayed”*. Respondent 1 in agreement stated that *“the panel members are not objective.”* Respondent 2 further stated that the *“chairperson should adopt a neutral stance”*

According to Friedman (2015), internal auditing improve the firms effectiveness by ensuring assurance processes are independent, objective and fair. Similarly the IIA (1999) defines objectively as an unbiased approach that direct auditors to perform their assurance duty free from compromise and highest levels of integrity. Further the judgement on audit issues cannot be delegated to other. The respondents are of the perception that gate review panel

members do not demonstrate objectivity and therefore this is a potential risk that compromises the stage gate audit review process.

#### 4.3.3.4 Value add

Value add is the contribution and enhancement that the gate review audit process adds to the overall project management service offering. The remarks pertaining to the value that the gate audit review process adds are as follows:

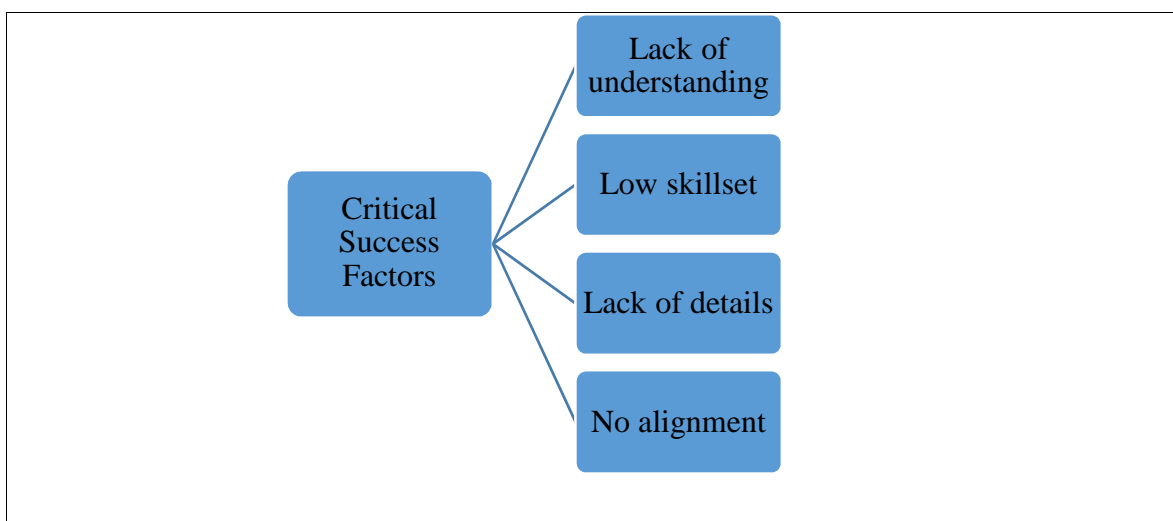
Respondent 7 stated that *“It is appropriate and does add value”*. Respondent 1 in agreement stated that *“If properly setup it adds value and eliminates white elephants or gold plating.”*

Respondent 4 however noted that *“it adds value only depending on who you have on the panel.”*

In addition, another founding principles is to provide value (IIA 1999): Auditors or reviewers ensure that their finding reports are developed with the highest level of quality and maintains reliability. They report constructive opinions and observations to stakeholders and hence adding value to efficient and effective administration of the organisational entity (APB, 2011). The respondents are of the perception that gate review panel members do not add value and therefore a potential risk that contributes to the effectiveness of the stage gate audit review process.

#### 4.3.4 Critical success factors

The evaluation of project critical success factors was the third objective that was investigated by the researcher.



**Figure 4.4 Critical Success Factors thematic decomposition**

**Source: The researcher, summary of NVivo Data (2016)**

The main findings that resulted from this objective are shown in figure 4.4 on page 69, which were lack of understanding, low skillset, lack of details and no alignment. These findings are discussed below.

**4.3.4.1 Lack of understanding**

The theme, “lack of understanding” is associated with the mental capacity of project management resource’s knowing and comprehending the expectation of the methodology. When reviewing comments relating to the understanding of the gate review processes are as follows:

Respondent 1 stated that *“A large proportion of the staff do not understand the methodology hence gaps are evident in the expectations.”* Respondent 5 in agreement stated that it is a *“lack of understanding of full scope.”* Respondent 7 further stated that there is a *“very limited understanding internally. External service providers have no understanding.”*

The thematic area of understanding hinges on two fundamental components, the first being an issue of competency and the second an issue of training and implementation.

Franklin *et al* (2009) suggests that project resources will need a fresh competency to extract knowledge from the abundance of information available in the future. According to Becker *et al.* (2011), the single biggest dilemma will be the transfer of skills and knowledge from aged retiring professionals to the next generation of work force. While asserted in Lecomber and Asumadu (2005) model of competence, the knowing what to do, knowing how to do it, the desire to do it and the opportunity of frequency to do it. The results appear to suggest that there is a problem how the PLP methodology is rolled out and implemented within the organisation and also eludes to the ability of the resources in how they comprehend and interpret the methodology.

**4.3.4.2 Low skillset**

Low skillsets makes reference to expertise, capability and ability to perform in the project management space by the technical resources. The remarks pertaining to the skillset level in Transnet Capital Projects are as follows:

Respondent 7 stated that *“there is a lack of skills and expertise.”* Respondent 4 in agreement indicated that staff was *“not skilled enough.”* Respondent 3 further stated that *“clients are also not suitability skilled and trained in preparing documentation.”*

Murray-Webster and Hillson (2011), model of competence, includes five elements in assessing project management competence. They assert that personal characteristic, experiences, attitudes and knowledge are the founding building blocks and when applied with skill result in behaviours associated with competence. Mature project management resources demonstrate skill and competence and the result suggests that TCP has a problem in this area and this could be an attributable factor resulting in projects failing at gate reviews. This is consistent with Goff (2008) and Lecomber and Asumadu (2005) model of competence.

#### **4.3.4.3 Lack of details**

The observations pertaining to the lack of details in the gate review process are as follows: Respondent 3 stated that there is *“no definition and a lack of detail.”* Respondent 1 in agreement indicated that *“more details are required.”* Respondent 4 further stated that *“clients are not clear on what he wants.”*

This element is linked to the inability of resources and clients to articulate what they require, in a detailed meaningful manner. Generally this is attributed to the lack of experience, knowledge and skills, which implies low competencies in the development of project scope and the result suggests that TCP has a problem in this area and this could be an attributable factor resulting in projects failing at gate review.

#### **4.3.4.4 No alignment**

When reviewing comments relating to the alignment between various facets of the gate review process, the following statements have been identified:

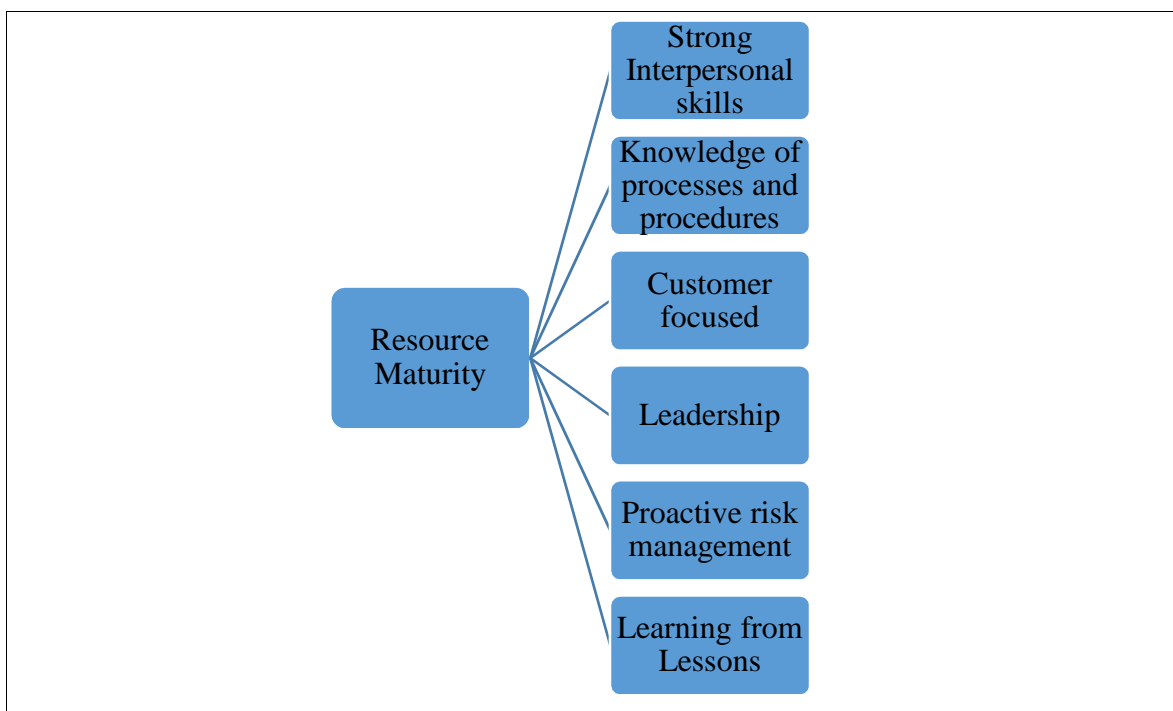
Respondent 6 stated that there is *“no strategy alignment, programmes, portfolios and projects with strategy.”* Respondent 4 in agreement stated that there is *“no alignment to strategy.”* Respondent 2 further stated that there is *“no alignment between strategy, portfolios, programmes and projects.”*

Projects are spawned as a result of strategic intent of the business. According to PMI (2013) projects are different from normal operations in that they are unique, novel and short lived while operation are repetitive and indefinite. The discipline of portfolio management ensures

that the programmes contained in the portfolio are aligned to a particular business strategy and prioritised according to strategic criteria and priorities. Programme management ensures that programmes meet strategic business objectives necessary for strategy implementation and deliver the benefits required by stakeholders. The results seem to suggest that there is a challenge with the translation of strategy into projects at TCP and as a result business cases and owners requirements specifications fail at gate reviews.

#### 4.3.5 Resource maturity

The thematic area of resource maturity is synonymous with competency in the knowledge area of project management. The evaluation of the resource maturity was the fourth objective that was investigated by the researcher. The main findings that resulted from this objective are shown in figure 4.5 which were strong interpersonal skills, knowledge of processes and procedures, not customer focused, leadership, proactive risk management and learning from lessons. These findings are discussed below.



**Figure 4.5 Resource maturity thematic decomposition**

**Source: The researcher, summary of NVivo Data (2016)**

##### 4.3.5.1 Strong interpersonal skills

The remarks pertaining to strong interpersonal skills in the assessment of maturity in resources are as follows:

Respondent 2 stated that project management resources must have “*strong interpersonal skills.*” Respondent 5 in agreement stated that “*interpersonal skills are vital.*” Respondent 1 also said that “*good clear communication is essential.*”

According to the APM (2016), people are the most important component of a project, forming the management resources and other vested stakeholders. A significant amount of time is exhausted on resolving people challenges rather than the critical path project deliverables (Busch, 2008). Quinn and Wilemon (2009) concur that many issues arise from interpersonal conflict, personality disparities, poor communication and cultural diversities between people and stakeholders. This view is also supported by Pinto and Kharbanda (1995) and Pinkowska et al. (2011) propose, soft skills pertaining to project management is essential to engage effectively with people. The alignment between TCPs and scholars on the dimension of soft skills is evident and supports the notion that project management resources must have the ability to engage and articulate work through people.

#### **4.3.5.2 Knowledge of processes and procedures**

The comments pertaining to knowledge of processes and procedures in the assessment of maturity in resources are as follows:

Both respondents 1 and 7 stated that project management resources must “*know business processes well.*” Respondent 2 stated that resources must further “*understand processes and systems.*”

By the definition as advocated by PMI (2013) and Kerzner (2013), the knowledge of processes and procedures is of paramount importance to project management resources and being able to leverage the organisation scale in terms of processes and procedures not only enhances governance but also organisational efficiencies and effectiveness in delivering project objectives.

#### **4.3.5.3 Customer focused**

The remarks pertaining to being customer focused in the assessment of maturity in resources are as follows:

Both respondents 6 and 7 stated that project management resources are “*not customer focused.*” Respondent 1, 2 and 5 however stated that resources are very “*customer focused.*” Respondent 4 further mentions that resources should not “*challenge customers.*”

Zwikael and Globerson (2004); Belassi and Tukel (1996) and Raz and Michael (2001), proposed an additional dimension of customer satisfactions to the evaluation criteria of project successes. They also highlight the importance of engaging customers on the design of the project and the progress throughout the life cycle. This ideology is a top ranking critical success factor as supported by Jugdev and Müller (2005); Pinto and Slevin (1989); Belassi and Tukel (1996); (Abdullah et al., 2009) and (Bredillet and DWivedula, 2009) in which they highlight the importance of client, customer and user consultation and acceptance of deliverables progressively during the lifecycle of the project. The results indicate a mixed perception on the customer management and focus at TCP, nevertheless, there is always room for further growth and improvement under this behavioural dimension.

#### **4.3.5.4 Leadership**

The remarks pertaining to leadership in the assessment of maturity in resources are as follows:

Respondents 6 stated that “*strong leadership is very important.*” Respondent 4 in agreement stated “*leadership translates the vision into reality.*” Respondent 1 further mentions that “*leadership is a critical and essential component for any project management team.*”

Leadership and leadership style is the most fundamental attribute of any project managers as confirmed by APM (2016), PMI (2013) and IPMA ICB 3.0 (2006). Leadership falls under the behavioural competency range and all three standards highlights the importance of leadership in delivering project objectives. APM (2014) refers to leadership as competent project professionals as a critical success factor of a project. It is highlighted in terms of being suitability qualified, skilled and have the appropriated experience and personalities to get the job done. Brown (2013) identified the need of competent project managers in terms of skills and experience. This was also supported by Price Waterhouse Coopers (2014); Alexandrova and Ivanova (2012); Steinfort and Walker (2007) and Pinto and Slevin (1989).

#### **4.3.5.5 Proactive risk management**

The comments pertaining to proactive risk management in the assessment of maturity in resources are as follows:

Respondents 1 noted that resources were “*not proactive in management of risks.*” Respondent 2 in agreement stated “*they are definitely not proactive.*” Respondent 5 mentions that the “*risk management is still evolving.*”

Risk management focus on the risk methodology which needs to be employed, identify the risks which have a potential of negatively impact the smooth progress of the project. The focus should be on internal and external risks, positive risks to the business should also be pursued. The APM (2016) also supports the notion of integrated risk management as a project success factor and this view is held by Steinfort and Walker (2007).

The results suggest that risk management at TCP is not being given the attention and detail that it calls for as in literature and best practice. Therefore risk management is an attributable factor resulting in high gate review failures.

#### **4.3.5.6 Learning from lessons**

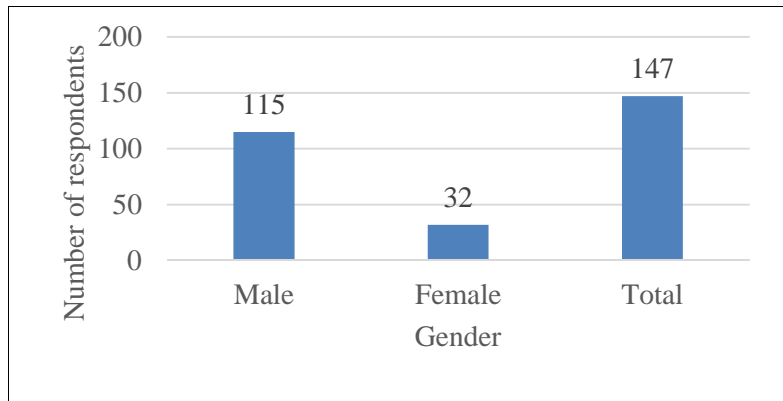
When interviewees were asked to comment on resources striving to learn from their and others past experience;

Respondents 1 stated that resources had *“no formal lessons learned workshops, or behaviours to learn from past mistakes. Keep making same mistakes.”* Respondents 2, 3 and 4 in agreement stated resources were *“not learning from mistakes.”* Respondents 6 and 7 however mention that the learning of lessons *“happen very informally and is limited and lots of improvement required in terms of structure and process, to leverage the benefits.”*

The results appears to advocate that project management resources at TCP don't learn and improve their skill from prior lessons or past experiences. The objective of lessons learned is to gather experiences and insights, be it negative or positive that can be shared with others and be implemented or applied to other projects. High performing mature project managers and organisations are consistently learning from their past lessons. Research undertaken by the APM, IPMA and PMI, leading fraternities in the profession of project management reveals that lessons learned reviews are powerful techniques adopted by mature project professionals to improve their competency and experience so as to not repeat the same mistakes in the future. It is therefore implied that the TCP project manager makes the same reoccurring mistakes and this can be an attributable factor that influences and contributes to gate review failure and an indicator of low project management maturity.

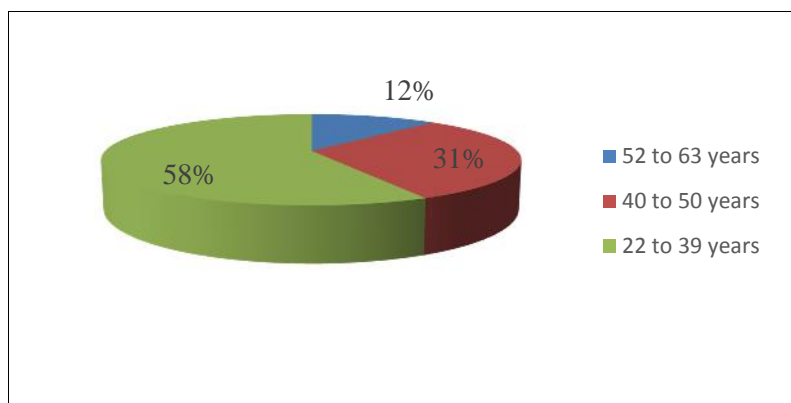
#### **4.4 Section 1: Respondents' Demographic Characteristics**

The total was 147 questionnaires a representation of 100% response rate. The following section provides respondents gender, age, organisational grade seniority and department they belonged to.



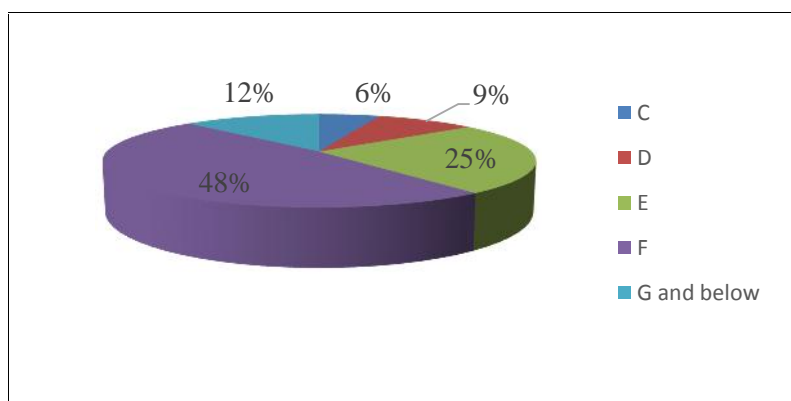
**Figure 4.6 Respondents according to gender**

Figure 4.6 presents the gender of the sample population that answered the survey. The total sample comprised of 78% male representation and 22% female representation. This result is a good reflection of the target population pertaining to the study and therefore any generalisation will be valid because of the probability sampling technique employed.



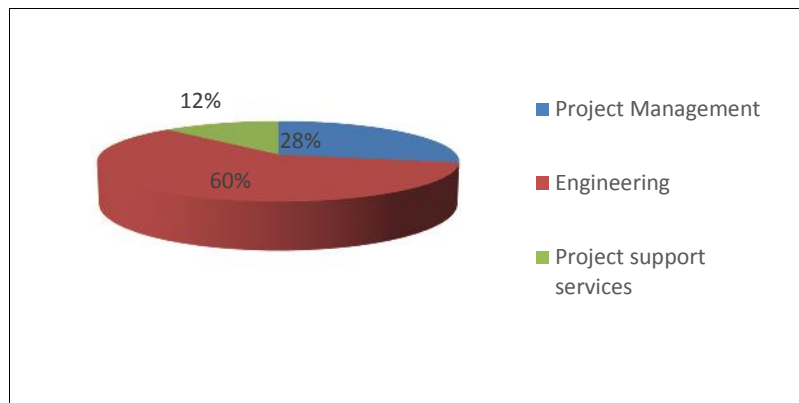
**Figure 4.7 Respondents according to their age Profile Cohort**

Figure 4.7 indicates that the majority (58%) of respondents were in the age group 22-39 years. These are followed by those who were 40-50 years (31%). The minority of 12% were aged 52-63 years. The data presented is a good reflection of the target population.



**Figure 4.8 Respondents according to Seniority in the organisation**

Figure 4.8 indicates that the majority of respondents belonged to the F-grade (48%). This is followed by those in the E-grade (25%). The F and E grade collectively make up the middle management population (73%). Notably, the C grade (6%) and the D grade (9%) make up the senior management level (15%). And lastly the G grade and below represent the non-management population of 12%. The data presented is a reflection of the target population. The results also indicates that majority of the respondents come from the middle management cadre of the organisation. This result is important since the project managers, engineers and project services support managers generally make up this grade. An important observation is the results could be subjected to an element of self-biasness since the respondents are appraising some of the critical issues pertaining to themselves and their behaviours.



**Figure 4.9 Respondents according to their Department**

Figure 4.9 indicates that a large proportion of respondents were from the engineering department (60%). These are followed by those in project management (28%). Project support service employees were in the minority 12%. Again the data is a good reflection of the target population of the study.

#### **4.4.1 Objective of the study**

In order to realise the primary objective of the study, the root causes of project gate review failure when reviewed against the Project Lifecycle Process Methodology at Transnet Capital Projects, secondary objectives were developed and tested. In each of the secondary objectives developed, a series of sub statements were constructed from the literature review and the qualitative data collection process. The statements were then evaluated using likert scale to establish the sample population's perception respectively (Likert, 1932). The

following section presents each of the secondary objectives and the respective evaluation of all the sub statements making up the secondary objective.

#### **4.5 Section 2: Project Lifecycle Process methodology is fit for purpose.**

To determine whether the PLP methodology is fit for purpose, respondent's attitudes towards nine statements were tested. The following is an account and discussion of the perception survey of the target sample:

Figure 4.10 on page 79, presents the result of nine constructs used to evaluate the of the target population's perception on their view that the PLP methodology is fit for purpose. The results of the five point Likert scale is summarised and discussed below.

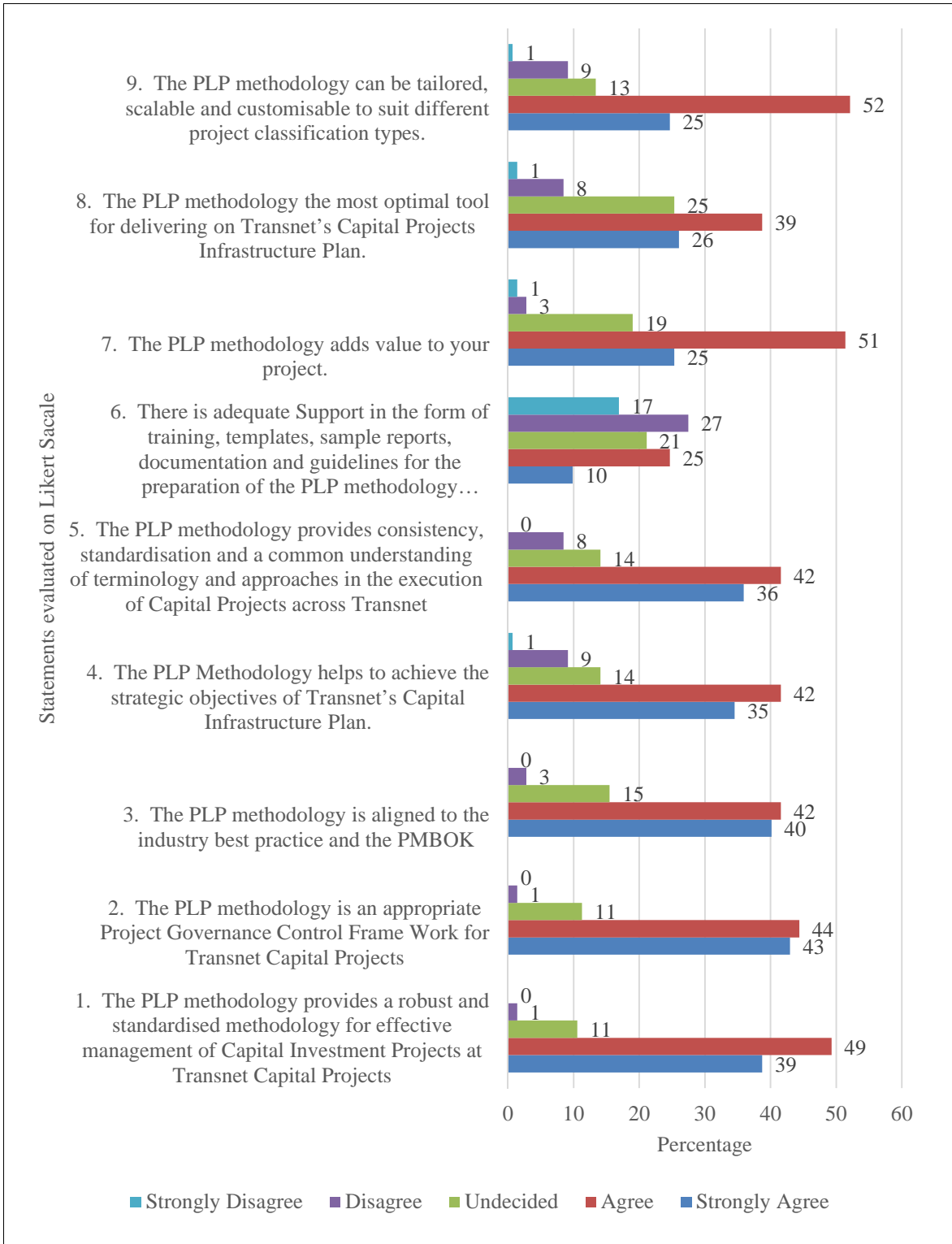
A large majority (88%) of the respondents concurred that the PLP methodology provides a robust and standardised methodology for effective management of capital investment projects and 87% of the respondents believe that the PLP methodology is an appropriate project governance control frame for Transnet Capital Projects.

Nearly 82% of the respondents are of the perception that the PLP Methodology is aligned to the industry best practice and the PMBOK while 77% of the respondents support the notion that PLP methodology helps to achieve the Transnet's capital infrastructure plan.

Three out of every four respondents (77%) believed that PLP methodology provides consistency, standardisation and a common understanding of terminology and approaches in the execution of Capital Projects across Transnet and 76% of all the respondents believed that the PLP methodology adds value to your project.

Almost 76% of the respondents are of the view that the PLP methodology can be tailored, scalable and customisable to suit different project classification types and nearly 66% of the respondents concur that the PLP methodology is the most optimal tool for delivering on Transnet's Capital Projects Infrastructure Plan.

A majority of 44% of the respondents did not support the opinion that there is adequate support in the form of training, templates, sample reports, documentation and guidelines for the preparation of the PLP methodology deliverables while 35% agreed with this notion. This result appears to suggest that there is a problem with the training, implementation and support of the PLP methodology in the form of guidelines and sample populated template documentation for Transnet Capital Projects.



**Figure 4.10 Evaluation on the Fit for Purpose of Project Lifecycle Process**

There was a generally positive, good observation in the results of all the construct. The results seems to suggest and support the notion that the PLP methodology is fit for purpose. An average of approximately 14% of the respondents took the middle stance and were

undecided on the various constructs. This result is expected since 12% of the sample comprise of junior project personnel, which are still developing and may not have a deep insight to the constructs to take a meaningful position. A further 2% of middle road group can be attributed to new recruits who are still in their early phases of orientation in their employment role and again are possibly uncomfortable in taking a meaningful position on the subject matter.

There was a consistently good alignment to the outcomes of the qualitative data collection process. Participants in general were in agreement that the PLP methodology is a superior project governance framework, which provided consistency and standardisation in the approach to project management. Respondent 1 mentioned *“the methodology provides a sense of comfort knowing that a second eye was cast over deliverables and any potential fatal flaws have been rectified”*.

Respondent 3 and 4 *“it enhanced project controls and could be classified as world class and good alignment to the PMBOK, and industry best practice”*. Respondent 1, 2 and 3 concurred that *“the PLP is very customisable, flexible and scalable”*; respondent 4 felt that *“the scalability did not reduce the level of effort and volume of work that this feature set out to achieve”*. With regards to the adequacy of support in the form of training, templates, sample reports and documentation, guidelines for the preparation of the PLP methodology deliverables, all respondents believed that training of the PLP was poor and below expectation. Respondent 3 mentioned *“There are no sample populated reports or templates. All templates are not regularly updated and lack guidelines on how to populate information”*. This is also consistent with the quantitative results.

In reviewing the historical development of project life cycles amongst scholars, it is evident from the results that the PLP methodology has alignment with the literature and is an accurate adaptation of Morris et al. (2000), the evolution of a project through progressive front end loading phases and the incremental investment of capital with evaluation gates in between the phases for go or no go decisions. There is clear conformation from the results that the underlying principles of the PLP are progressive elaboration, concurrent, integrated development and collaborative governance.

PMI (2013) concurs with this approach and defines in the PMBOK (2013) as: “Project governance enables organisations to consistently manage and maximize the value of project outcomes and align the projects with business strategy. It provides a framework in which

the project manager and sponsor can make decisions that satisfy both stakeholder's needs and organisational strategy objectives or addresses circumstances where these may not be in alignment." The results are further congruent with the APM (2016), core elements of governance frameworks for project management.

The outcome of the results harmonise with Archibald and Archibald (2015), view on the translation of strategy into portfolios, programmes and projects through the use of a governance control methodology. The results also support the notion that the PLP is consistent with Archibald et al. (2012), tailoring, scalable and customisable to suit different project classification types. It is evident from the results, that Transnet has adopted these principles to develop a project classification tool kit that is aligned with best practice, which can be tailored, altered and customised to suit any project type.

Transnet's project management governance framework (PLP methodology) is aligned with the current trends and incorporates the core elements of PMBOK (2013) that make up the framework. The PLP methodology incorporates and applies these core elements as a systemic tool for the review of projects against best practice.

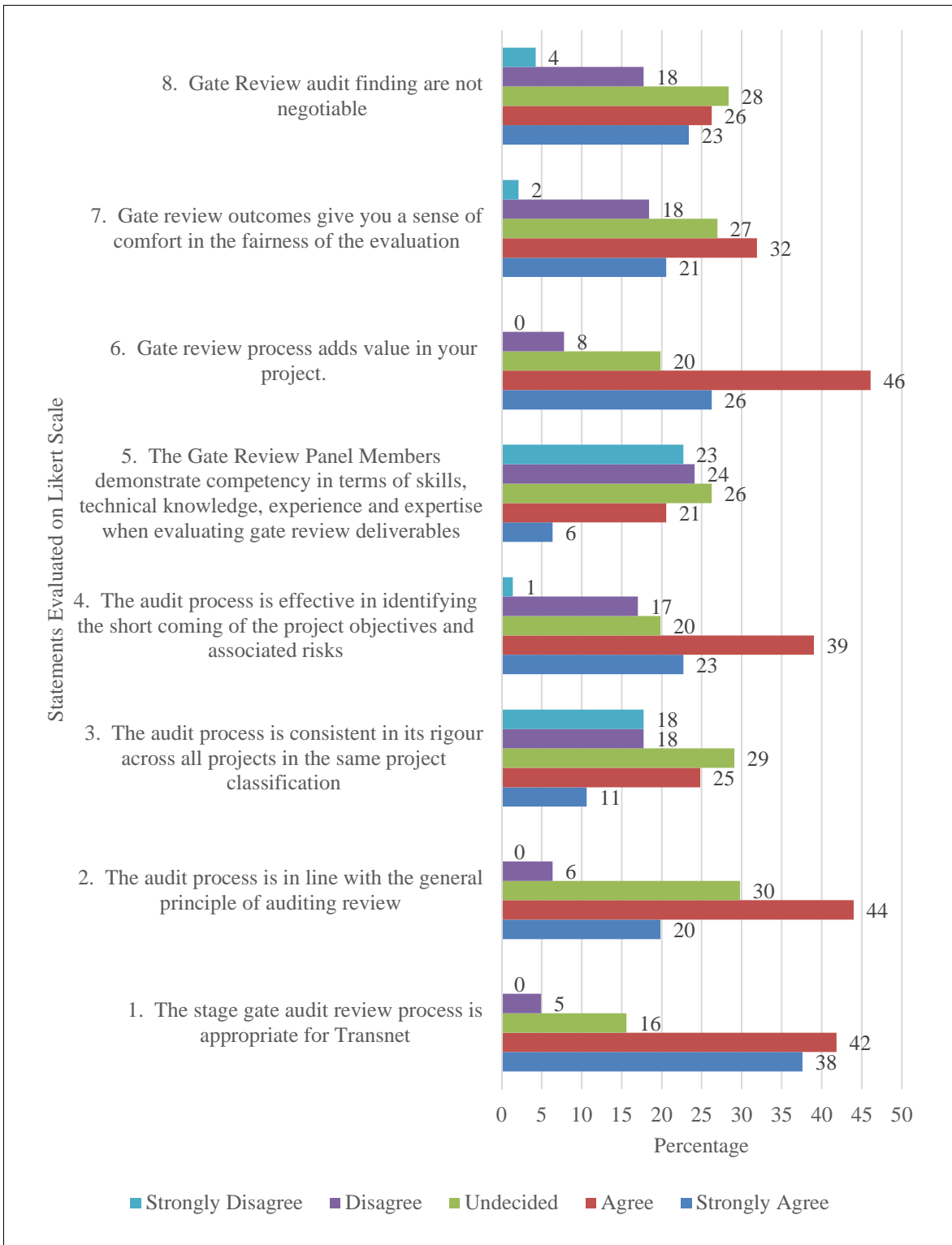
There is evidence in the interpretation of the results to suggest that there is a problem with the training, implementation and support of the PLP methodology in the form of guidelines and sample populated template documentation for Transnet Capital Projects. This therefore can be an attributable root cause factor resulting in gate review failure.

#### **4.6 Section 3: The effectiveness of the stage gate audit review process.**

To determine whether the stage gate audit review process is effective, respondent's attitudes towards eight statements were tested. The following is an account of the perception survey of the target sample.

Figure 4.11 on page 82, presents the result of eight constructs used to evaluate the of the target population's perception on the effectiveness of the stage gate audit review process. The results of the five point Likert scale is summarised and discussed below.

Almost 80% of the respondents agreed to the notion that the stage gate audit review process is appropriate for Transnet Capital Projects and 74% of respondents are of the view that the audit process is in line with the general principle of auditing review.



**Figure 4.11 Evaluation on the effectiveness of the stage gate audit review process**

Nearly 35% of all respondents believed that the audit process is consistent in its rigour across all projects in the same project classification; 29% were neutral and 36% did not believe so. There is a mixed perception on whether the audit process was consistent in its rigour across

all projects in the same classification. These results seem to suggest there is an indication that the consistency and rigour of the audit process is a problem. Of concern is that nearly 36% of the respondents did not support this notion.

There is a fair degree of disagreement (47%) amongst the respondents that the gate review panel members demonstrate competency in terms of skills, technical knowledge, experience and expertise when evaluating gate review deliverables. Approximately 26% were unsure and nearly 27% agreed with the notion.

Almost 62% of the respondents concurred with the perception that the audit process is effective in identifying the short coming of the project objectives and associated risks and 72% of the respondents believe that gate review process adds value to their project.

A majority (53%) of all respondents believed that gate review outcomes gives one a sense of comfort in the fairness of the evaluation and about half (49%) all respondents generally believed that gate review audit findings are not negotiable.

Overall, regarding the stage gate audit process, the majority of the respondents agreed to most of the elemental constructs. The results seem to suggest that the target population of Transnet Capital Projects are of the view that the stage gate audit process is appropriate for Transnet and is generally aligned with the principles of auditing review. The stage gate audit process also aids in identifying flaws in project objectives and associated risks. The audit process therefore adds value by giving project management resources a sense of comfort in the fairness of the evaluation. The outcomes are not negotiable and hence maintains the integrity of the audit review findings.

On average nearly 25% of the respondents took a middle stance on the constructs of this objective. As previously discussed 14% can be attributed to junior personnel and new recruits. The remaining 13% can possibly be attributed to the subject matter of auditing not being within their span of specialisation and knowledge.

The results seem to further imply two major concerns and potential problems. The first being, a risk that the sample population is of the opinion that the gate review panel members do not demonstrate competency in terms of skills, technical knowledge, experience and expertise when evaluating gate review deliverables. The second being the consistency in terms of rigour across all projects in the same project classification.

There was some alignment with the qualitative results in which respondent 7 mentioned that *“the audit process was appropriate and added value”*, however respondent 4 felt that *“there was no baseline measurement criteria and some of the requirements were ambiguous”*. Respondent 3 advised that *“There was great concern that panel review members were not consistent in their objectivity, rigour and were easily swayed by the project team”*. Respondent 1 noted that *“It was also observed that the chairperson of the gate review panel could sway the objectivity of the panel members”*. Respondent 6 further mentioned that *“There was also a perception that there was a gap in the understanding of the panel member’s expectation versus that of the methodology perspective”*.

All the respondents were also concerned that panel members poses a risk, in that their competency, skillset and experience was low which supports the results of the quantitative survey under this construct.

The result of the study under this objective seems to suggest a supportive view of Knechel and Sharma (2012) perspective of achieving a form of control through the stage gate review process as evident in their positive view on the appropriateness of the stage gate audit review process. According to (Subramaniam et al., 2013), the fundament objective of audits and review is to provide assurance in deriving value and credibility of independence in appearance and mind. This is evident with the general perception of the respondents supportive toward the fairness of the gate review.

There is also alignment with the Friedman (2015) and the Institute of Internal Auditing (1999), in which the respondents have expressed their positive view on the value add to improve organisation’s operations of the independent objective assurance activity, similar to the gate review process.

The respondent’s positive view with regard to the effectiveness in identifying flaws in project objectives and associated risks is congruent with Bell and Griffin (2012) perspective on the iterative management of risks and the promotion of continuous improvement. The respondents are also confident that the gate review findings are not negotiable which forms the pillar of integrity, and is in keeping with the principle of the Auditing Practice Board (APB, 2011).

There is no alignment with the Auditing Practice Board, on the pillar of competence, because the respondents have indicated a negative perception on the competency of the gate review

panel members. According to the APB (2011), auditors must demonstrate professional duty with respect knowledge and skill and exhibit education, training and practical experience. The results alludes to this thrust, lacking as trait with the gate review panel members and is therefore a concern and an attributable factor contributing to gate review failure.

The results also suggest that there is non-alignment with the Auditing Practice Board pillar of rigour and consistency (APB, 2011). There was a very mixed feeling on this construct by the respondents with fairly large number of the respondents indicating that the gate review panel members are not consistent in the same level of rigour on projects of the same level of classification. The results insinuate that this thrust is lacking as a trait with the gate review panel members and is therefore a concern and an attributable factor contributing to gate review failure.

The results further implies that there are minor short comings on the process with not having baseline measurement criteria and that some of the requirements could be conceived as ambiguous. This again is a potential threat and can be an attributable factor contributing to gate review failure.

Overall, the stage gate audit review process is effective and meets the objectives of general principles of auditing review. There are however a number of potential roots causes as discussed above, that can be potential attributable factors to project gate review failures.

#### **4.7 Section 4: The root causes of project gate review failure.**

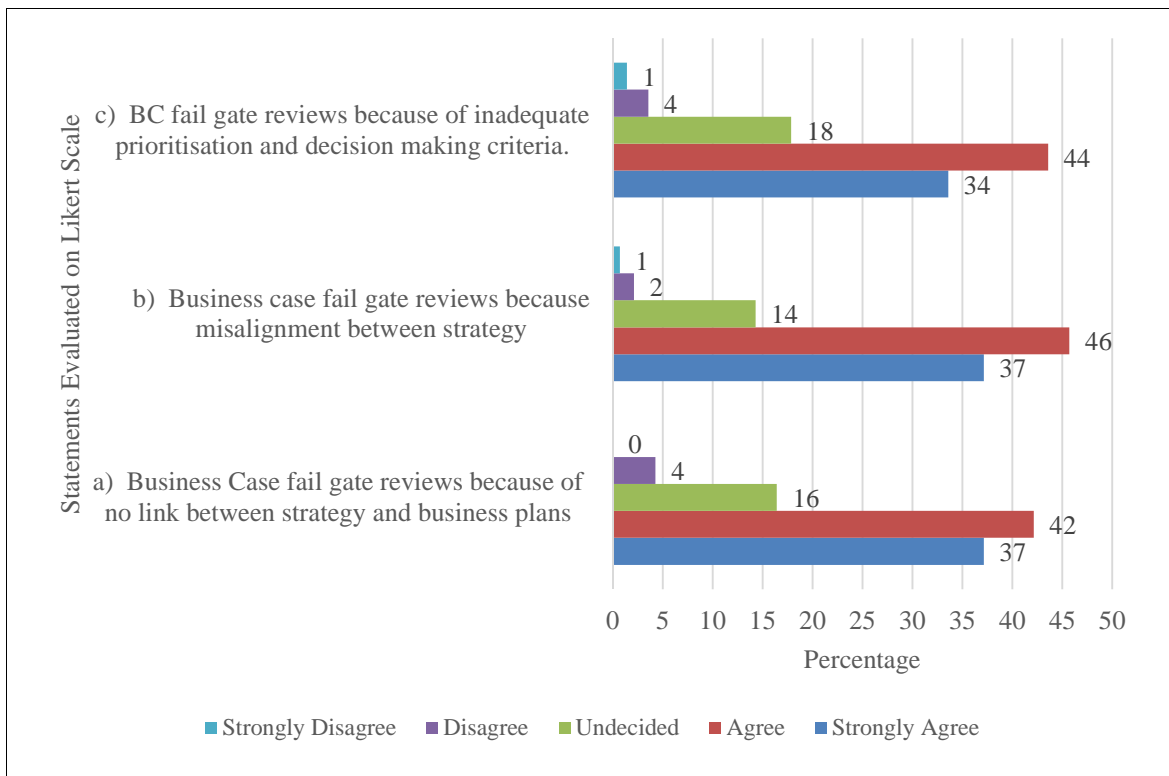
To determine the root causes of project gate review failure, respondent's attitudes towards ten statements were tested. Due to the importance of some of the factors, they were further decomposed into more statements to try capture deeper views. Owners Requirement Specification (ORS) were further broken into six more sub statements, Project Execution Plans (PEP) were further broken into three more sub statements and Business Cases (BC) were further broken into three more sub statements. The following is an account of the perception survey of the target sample:

##### **4.7.1 Business Cases (BCs)**

The business case is the backbone of each project; the investment committee focus on this document and check whether it makes business sense. Commercial feasibility study needs to be conducted well in advance to validate the need and the benefit of the project.

Alignment to strategy and evaluation on return on investment, giving authority for funds to be expended are all elements that make up the plan.

Figure 4.12 below presents the result of three constructs used to evaluate the target population’s perception on business cases being a potential root cause of gate review failure. The results and discussion of the five point Likert scale is summarised below.



**Figure 4.12 Evaluation of Business Cases as a Root Cause Factor of Gate Review Failures**

Majority (79%) of the respondents supports the view that business cases fail gate reviews because of no link between strategy and business plans and 83% of the respondents concur that business cases fail gate reviews because of misalignment between strategy and projects. Almost 78% of the respondents are of the opinion that business cases fail gate reviews because of inadequate prioritisation and decision making criteria.

The general results imply that business case failures are a top ranking factor and the qualitative data is consistent with this finding. The respondents further decomposed and support their views with the following factors as probable root causes:

- Respondent 2 said “*BC are prepared by client and have no alignment between strategy and portfolio, programmes and projects, they have limited skills and competency to develop good business cases*”.
- Respondent 4 mentioned that “*Clients have limited or no financial modelling support the business need for return on investment, the commercial elements are poor and lack detail with them focusing on engineering and neglecting commercial issues*”.
- Respondent 7 said “*Final project cost is still undefined with no qualified accuracy in the estimate*”.

The result of the study under this construct seems to suggest a supportive view with the APM (2014) in which it was identified, that the security of project funding during the life cycle as a critical success factor (Roe, 2014). Alignment with Eadie et al. (2013) in which he argues that large mega project require sound business cases and assurance on readiness and value for money is evident. Similarly Price Waterhouse Cooper highlighted secure funding and financial management processes are key CSF for projects (PwC, 2014). The results also confirmed in Steinfort and Walker (2007), view that adequate secure funding and sufficient budgets are critical success factors.

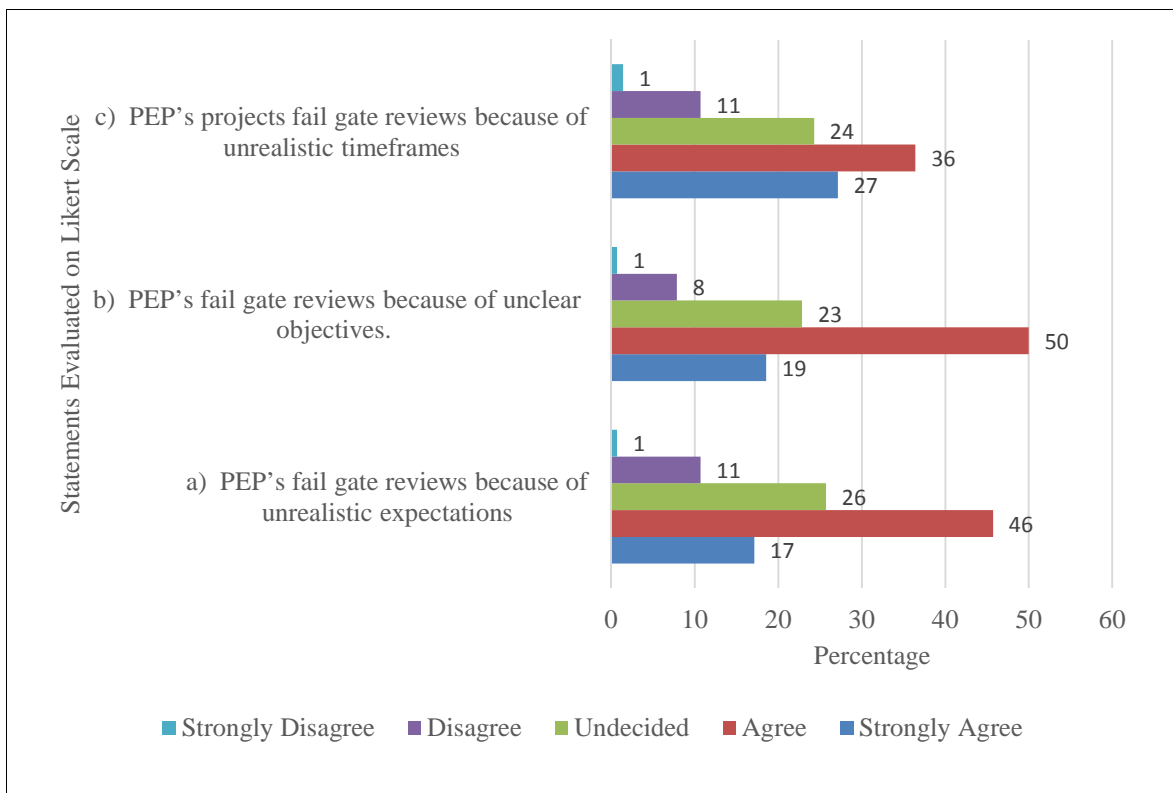
The results therefore suggests that poor business cases are a key problem at Transnet Capital projects and can be an attributable contributing factor to failure at gate reviews.

#### **4.7.2 Project Execution Plans (PEPs)**

This document is treated as the road map for any project, all the discipline and activities should be covered in this document at high level. The details of each discipline will be covered in each separate discipline documentation. The document should state the problem statement and identified options, from different option one should be identified and further developed. Other options which were discarded needs to be quantified and reason for disregarding them should be provided. It should tell the reader what is the project all about and how it is going to be executed. It unpacks the communication plan, human resourcing organisational strategy, quality assurance plan, health and safety management plan, environmental and community social management plan, procurement and materials management plan, project construction and commissioning plan and the project controls plan.

Figure 4.13 below presents the result of three constructs used to evaluate the target population’s perception on project execution plans being a potential root cause of gate review failure. The results and discussion of the five point Likert scale is summarised below.

A majority (63%) of the respondents supports the view that project execution plans fail gate reviews because of unrealistic expectations and 79% of the respondents concur that project execution plans fail gate reviews because of unclear objectives. Almost 63% of the respondents perceive that project execution plans fail gate review because of unrealistic time frames.



**Figure 4.13 Evaluation of Project Execution Plans as a Root Cause Factor of Gate Review Failures**

The results suggests that there is a general agreement that PEP’s are also a relevant cause for concern and a root cause factor for gate review failure. There is confirmation with this statement from the quantitative data collection in which some of the respondent further decomposed influencing factors as follows:

- Respondent 2 mentioned *“Lack of experience, skills and expertise in project planning by project resources”*.
- Respondent 6 said *“Poor leadership of the project manager”*
- Respondent 4 said *“the PEP documents are living documents and must be continuously updated throughout the lifecycle of the project and the quality is low”*.
- Respondent 4 also said *“It takes time and cost to keep the PEP current”*

The APM and Roe (2014) refers to proven methods and tools and aligned supply chain which are synonymous with the PEP activities and highlight these factors as critical success factor for project success. There is good support and alignment in the results with Mir and Pinnington (2014), PMI (2013), Alexandrova and Ivanova (2012). Schultz et al. (1987), (Morris, 2013b) and Deloitte (2007), who went on to suggest that methods and tools like PEP’s yield project success when appropriately used.

The results therefore suggests that project execution plans are a key problem at Transnet Capital projects and can be an attributable contributing factor to failure at gate reviews.

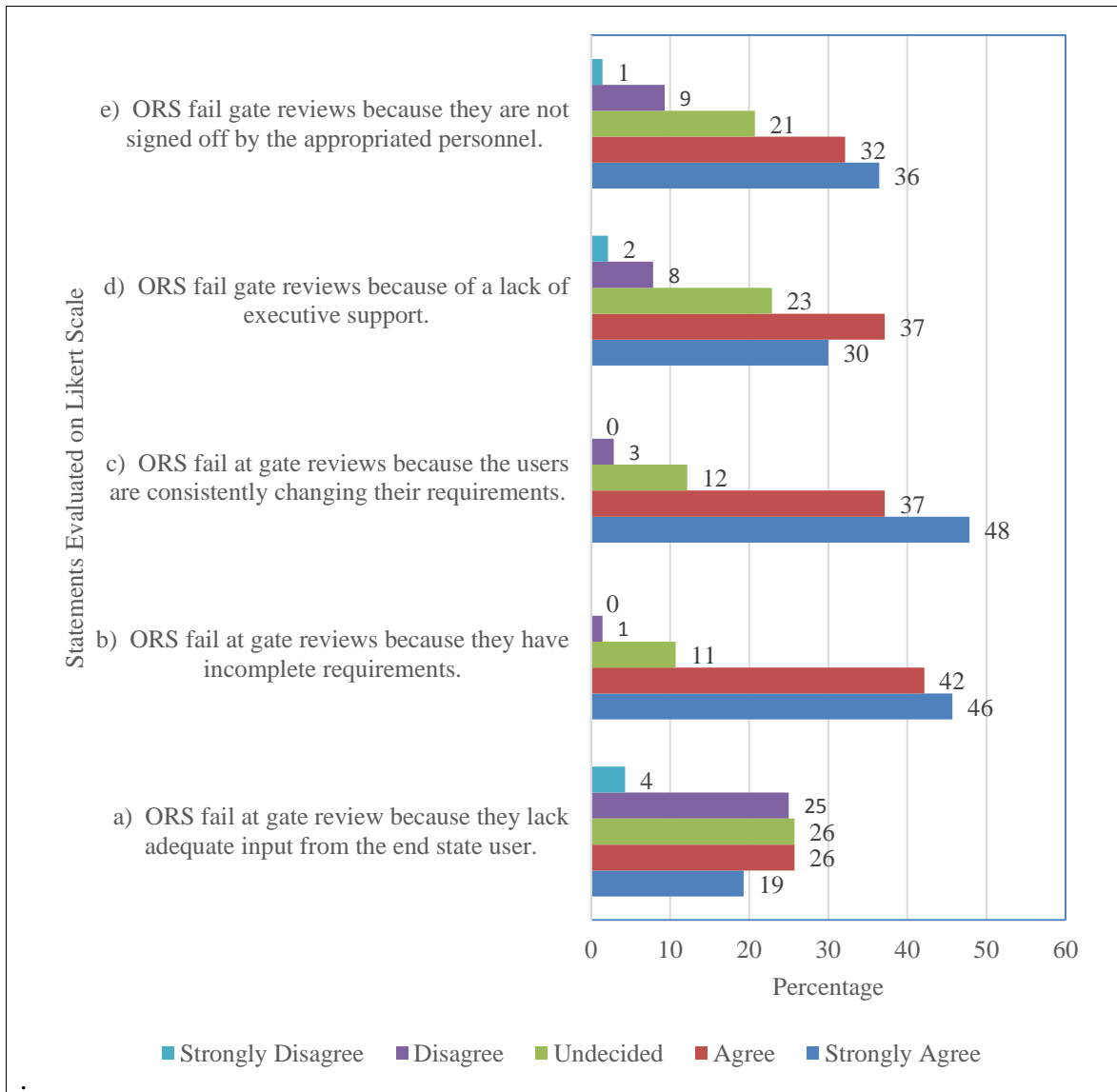
### **4.7.3 Owners Requirements Specifications**

Owner requirements specification is a document that is produced by the owner or client due to intimacy knowledge of the operating plant. This document in Transnet is treated as project charter; this is the beginning of the project. It needs to specify the main issues, whether the project has been budgeted and also stipulates the requirements and time frame for the project to be completed. It also identifies the sponsor and the support of executive management team.

Figure 4.14 on page 90, presents the result of five constructs used to evaluate the of the target population’s perception on project owners requirement specifications being a potential root cause of gate review failure. The results and discussion of the five point Likert scale is summarised below.

Nearly 55% of the respondent agreed that owner’s requirement specification fail gate reviews (ORS) because they lack adequate input from the end user and a majority (86%) of the respondents believe that ORS’s fail gate reviews because they have incomplete requirements, while 85% concur that ORS’s fail at gate reviews because of the users consistently changing their requirements.

Almost 67% of the respondents support the notion that ORS's fail gate review because of lack of executive support and 68% of the respondents agree with view that ORS's fail gate reviews because they are not signed off by the appropriate personnel.



**Figure 4.14 Evaluation of Owners Requirement Specification as a Root Cause Factor of Gate Review Failures**

The results imply in general an overwhelming agreement that gate review failures are attributed to ORSs because of limited inputs from end state users, incomplete user's requirements, changing requirements, lack of executive support and approval by the appropriate personnel.

There is good support and confirmation with these factors, in the finding of the qualitative data in which the respondents unpack more detailed reasons for these findings as follows:

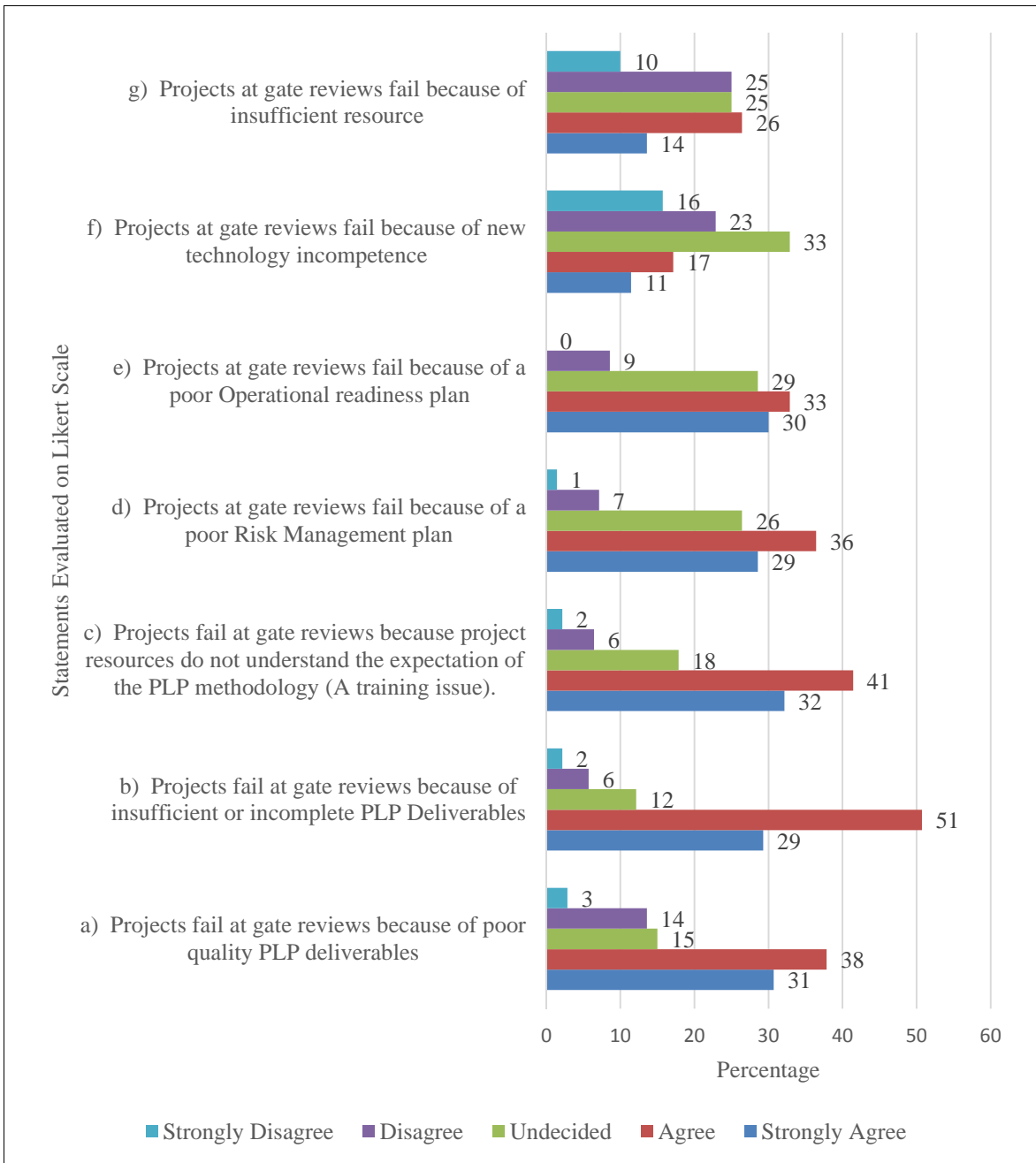
- Respondent 1 said *“The clients or owners were responsible for the development of ORS documents. The owners lacked the ability to develop this document from a knowledge, skills and competency perspective. A high focus on business requirements as opposed to what is required”*
- Respondent 3 said *“ORS documents are ambiguous and broad based”*.
- Respondent 4 said *“There is misalignment in requirements between client’s operations and planning departments and some clients do not know what is required or wanted. It is a skills issue with the clients and we try help”*.
- Respondent 2 *“A reluctance to sign off and take responsibility and there is poor communication between clients and project personnel”*.

The APM and Roe (2014) makes reference to engaged users and operators, capable sponsors as critical project success factors. The content of the ORS document is identical to this terminology and they appear to be in very good parity, alignment and support for the results under this construct. Similarly this ideology is a top ranking critical success factor as supported by Jugdev and Müller (2005); Pinto and Slevin (1989); Belassi and Tukel (1996); Abdullah et al. (2009) and Bredillet and DWivedula (2009) in which they highlight the importance of client, customer and user consultation and acceptance of deliverables during the project execution life cycle. Notwithstanding the Standish annual report confirms the importance of engaged users and operators.

#### **4.7.4 Other General Root Cause Factors**

Figure 4.15 on page 92 presents the result of seven constructs used to evaluate the target population’s perception on other critical project factors being a potential root cause of gate review failure. The results and discussion of the five point Likert scale is summarised on page 91.

Almost 69% of the respondents perceive that projects fail gate review because of poor quality PLP deliverables and a majority (80%) of respondents are of the opinion that projects fail gate reviews because of insufficient or incomplete PLP deliverables while nearly 73% of the respondents are of the notion that projects fail gate reviews because the project resources do not understand the expectation of the PLP methodology (a training issue).



**Figure 4.15 Evaluation of General Root Cause Factors of Gate Review Failures**

The result seem to suggest that there fundamental training challenge with the understanding of the PLP methodology. This implies that there is a lack of suitable training intervention that would bridge the gap of understanding the expectations. The implication is incomplete deliverables and inferior quality.

The qualitative results confirms this finding and unpacks the main reasons for these phenomena into further root cause influencing factors, as follows:

- Respondent 1 said “*Project managers are not strong on leadership coupled with low maturity of resource skills, competency and experience*”
- Respondent 4 mentioned “*Unclear expectations and restricted and compressed timelines*”.
- Respondent 5 “*not knowing what to produce and just producing inform for compliance rather than quality*”.
- Respondent 6 said that “*there was no quality assurance processes and procedures*”.

The APM and Roe (2014) make reference to competent project professionals, capable project teams, proven methods, tools and appropriate standards. These factors are one of the same with the finding under this construct and hence support by literature. This view is further reinforced by PwC (2014); Alexandrova and Ivanova (2012); Steinfort and Walker (2007) and Pinto and Slevin (1989). Therefore poor quality, incomplete or insufficient deliverables and poor understanding of the methodology are likely to be the problem at Transnet Capital Projects and can be attributable contributing factors to failure at gate reviews

Nearly 55% of the respondents are of the view that projects fail gate reviews because of poor risk management plans. The result implies that risk management planning at TCP is not undertaken effectively. There is a consistent agreement with that qualitative data with this construct. The respondents have decomposed the reasons for risk management planning failure as follows:

- Respondent 2 said that “*there was lack of understanding of risk management*”.
- Respondent 1 said that “*there was a lack of proactive behaviour versus compliance behaviour demonstrated by project resources and not done from the inception of the project*”.
- Respondent 4 mentioned that there was “*No risk management procedures to guide project resources*”
- Respondent 3 said that “*there was limited client involvement*”.
- Respondent 5 mentioned that “*there no formal training and no skills competency and hence no ownership*”.

Risk management focuses on the risk methodology which needs to be employed and identify the risks which have a potential of negatively impact the smooth progress of the project. The

focus should also be on internal and external risks, positive risks to the business should also be pursued. The APM and Roe (2014) also support the notion of integrated risk management as a project success factor and this view is held by Steinfort and Walker (2007).

Almost 63% of the respondents believed that projects fail gate reviews because of poor operational readiness plans. The result implies that operational readiness planning is not done effectively at TCP. There is a consistent agreement with that qualitative data with this construct and the respondents have decomposed the reasons for failure as follows:

- Respondent 1 said that *“this was part of the client’s responsibility with no ownership and involvement from end state users”*.
- Respondent 2 said that *“the document lacks detail and users and owners have different view of the product. In addition there is a lack of understanding and limited support”*.
- Respondent 5 mentioned that *“there was no input from human resources, property and legal department”*.

This document ensures that immediately after the project is commissioned and put on commercial operation, the right reasons for operating and maintaining the equipment is in place.

A majority (39%) of the respondents are of the view that technology incompetence is not a reason for gate review failure and significantly 27% of the respondents believe that technology incompetence is a reason for gate review failure. A review of the qualitative data indicates that there was no verifiable evidence that project failure at gate reviews was attributed to technology incompetency. There is an agreement between the two data, however the data could be subjected to self-bias and the halo effect of the engineers and project managers, both coming from a technical engineering perspective. Similarly results in other constructs did imply that the organisation was very technical and engineering orientation and therefore, have strong technical engineering competence internal to the organisation. The other reason could be attributed to the competency construct for gate review panel’s members indicating a low technical level and as a result they are unable to review the technology construct in great detail. The Standish report seems to support this singularity as a reason why projects fail (Standish, 2004).

Majority (40%) of the respondents are of the view that projects fail gate reviews because of insufficient resources. The results seem to suggest that the amount of resources are insufficient and a probable cause of gate review failures. There was limited qualitative data to compare this construct and hence no conclusive pattern was noted. Similarly the Standish report (2004) seems to support this phenomena as a reason why projects fail (Standish, 2004).

#### **4.8 Section 5: The maturity levels of the project managers and engineers**

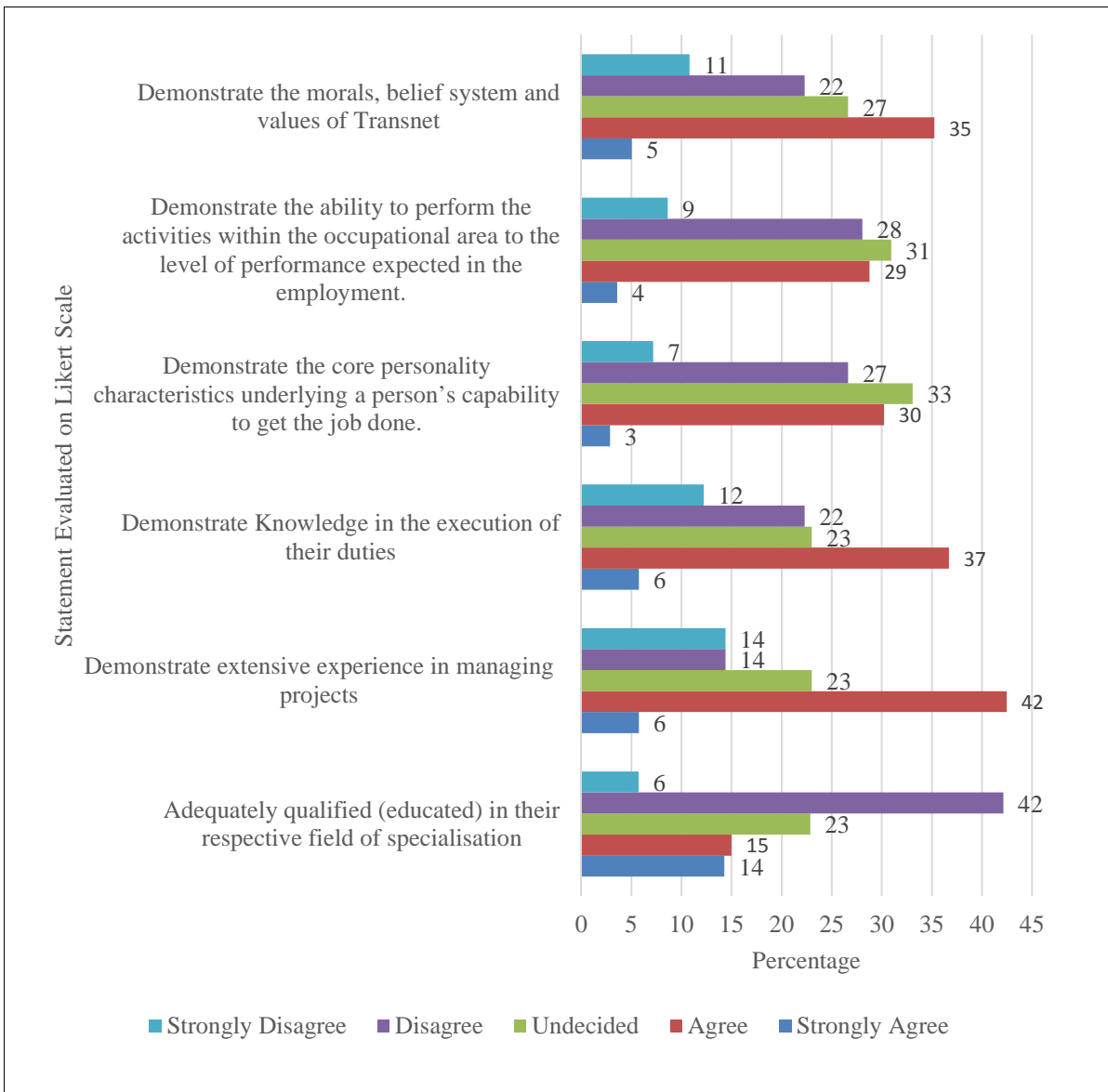
To determine the maturity levels of the project managers and engineers in terms of competency, experience and skill in their field, respondent's attitudes towards ten statements were tested. Due to the importance of project management resource competence, it was further decomposed into six more statements to try capture deeper views. The following discussion is an account of the perception survey of the target sample:

##### **4.8.1 Project Management Resource Competence**

Figure 4.16 on page 96, presents the result of six constructs used to evaluate the of the target population's perception on Project management resource competence. The results of the five point Likert scale is summarised and discussed below.

Majority (48%) of the respondents disagreed with notion that project resources are adequately qualified (educated) in their respective field of specialisation. The implication of these results are that there are a large number of project management resources at TCP, who are not suitability qualified in their field of specialisation and this could be a potential factor that negatively influences the competency levels of resources.

Nearly 48% of the respondents were of the view that project management resources demonstrate extensive experience in the management of projects while approximately 29% disagreed with this view and 23% are unsure. This result seems to suggest that there are a large number of project management resources at TCP who are extensively experienced. A concern that arises, is that there, could be potentially 28% of the target population who are not suitability experienced and this proposes a potential risk and negatively influences competency levels of resources.



**Figure 4.16 Evaluation of Project Management Resource Competence**

Almost 43% of the respondents are of the opinion that project management resources demonstrate knowledge in their execution of their duties. The result implies that potentially only 43% of the target population at TCP perceive that project management resources demonstrate knowledge in the execution of their duties and 34% do not. The potential 34% of the population group are not demonstrating knowledge is a risk for TCP as potential cause of reduced competency levels of resources.

Nearly 33% of the respondents were of the view that project management resources demonstrate the core personality characteristics underlying a person's capability to get the

job done. Approximately 34% of the respondents disagreed with this view while 33.09% were uncertain. Whilst the results imply no definitive stance on this construct, there is a concern that potentially 34% of the target population perceive that project management resources do not demonstrate the core personality characteristics underlying a person's capability to get the job done. Again this is viewed as a potential risk to TCP in terms of reduced competency levels.

Almost 37% of the respondents disagreed that project management resources demonstrate the ability to perform the activities within the occupational area to the level of performance expected in their employment. This is viewed as a potential risk to TCP in terms of reduced competency levels.

A large majority of 40% of the respondents believe that project management resources demonstrate the moral, belief system and values of TCP and 33 % were in disagreement while 27% were indifferent to this construct. Again whilst a majority are in agreement on this behavioural construct, a concern arises with the 33% of the respondents that are of the opinion that the resources are not living the moral belief system and values of TCP. This is a potential problem for TCP and this could be an attributable cause of reduced competency levels of resources.

In general the average number of 36% of the sample are of the opinion that project management resources are not competent. These results seem to suggest the incompetency level amongst project management resources on average 36% of the target population, that is one in three project management resource are incompetent in their ability to lead and deliver projects satisfactory. This result is high as compared to industry best practice of less than 15% (McKinsey, 2010).

According to the ICB 3.0 (2006) competence is Knowledge plus Experience plus Personal Attributes. The construct that was used to measure the perception of project management competency was the Crawford (2013) integrated model of competence. The results of the survey implies that there are inherent competency problems with project management resources at TCP. While not conclusive there is a slight general disagreement in perception, yet significant to the study, in which not all project management resources demonstrate competency. The APM and Roe (2014) argue that the commitment to project success, competent project professional and capable project teams are critical success factors for projects and hence supports the results under this construct that competency of project

personnel are likely roots causes of project gate review failure. Similarly Eadie et al. (2013) identified the need of competent project managers in terms of skills and experience. This notion was further supported by PwC (2014) and Alexandrova and Ivanova (2012).

In summary, there are a significant proportion of the respondents who disagree that project management resources are suitably qualified, experienced, and knowledgeable nor do they have the ability to exceed performance in the occupational area of employment. Their perception further demonstrates that not all project management resources are aligned to the morals, belief system and values of Transnet Capital Projects.

The evaluation constructs could have been subjected to the halo effect by the respondents and an element of self-bias could be an attributable factor for the dispersion of the results. There was no qualitative data to triangulate these results for further deduction.

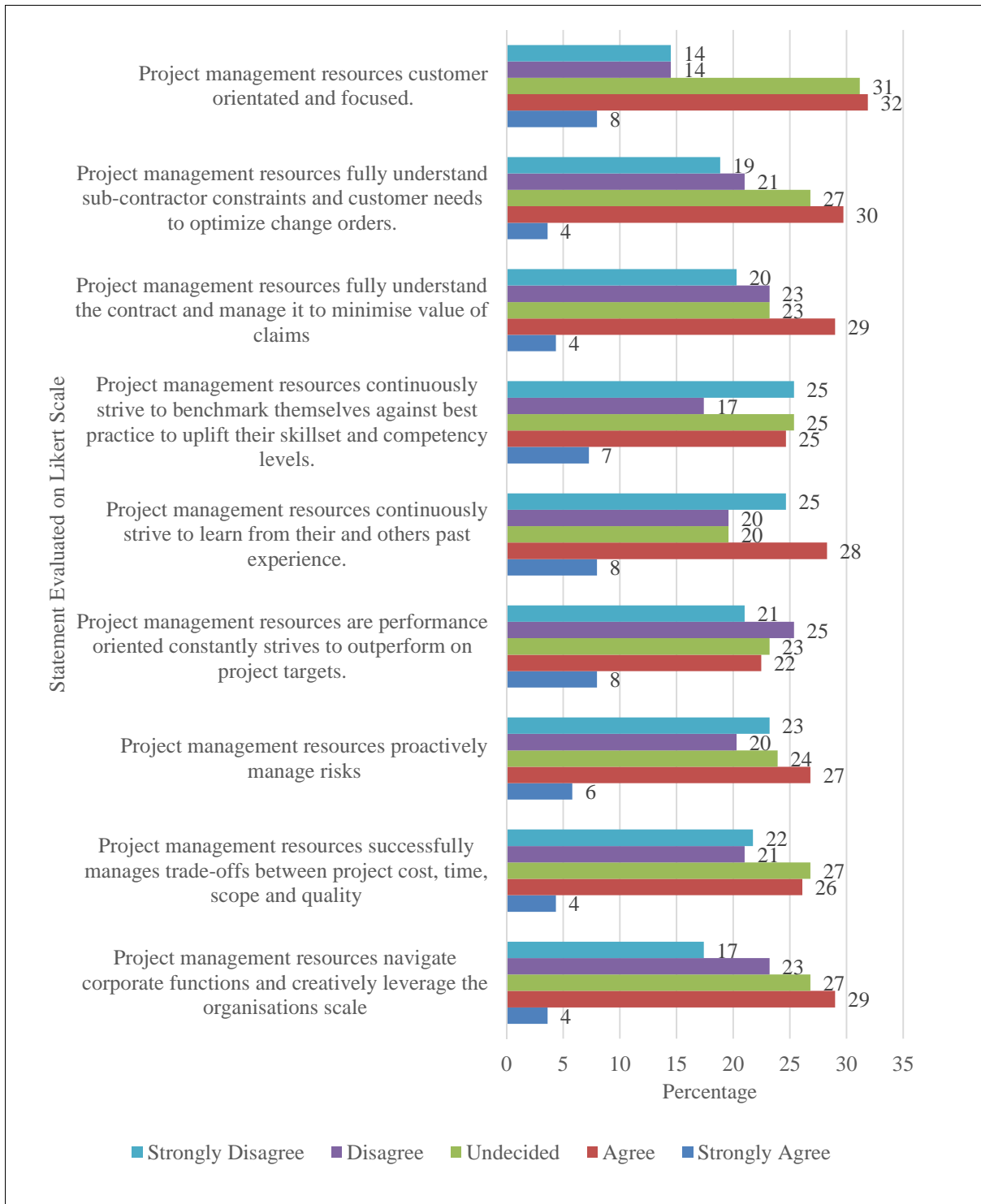
Figure 4.17 on page 99, presents the result of nine behavioural constructs used to evaluate the target population's perception on the project management resource role expectation. The results and discussion of the five point Likert scale are summarised below on page 98.

Almost one third (32.6%) of the respondents are in agreement with the view that project management resources navigate corporate functions and creatively leverage the organisation scale while 27% were indifferent and a majority 48% disagreed with the construct. The implication of this result indicates, that project management resources are unable to engage within the organisation and are very unfamiliar with key processes and procedure. They further may have challenges with networking with key players and decision makers within the organisation at large.

This construct is similar to the IPMA ICB 3.0 standard, under the behavioural competence range. It refers to leadership, engagement, assertiveness, consultation, negotiation and conflict resolution which are critical dimensions of behavioural competencies for project management resources. This framework supports the results and confirms that project management resources at TCP do not demonstrate the required behavioural competencies. The qualitative data confirms this finding with good alignment.

Nearly 30.4% of the respondents are in agreement with the perception that project management resources successfully manages trade-offs between project cost, time, scope and quality. Less than 27% were neutral in this regard while a large majority (43%) disagreed

with this view. This suggests that project managers in TCP are not adequately managing the triple constraint of cost, time and scope and quality in projects.



**Figure 4.17 Evaluation of Project Management Role Expectation**

The elements of the triple constraint are reviewed during the gate review process in documents of the business case, owner’s requirement specification, engineering reports and

project schedule. This notion is aligned with the school of traditional project management, in which the iron triangle of scope, cost, time and quality is used to measure the success of projects and are referred to as the micro criteria ((Atkinson, 1999); (Cooke-Davies, 2002); (Jugdev and Müller, 2005)). The qualitative data seem to support this result in that the respondents have agreed that trade-offs between project cost, time, scope and quality is non-existent or done on an informal level. This can be an attributable factor that contributes to gate review failure and implies low project management maturity amongst the resources at TCP.

Almost 32.61% of the respondents are of the opinion that project management resources proactively manage risks from both technical and financial perspective and 24% were unsure, while a majority 43.4% disagreed with this opinion. This result seem to suggest that project managers at TCP are not adequately managing risks from a technical and financial perspective. Risk management is a key deliverable that is contained in the risk management plan which is reviewed at the stage gate review audit process. The qualitative data supports this view in which respondent 5 said *“risk management was non-existent or still evolving at an informal level. In cases where risk management was being done, it was done more as a compliance requirement rather than a proactive behavioural approach”*. Risk management has been considered an import factor by many scholars and Steinfort and Walker (2007) refer to it as integrated risk management. They went on to propose that the act of proactively managing risks and balancing them against financial constraints is a good indication of the maturity of project management resources. The lack of proactive integrated risk management by TCP project resources is an indicator of low project management maturity and this can be an attributable factor that contributes to gate review failure.

Nearly 30.4% of the respondents felt that project management resources are performance oriented and constantly strive to outperform on project targets. Less than 24% remained neutral while a majority 46.3% disagreed with this notion. The result imply that project management resources at TCP are not performance orientated and don't strive to outperform on project targets. The qualitative data supports this result, in which respondent 7 advised *“the performance on project targets are non-existent or occur at a micro informal level”*. PMBOK (2013) defines project management as “the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project activities and requirements involves the management of expectations and baseline targets. Therefore if

project management resources are not performance orientated, then project outcomes would fail, hence this can be construed as a potential factor that contributes to gate review failure.

Nearly 36.3% of the respondents are of the view that project management resources continuously strive to learn from their and others past experience, and approximately 20% were unsure, while 44.2% disagreed with this view. The results appears to advocate that project management resources at TCP don't learn and improve their skill from prior lessons learned or past experiences. The objective of lessons learned is to gather experiences and insights, be it negative or positive that can be shared with others and be implemented or applied to other projects. The qualitative data supports this result in which respondent 7 advised "*that lessons learned workshops occurred at an informally unstructured level*", technical director 1 said "*lesson learned workshops was this was non-existent*". Respondent 1 also commented that "*there were no policies, procedures, systems and guidelines to direct the initiative*". High performing mature project managers and organisations are consistently learning from their past lessons. Research undertaken by the APM, IPMA and PMI, leading fraternities in the profession of project management reveals that lessons learned reviews are powerful techniques adopted by mature project professional to improve their competency and experience so as to not repeat the same mistakes in the future and is a sign of continuous improvement. It is therefore implied that the TCP project manager makes the same reoccurring mistakes and this can be an attributable factor that influences and contributes to gate review failure and is an indicator of low project management maturity.

About a third 31.9 %of the respondents felt that project management resources at TCP continuously strive to benchmark themselves against best practice to uplift their skillset and competency levels and 25.36% were neutral while a majority 42.8% disagreed with this notion. The results appears to indicate that project management resources at TCP do not benchmark themselves against best practice to uplift their skillset and competency levels. The qualitative data supports this result in which respondent 7 felt that "*there were limited or non-existent initiatives to bench mark skills and competency levels. Whilst there are individual development plans, the training interventions are unstructured and less purposeful*". The APM, IPMA and PMI, leading fraternities in the profession of project management provide professional international competency accreditation. As part of the

renewal of professional registration, individuals must demonstrate continued professional development by bench marking their skills with industry best practice and close the gaps with the relevant training or developmental activities. This behaviour is an indicator of maturity and therefore the results under this construct eludes to low maturity.

Nearly a third (32.7%) of the respondents have the perception that project management resources fully understand the contract and manage it to minimise value of claims and 23% were uncertain, while a majority (43.5%) disagreed with this perception. The results insinuate that project managers at TCP do not understand project contract management and hence cannot minimise the value of compensation events. According to IPMA ICB 3.0 (2006), procurement, contract management, cost and finance form dimensions of technical competence and every mature project manager must demonstrate skill and experience under this element. The results under this construct is an indicator of low maturity and is supported by the IPMA ICB 3.0 (2006) competency standard. The qualitative data also supports this result in which all of the respondents have advised that project management resources do not fully understanding the contract and managing it to minimise value of claims. This is non-existent and in some cases have very junior low maturity resources or entry level, inexperienced resources with pockets of success.

About one third (33.3%) of the respondents are of the notion that project management resources fully understand sub-contractor constraints and customer needs to optimise change orders. Less than 27% were undecided, while 39.8% disagreed with this notion. The results intimate that project management resources at TCP are unable to manage project change control and to optimise customer needs against constraints. The qualitative data supports this result in which respondent 6 advised that “*resources were too accommodating to customers, and in some cases over committed expectations and under delivered*”. *Poor negotiations skills, lack confidence, lack of understanding of contractor constraints, limited customer focus were some of the challenges*”. According to IPMA ICB 3.0 (2006), change, control and reports form dimensions of technical competence and negotiation, consultation and conflict and crisis form dimensions of behavioural competency and mature project management resources demonstrate these skills. The results imply under this construct that TCP project management resources have low maturity.

A majority (40%) of the respondents agreed that project management resources are customer orientated and focused, 31.16% were unsure while 28.92% were in disagreement with this view. The results allude to project management resources at TCP are customer orientated and focussed. The qualitative data supports this result in which respondent 5 indicated that “*the project management resources are customer focused*”. Zwikael and Globerson (2004); Belassi and Tukul (1996) and Raz and Michael (2001)), proposed an additional dimension of customer satisfactions to the evaluation criteria of project successes. The results under this construct, is positive and it suggests that TCP project managers are doing reasonably well under this construct of customer orientation and focus.

#### 4.9 Multivariate analysis: Principal Components

The reduction of variables was undertaken through the use of principal component analysis techniques. When the data set has some element of correlation and duplication, PCA rationalises, combines and consolidates the construct. This approach is useful when there is a significant large number of variables (Jolliffe and Cadima, 2016).

**Table 4.2 Principal Component Analysis 1**

Component	Eigenvalue	Difference	Proportion	Cumulative
<b>Comp1</b>	<b>6.55297</b>	3.93011	0.3855	0.3855
<b>Comp2</b>	<b>2.62286</b>	1.43785	0.1543	0.5398
<b>Comp3</b>	<b>1.18501</b>	0.142896	0.0697	0.6095
<b>Comp4</b>	<b>1.04212</b>	0.240895	0.0613	0.6708
<b>Comp5</b>	0.801221	0.070702	0.0471	0.7179
<b>Comp6</b>	0.730519	0.104476	0.043	0.7609
<b>Comp7</b>	0.626043	0.09284	0.0368	0.7977
<b>Comp8</b>	0.533204	0.078251	0.0314	0.8291
<b>Comp9</b>	0.454953	0.02932	0.0268	0.8558
<b>Comp10</b>	0.425633	0.031497	0.025	0.8809
<b>Comp11</b>	0.394136	0.053547	0.0232	0.904
<b>Comp12</b>	0.340589	0.018948	0.02	0.9241
<b>Comp13</b>	0.321641	0.031454	0.0189	0.943
<b>Comp14</b>	0.290187	0.022658	0.0171	0.9601
<b>Comp15</b>	0.267529	0.012631	0.0157	0.9758
<b>Comp16</b>	0.254898	0.098407	0.015	0.9908
<b>Comp17</b>	0.156491	.	0.0092	1

Number of observations=142 Rotation: (unrotated = principal)

The analysis of the amount of variability is measured by an eigenvalue and any values greater than 1 are important, implying that the amount of variance in the components is critical for retention. In Table 4.3 below, 5 constructs (variables) are highlighted as critical and will

have a significant impact on gate review failure. Any variance greater than 0,06 was retained as part of the selection criterion.

**Table 4.3 PCA Factor Loadings**

<b>Factor Loadings (eigenvectors)</b>				
<b>Variable</b>	<b>Comp2</b>	<b>Comp6</b>	<b>Comp8</b>	<b>Comp16</b>
The Gate review Panel members are consistent in their review and its rigour across all projects in the category classification.	<b>0.557</b>	-0.206	-0.102	0.2164
The audit process is in line with the general principle of auditing review.	-0.008	<b>0.655</b>	-0.108	0.042
The PLP methodology can be tailored, scalable and customisable to suit different project classification types.	0.0269	-0.147	<b>0.551</b>	-0.0831
The PLP methodology is an appropriate Project Governance Control Frame Work for Transnet Capital Projects.	-0.115	0.07	-0.226	<b>0.5375</b>
The PLP methodology is aligned to the industry best practice and the PMBOK.	-0.116	0.0941	-0.213	-0.6072
The PLP Methodology helps to achieve the strategic objectives of Transnet's Capital Infrastructure Plan.	0.0233	-0.044	-0.208	-0.3501
The PLP methodology provides consistency, standardisation and a common understanding of terminology and approaches in the execution of Capital Projects across Transnet.	0.0146	-0.222	-0.091	0.0454
There is adequate Support in the form of training, templates, sample reports, documentation and guidelines for the preparation of the PLP methodology deliverables.	0.3987	0.2584	0.165	-0.0009
The PLP methodology adds value to your project.	0.0808	-0.079	0.0976	0.1419
The PLP methodology the most optimal tool for delivering on Transnet's Capital Projects Infrastructure Plan.	0.0407	-0.057	-0.302	0.0924
The PLP methodology provides a robust and standardised methodology for effective management of Capital Investment Projects at Transnet Capital Projects.	-0.142	-0.036	0.0765	0.2894

The stage gate audit review process is appropriate for Transnet?	-0.0874	-0.102	0.5172	-0.067
The audit process is consistent in its rigour across all projects in the same project classification.	0.3783	0.412	0.0507	0.0105
The audit process is effective in identifying the short coming of the project objectives and associated risks.	0.13	0.1384	0.2779	0.0031
The Gate Review Panel Members demonstrate competency in terms of skills, technical knowledge, experience and expertise when evaluating gate review deliverables.	<b>0.5335</b>	-0.205	-0.110	-0.2072
Gate review outcomes give you a sense of comfort in the fairness of the evaluation.	0.0587	-0.348	-0.174	0.0173
Gate Review audit finding are not negotiable.	-0.134	0.036	-0.037	-0.0447

KMO Sampling adequacy = 0.8804

Kaiser-Meyer-Olkin (KMO) value of sampling adequacy is high (0.8804) indicating the PCA is relevant (Kaiser, 1970). When the KMO index is close to 1 the PCA is very efficient and when the PCA is close to zero, the PCA is irrelevant. The component loadings are the correlations between the variable and the component. The five factors that have factor loadings greater than 0.5, are crucial in establish the root cause failures of project gate reviews.

These factors are critical in establishing the root cause failures of project gate reviews at Transnet Capital Projects. The results show that gate review panel members are consistent in their review and its rigour across all projects in the category classification (0.557), the audit process is in line with the general principle of auditing review (0.651), the PLP methodology can be tailored, scalable and customisable to suit different project classification types (0.551), and that the PLP methodology is an appropriate project governance control frame work for Transnet Capital Projects (0.537) and the gate review Panel Members demonstrate competency in terms of skills, technical knowledge, experience and expertise when evaluating gate review deliverables (0.534). The results suggest that these five interlinked processes are crucial in Transnet Capital Project, and can lead to failure of project gate review if not effective.

## Principal Component 2

**Table 4.4** Principal Component Analysis 2

Component	Eigenvalue	Difference	Proportion	Cumulative
<b>Comp1</b>	<b>7.26642</b>	5.62344	0.4037	0.4037
<b>Comp2</b>	<b>1.64297</b>	0.175523	0.0913	0.495
<b>Comp3</b>	<b>1.46745</b>	0.297661	0.0815	0.5765
<b>Comp4</b>	<b>1.16979</b>	0.226356	0.065	0.6415
Comp5	0.94343	0.07189	0.0524	0.6939
Comp6	0.87154	0.172908	0.0484	0.7423
Comp7	0.698632	0.07063	0.0388	0.7811
Comp8	0.628002	0.056788	0.0349	0.816
Comp9	0.571214	0.049793	0.0317	0.8477
Comp10	0.521421	0.089313	0.029	0.8767
Comp11	0.432108	0.057555	0.024	0.9007
Comp12	0.374554	0.028205	0.0208	0.9215
Comp13	0.346348	0.053001	0.0192	0.9408
Comp14	0.293348	0.029399	0.0163	0.9571
Comp15	0.263949	0.07897	0.0147	0.9717
Comp16	0.184979	0.011744	0.0103	0.982
Comp17	0.173235	0.022613	0.0096	0.9916
Comp18	0.150622	.	0.0084	1

KMO sampling adequacy=0.8924

The results reveal 4 out of 17 factors are significant; have eigenvalues >1. Combined, these factors account for 64.1% of the variation between all factors under investigation. Any variance greater than 0.065 is retained. Table 4.5 on page 106, highlights the important factors that will have a significant impact on gate review failures.

**Table 4.5 Principal components (eigenvectors)**

	<b>Comp 6</b>	<b>Comp8</b>	<b>Comp16</b>	<b>Comp17</b>
Projects fail at gate reviews because of poor quality PLP deliverables	-0.0001	-0.3918	-0.3596	0.5242
Business Case fail gate reviews because of no link between strategy and business plans	-0.0634	-0.0014	0.5558	0.3817
Projects fail at gate reviews because project resources do not understand the expectation of the PLP methodology	-0.1646	0.5512	-0.1617	-0.0656
ORS fail at gate reviews because they have incomplete requirements.	0.5101	-0.1457	-0.1512	-0.0007
Projects fail at gate reviews because of insufficient or incomplete PLP Deliverables	0.0074	-0.4131	0.3679	-0.554
Projects at gate reviews fail because of a poor Risk Management plans	0.1082	0.164	0.0902	0.1859
Projects at gate reviews fail because of a poor Owners Requirement specification (ORS):	-0.1703	0.2448	0.0361	-0.0497
Projects at gate reviews fail because of new technology incompetence	0.254	0.1169	0.0339	0.0321
Projects at gate reviews fail because of insufficient resources	-0.1969	0.0968	0.0845	-0.0382
ORS fail at gate review because they lack adequate input from the end state user.	0.0316	-0.2474	-0.0786	-0.111
ORS fail at gate reviews because the users are consistently changing their requirements.	0.3798	0.1967	0.1835	0.1183
ORS fail gate reviews because of a lack of executive support.	-0.317	-0.2141	-0.0999	0.0037
ORS fail gate reviews because they are not signed off by the appropriated personnel.	-0.5125	-0.0102	0.0616	0.1467
PEP's fail gate reviews because of unrealistic expectations	-0.0853	-0.2007	-0.0501	-0.1363
PEP's fail gate reviews because of unclear objectives.	0.1739	-0.0199	0.0306	0.1558
PEP's projects fail gate reviews because of unrealistic timeframes	0.0739	0.0779	-0.0062	0.0262

Business case fail gate reviews because misalignment between strategy	-0.0135	0.0878	-0.5492	-0.2101
BC fail gate reviews because of inadequate prioritisation and decision making criteria.	0.1145	0.2016	0.0305	-0.3054

KMO sampling adequacy=0.8616

KMO measure of sampling adequacy is high (0.862) indicating the PCA is relevant. There are four factors that have loading values greater than 0.5, and these are the ones that are crucial in establishing potential root causes of failures in project gate reviews (Kaiser, 1970). The following factors are critical in establishing the root cause failures of project gate reviews at Transnet Capital Projects. The results show that projects fail at gate reviews because of poor quality PLP deliverables (0.524), business Case fail gate reviews because of no link between strategy and business plans (0.555), projects fail at gate reviews because project resources do not understand the expectation of the PLP methodology (0.551), ORS fail at gate reviews because they have incomplete requirements (0.510). As above, the results suggest that these four interlinked processes could be crucial in Transnet Capital Project, and can lead to potential overall failure of project gate reviews.

### Principal Component 3

**Table 4.6 Principal Component Analysis 3**

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	<b>9.9299</b>	8.26444	0.662	0.662
Comp2	<b>1.66546</b>	1.12153	0.111	0.773
Comp3	0.543929	0.111274	0.0363	0.8093
Comp4	0.432655	0.030518	0.0288	0.8381
Comp5	0.402137	0.06678	0.0268	0.8649
Comp6	0.335357	0.038932	0.0224	0.8873
Comp7	0.296424	0.009015	0.0198	0.9071
Comp8	0.287409	0.058429	0.0192	0.9262
Comp9	0.228981	0.030204	0.0153	0.9415
Comp10	0.198777	0.019339	0.0133	0.9547
Comp11	0.179438	0.020439	0.012	0.9667

Comp12	0.158999	0.023505	0.0106	0.9773
Comp13	0.135494	0.022794	0.009	0.9863
Comp14	0.1127	0.020354	0.0075	0.9938
Comp15	0.092345	.	0.0062	1

Rotation: (unrotated = principal)

The results reveal 2 out of 15 factors are significant; have eigenvalues >1. Combined, these factors account for 77% of the variation between all factors under investigation. Any variance greater than 0.065 was retained.

**Table 4.7 Principal components (eigenvectors)**

Variable	Comp3	Comp13
Project management resources customer orientated and focused.	0.8427	0.0586
Project management resources successfully manages trade-offs between project cost, time, scope and quality.	-0.2147	0.6399
Adequately qualified (educated) in their respective field of specialisation	0.312	-0.0332
Demonstrate extensive experience in managing projects.	-0.0805	0.2301
Demonstrate Knowledge in the execution of their duties.	-0.0408	0.0292
Demonstrate the core personality characteristics underlying a person's capability to get the job done	-0.1169	-0.3103
Demonstrate the ability to perform the activities within the occupational area to the level of performance expected in the employment	-0.1412	-0.0918
Demonstrate the morals, belief system and values of Transnet.	-0.0501	0.2127
Project management resources navigate corporate functions and creatively leverage the organisations scale.	-0.1112	0.0317
Project management resources proactively manage risks from both technical and financial perspective.	-0.2155	-0.3032
Project management resources are performance oriented constantly strives to outperform on project targets.	-0.1396	-0.1885
Project management resources continuously strive to learn from their and others past experience.	-0.0691	0.1017

Project management resources continuously strive to benchmark themselves against best practice to uplift their skillset and competency levels.	-0.0152	-0.388
Project management resources fully understand the contract and manage it to minimise value of claims.	0.0743	0.2227
Project management resources fully understand sub-contractor constraints and customer needs to optimize change orders.	0.1155	-0.2082

KMO sampling adequacy=0.8857

KMO measure of sampling adequacy is high (0.8857) indicating the PCA is relevant. There are only two factors that have loading values greater than 0.5, and these are the ones that are crucial in establishing potential root cause of gate review failures of project gate reviews (Kaiser, 1970). The following factors are critical in establishing the root cause failures of project gate reviews at Transnet Capital Projects. The results show that project management resources customer orientated and focused (0.853) and .that project management resources successfully manages trade-offs between project cost, time, scope and quality (0.6399). The results suggest that the two interlinked processes could be crucial in Transnet Capital Project, and can lead to potential overall failure of project gate review.

#### **4.10 High Level Finding Summary**

The results together with the interpretation and discussion under the four objectives reveal that literature amongst scholars are supportive of the findings.

The PLP methodology is a world class project management methodology that is developed from experience and benched marked against industry best practice such as the project management institute's PMBOK.

The PLP methodology ensures that all project at Transnet are progressively and consistently developed throughout their evolution lifecycle with the responsible and effective management of capital investment. This approach is based on agreed, defined scope level, evaluation techniques, and set deliverables, all executed within the framework of Transnet's minimum requirements for the definition and execution of capital investment projects. Therefore, the primarily intent is to advise and guide all those directly involved in the development, evaluation and execution of capital intensive engineering projects.

The fundamental benefits and derived value proposition of the PLP methodology is that it ensures all projects developed and executed at Transnet are prepared with a consistent approach. The benefits can be summarised as follows:

- Improved capital investment effectiveness
- Consistency of method across Transnet Operating Divisions
- Standardisation of terminology
- Alignment and line of sight of strategic planning across the group
- Risk mitigation through rigorous gate review processes
- Better defined cost and schedule estimates
- Project schedule planning and project controls standards established for project development.

The underlying principles of the PLP are progressive elaboration, concurrent, integrated development and collaborative governance.

Whilst the PLP methodology is well positioned and positively poised as an integrated project management tool the findings of the study indicates that there is a fundamental problem with the methodology and this can be construed as a potential factors influencing project gate review failure.

Figure 4.18 on page112, presents the fish bone diagram highlighting the summary of the causes and effect of the study.

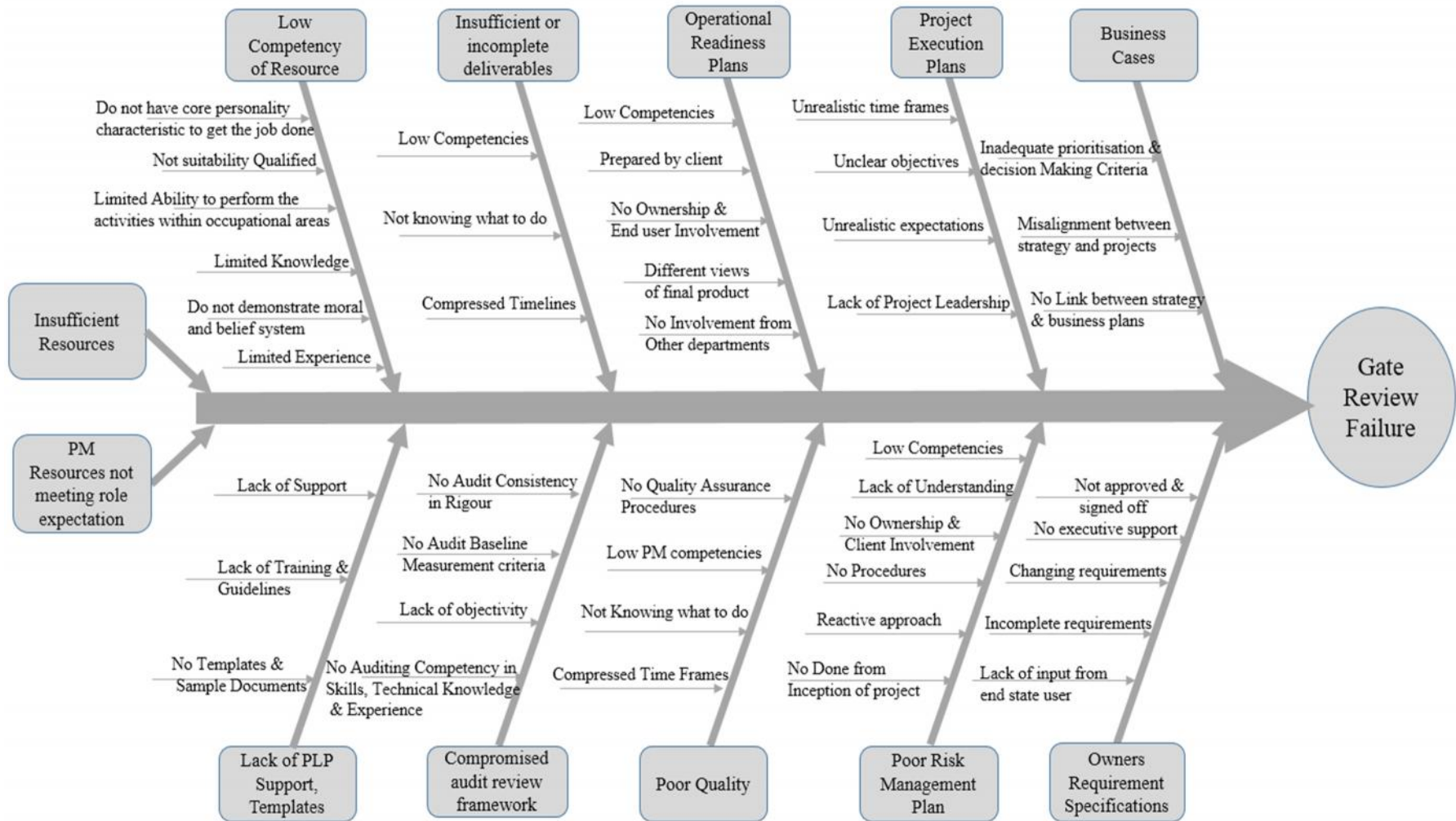


Figure 4.18 Fish bone diagram of high-level findings of the study. Source: The researchers construct

#### **4.11 Chapter Summary**

This study was an exploratory mixed method employing both qualitative and quantitative designs. Qualitative data were collected from the semi structured interviews from seven senior personnel and captured onto an excel spreadsheet. The summary data was then analysed using NVivo software and the key themes and summary responses under each question is presented and discussed. The quantitative data was cross sectional and was analysed in STATA version 14. The data was analysed at a 95% confidence interval and cronbach alpha of 95% was calculated indicating a high reliability of the results.

The final results were presented in a graphical and tabular format and all significant highlights of the data presented. In general there were no noticeable flaws in the data set and the analysis was under the supervision of an independent statistician.

The data was evaluated and discussed under each of the research question. The finding of the quantitative and qualitative approaches were triangulated and linked to the supporting literature review of chapter 2 where possible. A cause and effect figure of the key finding is summarised.

The next chapter link the objectives and the finding of the study. Conclusions together with recommendations to address the research problem will be proposed and suggestion for future studies will be presented.

## CHAPTER FIVE

### Conclusions and Recommendations

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#### 5.1 Introduction

The study has undertaken to gain an understanding of the root cause of project gate review failures when evaluated against a Project Lifecycle Process Methodology. The responsible investment in infrastructure projects in South Africa is a critical success factor for economic growth. Transnet is one such organisation to realise this goal. Transnet's capital investment programme contributes to 38% of the national infrastructure plan of South Africa. The execution of large capital infrastructure projects are complex and high rates of failure is evident, where projects run well over their budgets and are delivered fashionably late. This section of the dissertation will present the conclusion of the research and establish if the research questions have been resolved.

The implications and benefits in understanding the root cause analysis of project gate review failures when evaluated against a Project Lifecycle Process Methodology will be highlighted followed by the limitations of the study. Recommendations to Transnet Capital Projects are proposed under each of the respective findings of the study. The chapter will finally be concluded with recommendations for further studies.

#### 5.2 Key Findings

The data and the discussion of the previous chapter provided substantial insight into the various elements of project gate review failures when evaluated against a Project Lifecycle Process Methodology at Transnet Capital Projects. This provided vital information from which conclusions may be drawn. Conclusions based on empirical findings that have been drawn in relation to each of the objectives. The discussion below outlines the findings from the mixed method approach and the literature basis. The outcome from each analysis was evaluated to establish the relevance in answering the research question.

##### 5.2.1 Objective 1: PLP Methodology is Fit for Purpose.

In the assessment of whether the project lifecycle process methodology is fit for purpose at Transnet Capital Projects, it was established that the methodology is a world class project management methodology that is developed from experience and benched marked against

industry best practice such as the project management institute's PMBOK. Whilst the PLP methodology is well positioned and positively poised as an integrated project management tool, the finding of the study under this objective indicates that there is a fundamental problem with the support of the methodology in the form of training, provision of sample documentation, standard templates and guidelines on how to prepare deliverables. This can be construed as a potential factor influencing gate review failure.

#### **5.2.1.1 Conclusions to Objective 1**

It can therefore be concluded that the PLP methodology is fit for purpose, however support in the form of training, provision of sample documentation, standard templates and guidelines on how to prepare deliverables are lacking and hence must be provided.

#### **5.2.1.2 Recommendation for Objective 1**

In order to overcome this challenge, it is recommended that extensive training on the PLP methodology be undertaken. The training must be implemented as two initiatives. Initiative one will focus on training on the subject matter of the PLP methodology and its relation to the delivery of strategic objectives.

Initiative two will focus on the implementation, execution and preparation of the PLP deliverables systems (process). This training is targeted for both management and subordinates with more emphasis applied to the process area for management and the implementation area for subordinates.

In addition, a comprehensive series of guidelines must be developed on how to complete each of the critical control deliverables. This must be backed up with standard template documents and a few good sample populated documents. The methodology can be hyperlinked with the documents and the guidelines can be coupled with interactive training and a click of a mouse on the subject matter which brings up a training window.

The implications associated for this recommendation is that the training will require additional resources in terms of financial budgets and time off from general operations. A suitable budget must therefore be devised and training interventions must also be undertaken in timeframes that have minimal effect on operations. The training can take the form of electronic learning portal platform, on demand to curb excessive costs and disruptions to operations.

The development of the interactive document management system and the sample templates would require additional resources in the form of cost, time, and information technology and software applications followed by focused training on how to use the technology.

### **5.2.2 Objective 2: Effectiveness of the Stage Gate Audit Review Process.**

The analysis of this objective revealed that the stage gate audit review process at Transnet Capital Projects is appropriate and complies with some of the general principles of audit review. The audit process adds value to projects by giving management a sense of comfort, that the process is fair in their evaluation and the process is effective in identifying the short comings of the project objectives and deliverables. While the stage gate audit review process is effective in some of the dimensions, it was established that the audit process is not consistent in rigour across all projects in the same project classification, the gate review panel members do not demonstrate competency in terms of skills, technical knowledge and experience when evaluating the gate review deliverables. In addition the objectivity of gate review panel members are a potential problem and that there are minor short comings on the process as a result of not having baseline measurement criteria and that some of the requirements could be conceived as ambiguous.

#### **5.2.2.1 Conclusions Objective 2**

Based on the finding of the study under this objective, it can therefore be concluded that the stage gate audit review process is not operating effectively because of the gate review panel members not being consistent in rigour and objectivity. They are further lacking competence in terms of skills, technical knowledge and experience and do not apply a baseline measurement criteria when evaluating gate review deliverables.

#### **5.2.2.2 Recommendation Objective 2**

In order to overcome this challenge, it is recommended that the following intervention be undertaken:

- a) A re-selection of gate review panel members from within the organisation or possible new recruitment of suitability experienced, qualified and competent experts. The criteria for selection must be, as a minimum, the following to address the underlying competency issues:

- Must be considered as a knowledge expert in the areas of specialisation, for example civil engineering and financial modelling etc.
  - Must be suitably qualified from a recognised University.
  - Must be registered as a professional from an accredited professional body.
  - Must have practical experience of a minimum of 20 years in large capital infrastructure projects coupled with general project management related skills.
  - Must have extensive experience in auditing and reviews of processes and deliverables.
  - Must have a good general business management acumen.
- b) Panel members must be dedicated only to project stage gate reviews so as to maintain consistency. During non-peak periods of low volume of reviews and audits, the panel members can be involved in continuous improvement activities like updating of standards, development of methods and auditing procedures, sample check lists and sample populated documentation which could be used in the development of gate review deliverables. This committee can be called a PLP methodology centre of excellence.
- c) All panel members must be provided with focused training in the general principles of auditing and informally accredited within the organisation by taking a competency test on an annual basis to maintain skills levels at an optimum. This will eliminate any issues like objectivity, inconsistency in rigour and keep their knowledge current with the latest development in the industry.
- d) The audit process must be realigned and a new auditing procedures and guidelines must be developed. The procedures must be socialised to the general technical and project management personnel in the form of structured training interventions.
- e) Baseline auditing criteria and check lists must be developed and socialised with the extended stakeholders to maintain consistency and transparency.
- f) At project setup, the scalability for the project must be defined jointly between the clients (owners), project team members and the gate review panel members. Deliverables that would be scrutinised must be upfront agreed and the relevant content be benchmarked against the standard for relevance. This collaboration would assist in resolving consistency issues, ambiguity and any baseline measurement criteria issues.

- g) The implications associated for this recommendation is that the training will require additional resources in terms of financial budgets and time off from general operations. A suitable budget must therefore be devised and training interventions must also be undertaken in timeframes that have minimal impact on normal operations. Here again the training can take the form of electronic learning portal platforms, on demand to curb excessive costs and disruptions to operations.
- h) A suitable budget must also be setup for recruitment of additional panel members should suitable incumbents not be found within the organisation. An appropriate operating budget must be set for the newly formed centre of excellence.
- i) A PLP methodology champion must be appointed to drive this initiative.
- j) The panel member's costs can be charged against projects which can capitalised against the project warrants and sanctions.
- k) Time and budgetary allowances must be planned for procedures, guideline and sample documentation development.
- l) The possibility of engaging a specialist consultant for these services shall be preferred so as to not impact the organisation negatively.

### **5.2.3 Objective 3: Root Causes of Project Gate Review Failure.**

The results together with the interpretation and discussion under this objective reveal that literature amongst scholars are supportive of the findings. Ten constructs on the possible root causes of gate review failure were assessed. In summary, projects fail at stage gate reviews because of limited understanding on the PLP methodology, low quality, incomplete or insufficiently put together business cases, project execution plans, owner's requirement specifications, risk management plans and operational readiness plans. Having insufficient suitable resources also compound this problem while technology incompetence was not a factor.

#### **5.2.3.1 Conclusions Objective 3**

Arising out of the empirical study it could therefore be established that the root causes of project gate review failure when evaluated against the PLP methodology at Transnet Capital Project is attributed to the following factors:

- i. Poor Business Cases
- ii. Poor Project Execution Plans
- iii. Poor Owner's Requirement Specification

- iv. Poor Risk Management Plan
- v. Poor Operational Readiness Plans
- vi. Poor Quality
- vii. Insufficient & incomplete Deliverables
- viii. Lack of understanding expectation
- ix. Insufficient resources
- x. Low maturity and competency of project management resources

### **5.2.3.2 Recommendation Objective 3**

In order to overcome these challenges, it is recommended that the following initiatives be implemented to both TCP personnel and the operating division clients:

- a) Extensive training on the PLP methodology must be undertaken. The training must be broken up into a series of modules and be held at least twice per year. This can be linked to the recommendations of objective 1 and 2. The training focus areas that are recommended in order to address the findings are as follows:
  - Module 1 Overarching PLP Methodology Training. To understand the principles, the structure, components and the deliverables in response to capital investment planning.
  - Module 2 Focused business case development training. To understand the purpose, structure and how to develop the deliverables.
  - Module 3 Focused on project execution planning training. To understand the purpose, structure and how to develop the deliverables.
  - Module 3 Focused on Owner's Requirement Specification. To understand the purpose, structure and how to develop the deliverables.
  - Module 5 Focused on Risk Management Plan. To understand the purpose, structure and how to develop the deliverables.
  - Module 6 Focused on Operational Readiness Plans. To understand the purpose, structure and how to develop the deliverables.
- b) Develop simple processes and procedures with sample templates for the development of the abovementioned deliverables.
- c) Appoint a risk management professional to lead risk management planning and take ownership for developing risk management procedures and processes tailored for TCP and integrating back to the corporate enterprise risk registers.

- d) Develop a quality management procedure and policy governing the preparation of gate review deliverables and reviewing content and quality prior to gate review audits.
- e) Re-engineering recruitment initiatives to streamline on boarding of project management resources together with an optimum resource planning tools. The attraction and retention of specialist skills as well as competent project management resources must be given high attention. The remuneration incentives must be benchmarked against the industry and adjusted as required.
- f) Possibility of having an internal PLP annual certification programme for all project management resources must be considered.
- g) It is suggested that the ownership for these intervention reside with the project management academy as mentioned under objective 4 recommendations.
- h) The implications associated for this recommendation is that the training interventions will require additional resources in terms of financial budgets, trainers and time off from general operations. A suitable budget must therefore be devised and training interventions must also be undertaken in timeframes that have minimal effect on operations. The training can take the form of electronic learning portal platforms, on demand to curb excessive costs and disruptions to operations.
- i) A suitable budget must be setup for recruitment of additional specialists like the risk management specialist.
- j) Time and budgetary allowances must be planned for procedures, guideline and sample documentation development.
- k) The possibility of engaging a consultant for these services is also recommended.

#### **5.2.4 Objective 4: Maturity levels of the Project Managers and Engineers**

The competency of project resources was assessed using the Crawford integrated model of competence. Whilst a majority of the respondents indicated that the project management resource demonstrate extensive experience, knowledge and live the values, moral and belief system of Transnet Capital Projects in their execution of project management duties, a significant number disagreed. Similarly a majority of the respondents indicated that project management resource are not suitability qualified, do not demonstrate the distinct personality attributes underlying a person's ability to get the job functions done and do not demonstrate the aptitude within the specialised occupational areas to the level of proficiency expected in their employment.

There is significant evidence to suggest that 1 in every 3 (nearly 36% on average of the constructs measured) of the TCP's project management resources are not competent, that is lacking in one or more of the measurable dimensions making up the model of competency. Therefore this is a potential factor influencing and impacting on project gate review failure.

The behavioural role expectation maturity of project managers were assessed using hybrid constructs of IPMA ICB 3.0 standards and TCP role expectation. In general the results of the study seems to suggest that project management resources at TCP are not meeting the expectation of the role and are not performing at the required level because the project management resources:

- Do not navigate corporate functions and creatively leverage the organisations scale.
- Do not manage trade-offs between project cost, time, scope and quality.
- Do not proactively manage risks from both technical and financial perspective.
- Are not performance oriented in delivering on project targets.
- Do not strive to learn from their and others past experience and lessons.
- Do not strive to benchmark themselves against best practice to uplift their skillset and competency levels.
- Do not understand the contract and manage it to minimise value of claims.
- Do not understand sub-contractor constraints and customer needs to optimize change orders.

They have scored poorly on all of the assessment constructs with the exception that they are moderately customer focused. This suggests that the maturity of the project management resources are low and therefore this result implies that the low maturity levels of project management resources are influential on gate review failure.

#### **5.2.4.1 Conclusions Objective 4**

It can therefore be concluded that a large proportion of the project managers and engineers (approximately 36% on average) are not competent in successfully managing large infrastructure related projects.

Further, it can be concluded that the maturity levels of project managers and engineers are low, because a large proportion of the personnel do not meet the requirements of the role expectation and IPMA ICB 3.0 standards in terms of the technical, contextual and behavioural capacity.

#### 5.2.4.2 Recommendation Objective 4

In order to overcome this challenge, it is recommended that the following intervention be undertaken for all the findings under this objectives:

- a) Establish an internal project management academy. The purpose of the academy will be to develop and maintain focused training interventions for skills development and the upliftment of competencies in the discipline of project management. The academy will focus on some of the following initiatives:
  - Prepare training material and teaching modules in focussed areas where there are gaps in competencies within the organisation. Integration of the focused training interventions recommended under objectives 1, 2 and 3 above must be included.
  - Establish electronic learning portal platforms, on demand to curb excessive costs and disruptions to operations.
  - Establish a project management hot line to help project management resources with technical queries and issues on a day to day basis.
  - Provide advisory services on project problems and challenges.
  - Host conferences and symposiums to share knowledge and keep up to date with the latest development in the project management profession.
  - Host lessons learned workshops and manage a data base of lesson with solutions and recommendations.
  - Network with project management fraternities and other academic institutes of learning. Jointly develop training programmes and host guest lectures and workshops.
  - Establish an internal project management certification programme customised to the PLP methodology and the Transnet capital project environment. Project managers must undertake annually, a competency test on procedures on how to develop critical deliverables and the understanding of the methodology as mentioned in the recommendations of objective 3.
  - Provide practical workshops on live projects in specialist areas like risk management.
- b) Make the certification with PMI compulsory for all practicing project managers. The company can incentivise the staff members by paying the annual membership and certification examination fee.

- c) Establish formal coaching and mentorship programmes for junior project managers within the organisation and on the job training initiatives.
- d) Establish a formal role profile for project managers and training them to understand the expectations of the organisation and the role. Link the expectation to balance score cards and performance management programmes.
- e) Ensure all governance procedures and administrative procedures are formalised and rolled out with structured formal training initiatives.
- f) Develop focused training on contract management, customer services, risk management, construction management, people interpersonal skills training etc.
- g) Foster self-development by encouraging individual to take ownership for their training needs by promoting initiatives like Individual Development Plans and 360 degree reviews on performance and areas for continuous improvement.
- h) Recruit experts and specialists experienced in the project management discipline. They must facilitate mentoring, coaching, advisory services and teaching roles within the organisation.
- i) The implications associated for this recommendation is that the training will require additional resources in terms of financial budgets and time off from general operations. A suitable budget must therefore be devised and training interventions must also be undertaken in timeframes that have minimal effect on operations.
- j) A suitable budget must be setup for recruitment of additional staff members for the project management academy.
- k) A suitable operating budget must be set for the project management academy. A principal champion must be appointed for the academy. The costs can be charged against the various training budgets.
- l) Time and budgetary allowances must be planned for update procedures and guidelines. The possibility of engaging a consultant for these services is also encouraged so as to not disrupt others within the organisation.

### **5.3 Limitations of the study**

The scope of this research is limited to a South African context, with focused emphasis on the Transnet Capital Projects organisation; therefore the results may only be valid in this context and industry sector. The results and outcomes may be extended to other similar organisations in analogous industries with caution, so as to not generalise the findings.

The scope of this research is also confined to the infrastructure and construction industry with emphasis in the general built environment and infrastructure project space. This research also concentrates on project managers and engineers working at Transnet Capital Projects. The opinion of the sample research contributors is not adequate to represent the entire South African population's views. According to Rogers et al. (2005), late adopters also have a different demographic perception and attitudinal physiognomies than initial adopters. Therefore outcomes must not be used to take a broad general view.

Cross sectional methods of sampling has been used because of the rigid time constraints, whereas a longitudinal method would have been preferred. The collected data and the survey instrument used, contain multiple choice items only, and open end response questions was restricted to the qualitative data collection process because of the complexity and manageability of data and information.

The survey questionnaires were administered in English, whilst there are nine official languages in South Africa, descending from various ethnic backgrounds. Native English speakers may have an advantage in understanding the questions better than non-native English speakers.

Another limitation is that the survey was administrated to only one group of individuals for the independent and dependent variables. According to Podsakoff et al. (2012), the data collected suffers from the common variance problem. To eliminate the phenomena of response bias, future research must be extended to other key project stakeholders like project support personnel, planners, cost engineers, clients and project governance committees.

A further limitation is that only a few number of project directors were interviewed and they may not represent the same view of other project directors within TCP.

Finally, given the limited time and resource constraint, the depth of the study and research outputs may only scratch the surface of the subject matter and further research may need to be explored.

#### **5.4 Recommendations for further research**

There were a number of focus areas this study was unable to examine. Further studies could consider an evaluation of the organisation maturity towards project management in terms of processes, systems and the role of the project management office.

There is an opportunity to repeat this study by using the organisational project management maturity model OPM3 (Institute, 2008). This would require a change to the research instrument and a new instrument aligned to OPM3 (Ghoddousi et al., 2011). The sampling population could be extended to all employees within Transnet Capital projects.

The sample frame for this study only considered Transnet Capital Project employees. It is recommended that the sample frame be increased to include the parent organisation and other subsidiaries. This will provide a more comprehensive picture of the root causes of project gate review failure and the maturity levels of competency within all project management resources of the Transnet group.

The scope of this study could be extended to other similar industries outside state owned enterprises.

This study was centred on the project management execution of projects, consideration for further studies should look at programmes and benefit realisations in strategic portfolio management at Transnet.

## **5.5 Summary of chapter**

In order for Transnet to realise its strategic vision of being a world class intermodal logistic service provider it would need to align its infrastructure plan to be more efficient and effective. The primary and secondary research objectives of this study have been successfully satisfied and the results are meaningful and valid. The limitations had no material bearing to the final outcomes of the study. Therefore the study has raised many valid, practical and relevant recommendations for closing the gap on the high rate of project gate review failures. The outcome of this study has provided a deeper knowledge on how project management processes can be re-engineered, improved and skill sets uplifted, in so doing, having a lower acceptable failure rate of projects when evaluated against the PLP methodology.

The outcomes of the study has further unlocked the challenges associated with the high levels of gate review failures and suggested procedure and process modifications to improve success rates going forward. The study presented tangible reasons and understanding of the factors that influence the causes of gate review failure.

The study employed triangulation techniques to enhance validity and reliability of the research outcomes. The findings were further supported and complemented by the literature implying a successful research project.

Recommendations in closing the identified challenges have been suggested for each of the objectives and it is perceived that if the recommendations are implemented, there may be agreement in the acceptance of the PLP methodology and its applicability to meet Transnet's infrastructure development plan and hence contributing to economic growth of South Africa.

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## APPENDICES

### Appendix A: The Questionnaire Guide

#### QUALITATIVE INTERVIEW QUESTIONS

Date:

The following interview questions are designed to help analyse and explore possible root causes for project gate review failures when appraised against the PLP methodology at Transnet Capital Projects. I am requesting that you look over the questions and, if you choose to do so, participate in the interview process. If you choose to participate, please **do not** write your name on the questionnaire. The interview will be a face to face engagement, using the questions below.

Please note that your responses will not be identified with you personally in the research.

The interview will take approximately 45 minutes to complete

**Instructions:**

To answer the questions, fill in your answer in the space provided below each question. Should you require additional space, please continue at back of each page.

Please take the time to read each question carefully before you answer, to inform me how you truly feel.

Your honest responses are essential for this analysis to be of value.

Your answers will be kept confidential.

Thank you for your time and effort in participating in the interview

**a. What population group do you belong to?**

Black

White

Coloured

Indian

**b. What is your gender?**

Male

Female

**c. What age group do you belong to?**

52 to 63 years

40 to 50 years

22 to 39 years

**d. What is your occupational role in the organisation?**

Project Director

Principal Project Manager

Senior Project Manager/ Engineering Manager

Technical Director

**e. What department do you belong to?**

Project Management

Engineering

**Evaluation on whether the PLP Methodology is fit for Purpose.**

1. What are the benefits of a Project Governance Control Frame Work? And what is your views on the appropriateness of the PLP methodology as Project Governance Control Frame Work for Transnet?

2. How would compare other Project Governance Control Frame Works that you may have worked with or familiar with, to the PLP methodology?

3. What is your observation on the adequacy of Support in the form of training, templates, sample reports and documentation, guidelines for the preparation of the PLP methodology deliverables? What additional intervention will you like to see in Area?

4. What is your position on the alignment of the PLP methodology to the Industry best practice and PMBOK, and if so How Does Passing the PLP gate reviews give you a sense of comfort in managing and delivering a project?

5. What are your viewpoints to the tailoring, customisation and suitability of the PLP methodology to enable effective management of major projects across the industry?

### **Evaluation on whether the Stage Gate Audit Process is flawed**

6. What is your notion on the appropriateness of stage gate audit review process for Transnet and does it added value or diminish value in your project?

7. What is your perception on the gate review panel members' consistency in the interrogation of project deliverables in terms of its rigor across all projects in the same category classification?

8. What is your opinion on the gate review panel member's skill sets, industry experience, technical knowledge and expertise to interrogate project deliverables for gate review evaluation and audit?

9. In your Portfolio of project that were gate reviewed in the last 3 years what was the percentage audit findings in:

Green –	Passed	_____%
Amber –	Hold	_____%
Red-	Failed	_____%

10. What improvements can you suggest to the gate review audit process?

### **Evaluation on the root causes of Project Gate Review Failures**

11. What are the causes of poor **quality or incomplete** PLP Deliverables on your project portfolio?

12. What is your observation on the understanding of the **expectation of the PLP methodology** by your project resources?

13. What are the reasons for the **Owners Requirement Specification** possibly failing at the gate review?

14. What are the reasons for the **Project execution plan** conceivably failing at the gate review?
15. What are the reasons for the **Risk Management plans** perhaps failing at the gate review?
16. What are the reasons for the **Business cases** potentially failing at the gate review?
17. What are the reasons for the **Operational Readiness plans** to likely fail at the gate review?
18. What are the reasons for **new technology** potentially failing at the gate review?

### **Assessment of the maturity of Project resources**

19. What are the expectations in **competency constructs or behaviours** for project management resources working under your management and team?
20. How do project management resources navigate **corporate functions** and creatively **leverage the organisations scale**?
21. How do project management resources successfully manage the **trade-offs between project cost, time, scope and quality**? And strive to **outperform** on project targets?
22. What is your view on project management resources proactively **managing risks** from both technical and financial perspective?
23. What is your observation on your project management resources continuously striving to **learn from their and others past experience**?
24. What potentially are project management resources doing to **benchmark** themselves against best practice to **uplift their skillset and competency levels**?

25. What is your notion of project management resources fully understanding the **contract** and managing it to **minimise value of claims**?

26. What is your view on your project management resources fully understanding sub-**contractor constraints** and **customer oriented needs** to optimize change orders?

Thank you for your time in completing the questionnaire!

## **QUANTITATIVE: QUESTIONNAIRE**

The following survey is designed to help analyse and explore possible root causes for project gate review failures when appraised against the PLP methodology at Transnet Capital Projects.

I am requesting that you look over the questionnaire and, if you choose to do so, complete it and return via email.

If you choose to participate, please **do not** write your name on the questionnaire. Please note that your responses will not be identified with you personally in the research.

The questionnaire will take approximately 25 minutes to complete.

To complete each answer on the questionnaire, select the number from the scale that corresponds to your level of satisfaction with the statement, and cross the adjacent circle. Please take the time to read each question carefully before you answer to inform me how you truly feel. Your honest responses are essential for this analysis to be of value. Your answers will be kept confidential.

When you have completed the survey, please return via email

Thank you for your time and effort in completing the questionnaire.

### **Personal Demographic Information**

a. What population group do you belong to?

Black

White

Coloured

- Indian
- b. What is your gender?
- Male
- Female
- c. What age group do you belong to?
- 52 to 63 years
- 40 to 50 years
- 22 to 39 years
- 19 to 21 years
- d. What band within the organisation do you belong to?
- D
- E
- F
- G and below
- e. What department do you belong to?
- Project Management
- Engineering
- Project support services

**Likert Rating Scale:**

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

Select the box that best describes how you feel about the statement.

**Evaluation on whether the PLP Methodology is fit for Purpose.**

- 1.1 The PLP methodology provides a robust and standardised methodology for effective management of Capital Investment Projects at Transnet Capital Projects.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

1.2 The PLP methodology is an appropriate Project Governance Control Frame Work for Transnet Capital Projects.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

1.3 The PLP methodology is aligned to the industry best practice and the PMBOK.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

1.4 The PLP Methodology helps to achieve the strategic objectives of Transnet's Capital Infrastructure Plan.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

1.5 The PLP methodology provides consistency, standardisation and a common understanding of terminology and approaches in the execution of Capital Projects across Transnet.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

1.6 There is adequate Support in the form of training, templates, sample reports, documentation and guidelines for the preparation of the PLP methodology deliverables.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

1.7 The PLP methodology adds value to your project.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

1.8 The PLP methodology the most optimal tool for delivering on Transnet’s Capital Projects Infrastructure Plan.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

1.9 The PLP methodology can be tailored, scalable and customisable to suit different project classification types.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

### **Evaluation on whether the Stage Gate Audit Process is flawed**

2.1 The stage gate audit review process is appropriate for Transnet?

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

2.2 The audit process is in line with the general principle of auditing review.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

2.3 The audit process is consistent in its rigour across all projects in the same project classification.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

2.4 The audit process is effective in identifying the short coming of the project objectives and associated risks.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

2.5 The Gate Review Panel Members demonstrate competency in terms of skills, technical knowledge, experience and expertise when evaluating gate review deliverables.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

2.6 The Gate review Panel members are consistent in their review and its rigour across all projects in the category classification.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

2.7 Gate review process adds value in your project.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

2.8 Gate review outcomes give you a sense of comfort in the fairness of the evaluation.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

2.9 Gate Review audit finding are not negotiable.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

## **Evaluation on the root causes of Project Gate Review Failures**

3.1 Projects fail at gate reviews because of **poor quality PLP deliverables**.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.2 Projects fail at gate reviews because of **insufficient or incomplete PLP Deliverables**.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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3.3 Projects fail at gate reviews because project resources do not understand the expectation of the PLP methodology (**A training issue**).

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.4 **Projects at gate reviews fail because of a poor Owners Requirement specification (ORS):**

3.4.1 ORS fail at gate review because they lack adequate input from the end state user.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.4.2 ORS fail at gate reviews because they have incomplete requirements.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.4.3 ORS fail at gate reviews because the users are consistently changing their requirements.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.4.4 ORS fail gate reviews because of a lack of executive support.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.4.5 ORS fail gate reviews because they are not signed off by the appropriated personnel.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.5 **Projects at gate reviews fail because of a poor Project execution plan (PEP)**

3.5.1 PEP's fail gate reviews because of unrealistic expectations.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.5.2 PEP's fail gate reviews because of unclear objectives.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.5.3 PEP's projects fail gate reviews because of unrealistic timeframes.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.6 Projects at gate reviews fail because of a poor **Risk Management plan**.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.7 Projects at gate reviews fail because of a poor **Business case (BC)**.

3.7.1 BC fail gate reviews because of no link between strategy and business plans.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.7.2 BC fail gate reviews because misalignment between strategy and project objectives.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.7.3 BC fail gate reviews because of inadequate prioritisation and decision making criteria.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.8 Projects at gate reviews fail because of a poor **Operational Readiness**.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.9 Projects at gate reviews fail because of **new technology incompetence**.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

3.10 Projects at gate reviews fail because of insufficient resources.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

## Assessment of the maturity of Project resources

4.1 Project Resources demonstrate competency in terms of skills, technical knowledge, experience and expertise in the execution of projects:

### **Project Resources demonstrate.....**

4.1.1 Adequately **qualified (educated)** in their respective field of specialisation.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.1.2 Demonstrate **extensive experience** in managing projects.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.1.3 Demonstrate **Knowledge in the execution** of their duties.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.1.4 Demonstrate the **core personality characteristics** underlying a person’s capability to get the job done.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.1.5 Demonstrate the ability to perform the activities within the **occupational area** to the level of **performance** expected in the employment.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.1.6 Demonstrate the **morals, belief system and values** of Transnet.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.2 Project management **resources navigate corporate functions and creatively leverage the organisations scale.**

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.3 Project management resources successfully **manages trade-offs between project cost, time, scope and quality.**

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.4 Project management resources proactively **manage risks** from both technical and financial perspective.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.5 Project management resources are **performance oriented** constantly strives to outperform on project targets.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.6 Project management resources continuously **strive to learn from their and others past experience.**

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.7 Project management resources continuously **strive to benchmark** themselves against best practice **to uplift their skillset and competency levels.**

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.8 Project management resources fully understand the **contract** and manage it to minimise value of claims.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.9 Project management resources fully understand **sub-contractor constraints** and **customer needs** to optimize change orders.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

4.10 Project management resources customer orientated and focused.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**Thank you for your time! Please don't forget to return the completed survey via email.**

## Appendix B: Ethical Clearance



17 February 2016

Mr Ashley Haridas 921321292  
Graduate School of Business & Leadership  
Westville Campus

Dear Mr Haridas

Protocol reference number: HSS/0147/016M

Project Title: Root cause analysis of Project Gate Review Failures when evaluated against a Project Lifecycle Process Methodology (A Transnet Capital Projects Case Study)

### Full Approval – Expedited Application

In response to your application received 10 February 2016, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL**.

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

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

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully



Dr Shenuka Singh (Chair)  
Humanities & Social Sciences Research Ethics Committee

/pm

Cc Supervisor: Dr M Hoque  
Cc Academic Leader Research: Dr M Hoque/Dr R Sibanda  
Cc School Administrator: Ms Zarina Bullyraj

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Humanities & Social Sciences Research Ethics Committee

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Website: [www.u.kz.ac.za](http://www.u.kz.ac.za)



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## Appendix C: Turnitin Report Summary

Root cause analysis of Project Gate Review Failures when evaluated against a Project Lifecycle Process Methodology. (A Transnet Capital Projects Case Study)

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