UNIVERSITY OF KWAZULU-NATAL

Developing a Framework for Project Status Reporting in South African State-Owned Companies

by

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Declaration

I, **Malusi Kenneth Luthuli**, know that plagiarism is to use another's work and present it as my own, and that this is a criminal offence.

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Dr Bibi Z. Chummun Date

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Dedication

This thesis is dedicated to my beloved sister, Ntombenhle Bonita Luthuli. Even after her untimely passing she has been and continues to be a great source of inspiration in all facets of my life. The times we spent together will forever be cherished and celebrated. We will forever love and miss you. Our paths shall cross again.

Abstract

There are two prominent organisations that play a critical role in the everyday life of most South Africans through freight logistics and electricity provision, Transnet State-Owned Company (SOC) and Eskom SOC, respectively. Within these organisations, billions of taxpayers' Rand are invested into hundreds of capital projects that are frequently delayed. A capital project is a long-term, capital-intensive investment project aimed at building-upon, adding to or improving a capital asset. It is defined by its large scale and exorbitant costs relative to other projects.

A project status report summarises the position or condition of a particular project during a stated period of time. It may be published as a single, stand-alone report or as part of a series of distinguishable, identifiable portions forming part of a larger report. During project status reporting, and according to the project management 'iron triangle', it is a measure of good governance for stakeholders to be informed of project progress during its lifecycle in terms of cost, schedule, scope, and quality. The key challenge, however, is that this can lead to stakeholders being unaware of various other constraints which affect capital projects executed by these organisations. Literature indicating how this challenge can be overcome is scarce.

In developing a holistic framework for project status reporting in South African SOCs as its primary finding, this study suggests that additional project management constraints should be considered during project status reporting. Fifteen themes were identified. Delays in approval processes which can negatively influence all other project management constraints and utilisation of centralised and digitised project management software were exclusively identified during the analysis of primary data. Themes solely identified during the review of secondary data were safety, health and environment; highly regulated disciplines within the project management space. Other themes identified in secondary data were document control which is responsible for the creation, review, modification, storage, issuance, distribution, accessibility, and destruction of project documents, which should be undertaken together with the procurement of project-related goods and services which, if not strategically planned and executed, may stall progress onsite.

Appropriately, most themes were present both in the primary and secondary data. These include the project cost management involving a set of processes that will allow the project to be completed within the approved budget. Schedule management details the activities and

milestones that comprise the project. Scope definition is a process of developing a comprehensive description of the desired project outcome. Project quality bespeaks a philosophy of adherence to standards. Resources relate to everything that is required to perform project activities or tasks. Risks emanating from within and outside the project need to be understood. Contract lifecycle management, involves legally binding documents between the contractor and client. Together with project reporting and communication, the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, control, monitoring, and the ultimate disposition of project information are additional considerations.

This framework formalises project status reporting pertaining to Eskom and Transnet SOCs. It nurtures effective communication, a key attribute in project management. It considers a holistic view of project management constraints, to give stakeholders an unparalleled view of all the project management disciplines. It promotes accurate flow of holistic project status information to both internal and external stakeholders, to aid problem-solving and decision-making during the project lifecycle. It advocates the utilisation of enterprise management offices as a means to improve stakeholder feedback. Lastly, it eliminates bureaucratic project management structures as a factor that is capable of undermining project status reporting.

The research design is phenomenology and the research approach is qualitative. The general population, target population and accessible population are concepts that were clearly articulated in order to guide the reader in appraising sampling credibility. The techniques used and the outcomes of the research study were then declared and defined. Thereafter, purposive sampling was used to identify a SOC with an accessible population of 20 individuals responsible for project status reporting. Due to the small, manageable size of the accessible population, census sampling was used to maximise data collection points. Ultimately, 16 respondents were interviewed. Data were collected using self-administered, semi-structured interviews. NVivo software was utilised to find relationships, differences and interconnectedness between the themes in the primary and secondary data.

This study recommends that Eskom and Transnet SOCs adopt this framework during project status reporting. Future research may want to refine the framework for wider application. Alternatively, future research may want to rank the project management constraints to determine the impact that each has *vis-à-vis* others.

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Acronyms and Terms

BCEA	*Basic Conditions of Employment Act, No. 75 of 1997*
CLM	Contract Lifecycle Management
DCS	Department of Correctional Services
DMAIC	Define-Measure-Analyse-Improve-Control
DNT	Department of National Treasury
DoE	Department of Energy
DPE	Department of Public Enterprises
DWS	Department of Water and Sanitation
EDMS	Electronic Document Management System
EPMO	Enterprise Portfolio Management Office
FFC	Forecast Final Cost – The sum of the committed cost or the anticipated cost of a project at completion.
GDP	Gross Domestic Product
IIRC	International Integrated Reporting Council
ILO	International Labour Organisation
IR	Integrated Report
MDS	Market Demand Strategy – Transnet's capital investment programme aimed at expanding South Africa's rail, port and pipeline infrastructure.

MW	Megawatt
Mtpa	million tonnes per annum
NEMA	*National Environmental Management Act, No. 107 of 1998*
NERSA	National Energy Regulator of South Africa
NGP	New Growth Path
NIP	National Infrastructure Plan
NNR	National Nuclear Regulator
OHSA	*Occupational Health and Safety Act, No. 85 of 1993*
PICC	Presidential Infrastructure and Coordinating Commission
PMI	Project Management Institute
PMO	Project Management Office
Portfolio	A group of similar programmes, aligned to the organisational strategy, grouped together to facilitate effective management.
Programme	A group of similar projects grouped together to facilitate effective management.
Project	An individual or collaborative endeavour carried out to develop a unique product or service, with definite start and end dates.
PMWL	Project Management World Library
RDM	Relationship Diagramming Method
RORO	Roll-On Roll-Off

RSA	Republic of South Africa
SCOPA	Standing Committee of Public Accounts
SOC	State-Owned Company
TCC	Transnet Corporate Centre – Organisation-wide leadership in key areas such as strategic planning and support services, internal auditing, financial management, procurement, business development, regulatory office, human resources, and information and communications technology.
TE	Transnet Engineering – A division of Transnet specialising in the maintenance, repair, upgrade, conversion, and manufacture of freight wagons, mainline and suburban coaches, and diesel and electric locomotives.
TF	Transnet Foundation – The corporate social investment specialist unit of Transnet.
TFR	Transnet Freight Rail – A division of Transnet that maintains an extensive rail network across South Africa that connects with other rail networks in the sub-Saharan region.
TGC	Transnet Group Capital – A specialist unit of Transnet that administers the execution of major projects.
TNPA	Transnet National Ports Authority – A division of Transnet that is responsible for the safe, effective and efficient economic functioning of the national port system, which it manages in a landlord capacity.
TP	Transnet Property – Manages Transnet's non-core property portfolio encompassing commercial and residential properties.
TPL	Transnet Pipelines – A division of Transnet that is the custodian of the country's strategic pipeline assets, servicing two key industries, fuel and gas.

TPT	Transnet Port Terminals – A division of Transnet that operates container terminals at Durban, Ngqura, Port Elizabeth and Cape Town.
WBS	Work Breakdown Structure – A detailed logical decomposition of all the work packages that constitute a complete project.

Chapter One: Introduction and Background

1.1 Introduction

The main objective of the study is to determine the appropriate framework for project status reporting in South African SOCs. A framework for project status reporting within these organisations is currently lacking. Chapter one provides the background of the research study. Chapter two provides an overview of the most prominent governmental stakeholders that influence the business conducted by Transnet and Eskom. Chapter three uses the project management 'iron triangle' as a foundation to describe the constraints that projects managed by Transnet and Eskom encounter. Chapter four discusses the interaction between enterprise management offices functioning at project, programme and portfolio levels within an organisation. Chapter five engages the existing models in the discipline of project management to demonstrate a literature gap. Chapter six discusses the research methodology used, the rationale for choosing this methodology, as well as the concepts of validity and reliability. The primary focus of chapter seven is to present and give meaning to the primary data obtained through the various research approaches discussed in chapter six. Chapter eight provides a comprehensive discussion of the findings of the analysed data if the secondary research questions are framed as objectives. Chapter nine pulls the study together by reiterating key discussion points. The content of each chapter is further articulated in section 1.12 below.

1.2 Background

There are two prominent organisations that play a critical role in the everyday life of most South Africans, through freight logistics and electricity provision, respectively, Transnet State-Owned Company (SOC) and Eskom SOC. Transnet SOC has recently launched its capital investment programme aimed at improving South Africa's rail, port and pipeline infrastructure to help boost the flagging economy (*Transnet, 2013*). Eskom SOC generates, transmits, distributes, and sells electricity to various customers in the industrial, mining and resources, commercial, agricultural, and residential sectors (*Eskom, 2017b*). Both these organisations posit that investment in infrastructure will have a positive knock-on effect on growing the South African economy (*Eskom, 2017b*; *Transnet, 2017a*).

Within these organisations, billions of taxpayers' Rand are invested into hundreds of capital projects that are frequently delayed (Groenewald, 2017; Yelland, 2016). According to the

Project Management Institute (*PMI, 2013: 03*), a project is 'a temporary endeavour undertaken to create a unique product, service, or result. The temporary nature of projects indicates a definite beginning and end'. A capital project, on the other hand, is a long-term, capital-intensive investment project aimed at building-upon, adding to or improving a capital asset (Barone, 2019). It is defined by its large scale and exorbitant costs relative to other projects. To aid decision-making and problem-solving, the status of all capital projects executed by these organisations is shared with internal and external stakeholders using project status reports. These are reports that summarise the position or condition of a particular project during a stated period of time. According to the International Integrated Reporting Council (IIRC, 2013), it may be published as a single, stand-alone report or as part of a series of distinguishable, identifiable portions forming part of a larger report.

During project status reporting, it is a measure of good governance for stakeholders to be informed of project progress during the project lifecycle in terms of cost, schedule, scope, and quality. (Lock, 2007). Literature suggests that additional project management disciplines should be considered during project status reporting (*PMI, 2013*), since there are others with a potential to influence large-scale infrastructural projects executed by Eskom and Transnet during their lifecycle. This study concurs with the notion that project status reporting should include cost, schedule, scope, and quality. However, it further demonstrates that project status reports should include other project management disciplines such as resources, risks, safety, health, environment, document control, procurement, contract management, and communication. These are themes that became apparent during data analysis. Therefore, they form part of the framework that this study develops for project status reporting within South African SOCs.

This framework formalises project status reporting pertaining to South Africa's large, geographically dispersed SOCs. It nurtures effective communication, a key attribute in the project management environment. It promotes accurate flow of holistic project status information to both internal and external stakeholders, in an effort to aid problem-solving and decision-making during the project lifecycle. It considers a holistic view of project management disciplines, to give stakeholders an unparalleled view of all the project management disciplines. It advocates the utilisation of enterprise management offices as a means to improve stakeholder feedback. This framework also eliminates bureaucratic project management structures as a factor that is capable of undermining project status reporting.

1.3 Problem Statement

As will be discussed in subsection 1.4.1 below and further expounded in chapter five, a range of project management models can be found within present literature. However, present literature reveals very little by way of formalised and holistic project status reporting pertaining to large, geographically dispersed SOCs tasked with executing megaprojects of strategic importance. The construction industry suffers from similar neglect; there is no holistic model formalising project status reporting. Instead, formalised project status reporting literature tends to point towards information and communications technology as well as software development (Barry and Uys, 2011; Iacovou, Thompson and Smith, 2009; Smith, Keil and Depledge, 2001; Smith and Keil, 2003; Snow, Keil and Wallace, 2007; Wearne, 2014). There is a need to formalise project status reporting within SOCs to promote accurate flow of project status information to internal and external stakeholders and to, at the very least, bring it on par with information and communications technology as well as software development.

1.4 Background to Problem Statement

1.4.1 Existing Models

As alluded to earlier, a range of project management models applicable to the construction industry can be found within present literature, but minimal research has been conducted into formalised and holistic project status reporting. Han, Love and Peña-Mora (2013) developed a systems dynamics model aimed at better understanding the complex nature of design errors and their impacts within the construction industry. They argue that a project management team tends to show optimistic biasing in estimating schedule delay recovery strategies, resulting in the project team underestimating the negative repercussions emanating from hidden design errors on schedule performance. The challenging nature of assessing quality of construction compliance led Kalyan, Zahed, Staub-French, and Froese (2016) to highlight the advantages and limitations of the potential for the usage of new, faster, inexpensive, and easy to use construction quality assessment, three-dimensional modelling technology to streamline the quality control process.

Meanwhile, a risk management model enabling project owners to enlist the services of experts in improving construction project quality and performance whilst simultaneously excluding project owner decision-making was developed by Algahtany, Alhammadi and Kashiwagi (2016). Chandra (2015) proposes a structural equation model aimed at investigating natural,

design, resources, financial, legal, regulatory, and construction risk factors that have a potential to affect project success. Gudiene, Banaitis, Banaitiene, and Lopes (2013) developed a conceptual critical success factors model for construction projects, describing major factors that influence project success. Meanwhile, Ko (2017) proposed a lean building design model aimed at improving design quality, based on the lean production system principles of the Toyota Production Systems philosophy.

Whereas, Dunović, Radujković and Škreb (2014) move toward a new model of complexity in the case of large-scale infrastructure projects, arguing that existing models in this area are not sufficient since they do not consider the holistic nature of complex projects. Hajdu (2013) utilises two scheduling models on a single project in a quest to ascertain the relevance of models for real life application. The main argument is that scheduling models are not adequate should it be the case that all possible trade-offs that occur within the complex projects are investigated and relevant connections made. Perhaps the most popular model, developed by Dr Martin Barnes, is the project management 'iron triangle' (Lock, 2007; *Project Management World Library [PMWL], 2017)*. It describes constraints that all projects of different shapes and sizes must face. The project management 'iron triangle' essentially stipulates that cost, schedule, scope, and quality can never be divorced from each other since they interact in such a way that one cannot be altered without influencing the others.

1.4.2 Other Challenges

This study has also identified a variety of other problems aligned to the one discussed above. It is seldom the case that organisations utilise enterprise management offices as a means to improve accurate stakeholder feedback at project level, programme level and/or portfolio level, even though literature indicates that there are numerous benefits to be had (Hyväri, 2014; Khalema, Waveren and Chan, 2015; Malatji and Marnewick, 2016; Marnewick and Labuschagne, 2010; Smith and Sonnenblick, 2013). Second, project status reporting in the construction industry seldom accounts for all the project management disciplines (*PMI, 2013*). Project status reporting as it stands is not holistic. This can lead to internal and external stakeholders being uninformed in terms of project-related cost, schedule, scope, quality, resources, risks, safety, health, environment, document control, procurement, and contract lifecycle. Comprehensive reporting can be complicated by the fact that SOCs tasked with executing megaprojects of strategic importance are often large, geographically dispersed

organisations. Third, the project management structure within these organisations can be quite diverse and excessively complicated. This bureaucratic structure means that the effects of selective and erroneous reporting, can quickly reverberate and amplify throughout the entire organisational structure and beyond, with devastating consequences.

Transnet and Eskom's project portfolios are worth hundreds of billions of Rand (*Eskom, 2017b*; *Transnet, 2017a*). Considering the amount of taxpayers' money invested by SOCs into projects each year, aimed at developing infrastructure and fostering economic growth, there is a pressing need to ensure that the above-mentioned problems are addressed. Project status reporting in the construction industry needs to be formalised. There needs to be utilisation of formalised and established project, programme and portfolio management structures that are adapted to these organisations. All project management constraints need to be accounted for during project status reporting. Moreover, the diverse project management structures present in SOCs, as outlined in section 1.5.2 below, have to be eliminated as a factor that is capable of negatively influencing project status reporting. To minimise, perhaps altogether eliminate, the above problems and to resolve the perceived theoretical gap, the proposed research will advocate for the development and subsequent utilisation of a project status reporting framework.

1.5 Rationale for the Study

1.5.1 SOCs, Infrastructural Investment and Economic Growth

In 2012, Transnet embarked on an ambitious R300 billion capital investment programme dubbed the Market Demand Strategy (MDS) (*Transnet, 2013*). The MDS aims to expand South Africa's rail, port and pipeline infrastructure, to address freight logistics constraints effectively, minimise road congestions, reduce the freight-related carbon footprint, and develop world-class infrastructure and technology. The MDS does this whilst simultaneously creating jobs, enabling skills development and growing the South African economy. The strategic programme embodies a seven-year Transnet corporate plan, approved by the board of directors and optimised annually considering strategic organisational objectives and prevailing market conditions. The objectives of the sole shareholder of Transnet, the Department of Public Enterprises (DPE), as reflected by the Transnet's mandate, is to 'assist in lowering the cost of doing business in South Africa, enabling economic growth and ensuring security of supply' (*Transnet, 2014*) through providing the appropriate rail, port and pipeline infrastructure.

Eskom 'is the world's eleventh-largest power utility in terms of generating capacity' (*DPE, 2017*), with 'approximately 95% of the electricity used in South Africa and approximately 45% of the electricity used in Africa' (*Eskom, 2017b*) generated by the power utility. Kusile and Medupi are two coal-fired power stations currently under construction that qualify as megaprojects of strategic importance to the South African economy. Poor engineering designs and allegations of corruption have escalated the costs of both plants to over R 300 billion (Khumalo, 2019).

The New Growth Path (NGP) is the principal driver towards investment in infrastructure, economic development and job creation (*Department of Economic Development, 2011*), aligned to what the organisations are currently undertaking. Investment in infrastructure is, according to the *National Infrastructure Plan (NIP*) developed by the Presidential Infrastructure Coordinating Commission (PICC), one of the key dynamics influencing job creation and a vital catalyst to economic growth (*PICC, 2012*). Delivering capital projects on time, within budget and at once achieving the scope and quality desired by the project owner, project sponsor, customers, and various other stakeholders, will no doubt enable successful economic development. As such, organisations can be a catalyst to economic prosperity in the short, medium and long term.

Within Eskom, Transnet and throughout the country, South Africa invests billions of Rand into hundreds of projects each year. It has been shown that, on the one hand, infrastructural investment in South Africa has a positive impact on the Gross Domestic Product (GDP) and, on the other hand, increased production encourages further investment in infrastructure (Fedderke, Perkins and Luiz, 2006). Hence there is a strong correlation between investment in infrastructure and economic growth, occurring in both directions. Downgrading of South Africa to junk status by ratings agency Standard and Poor's (Brown, 2017) and Fitch (Joffe, 2017), triggered by the cabinet reshuffle, undoubtedly put immense strain on the country's economy. After initial inactivity, Moody's followed suit by downgrading South Africa's five banks (le Cordeur, 2017). With these dynamics in mind, there is an obvious and pressing need to ensure that infrastructural investments yield fruit in the form of achieving the desired developmental goals, which in turn will stimulate job creation and, subsequently, boost the country's flagging economy. Eskom and Transnet need to stretch taxpayers Rand as far as possible not only as a matter of principle but also considering the persistent, volatile economic climate which is stunting job creation and hampering GDP growth.

1.5.2 Stakeholder Reporting

In large, geographically dispersed organisations, apprising stakeholders during the project lifecycle is a measure of good, accountable governance. All stakeholders need to be constantly informed of how projects are progressing. Depending on the reporting platform, reports generally include information pertaining to cost, schedule, scope, and quality. Collecting and collating accurate information to the satisfaction of all stakeholders is a daunting task in a large-scale project environment, more so if there is geographic dispersion at play. Moreover, assuring that information communicated is of the highest quality adds to the reporting complexities. Zulch (2014) has shown the importance of stakeholder communication in realising the project deliverables. Communicating accurate and pertinent information is a reporting challenge considering the phenomenon of 'selective reporting'. Selective reporting refers to an act by the project team member of conveying inaccurate project status to his/her seniors (Iacovou *et al.*, 2009) with the aim of suppressing information that will allow management to ascertain the true status of a project (Smith *et al.*, 2001). The primary reason this phenomenon occurs is management's inability to tolerate negative project information or anticipation by the reporting member of negative repercussions should project status reports reflect performance that is regarded as subpar.

Reporting structures in large, geographically dispersed organisations executing megaprojects of strategic importance, depending on the complexity of the project, may include, from low-level to high-level, supervisors, project managers, senior project managers, principal project managers, project directors, principal project directors, general managers, and chief executives. The naming convention will differ from organisation to organisation but the bureaucracy often remains as an impediment to accurate and pertinent reporting. Taking into consideration such a structure, the effects of selective reporting can quickly reverberate and amplify throughout the entire organisational structure and beyond, with devastating consequences. External stakeholders such as DPE, Department of National Treasury (DNT), Department of Energy (DoE), National Energy Regulator of South Africa (NERSA), and National Nuclear Regulator (NNR) can also become victims of this bias. Considering these dynamics, the central research question of the proposed study is to ascertain the most appropriate framework for project status reporting within these organisations.

1.6 Research Questions

Taking the above discussions into account, this research study primarily argues that the challenges that SOCs face when reporting project status to internal and external stakeholders can be overcome by the development and subsequent utilisation of a project status reporting framework. The proposed framework should be able to formalise project status reporting pertaining to SOCs, in particular, and the construction industry, in general, as a means to assure accurate flow of project status information to internal and external stakeholders. It will advocate for the utilisation of enterprise management offices as a means to improve accurate stakeholder feedback. It should wholly account for all the constraints that have the potential to influence projects executed by large, geographically dispersed organisations to give internal and external stakeholders full sight thereof. Finally, this framework should eliminate the bureaucratic project management structures as a factor that is capable of undermining accurate and pertinent project status reporting.

The central research question of this study is: what is the appropriate framework for project status reporting in South African SOCs?

The secondary research questions are as follows:

i. What project status reporting processes are currently in existence at Transnet and Eskom?
ii. What are the outcomes of the existing project status reporting processes?
iii. What are the key variables of the reporting processes that have been put in place to assure accurate flow of project status information to internal and external stakeholders?
iv. What are challenges that emanate from the existing project status reporting processes?
v. Is the proposed project status reporting framework suitable, logical; is it able to overcome the challenges that have been identified at Transnet and Eskom?

1.7 Research Objectives

The main objective of the study is to determine the appropriate framework for project status reporting in South African SOCs. This objective is further divided into five secondary research objectives, which are aligned to the research questions above, as follows:

i. To determine the project status reporting processes that are currently in existence at Transnet and Eskom;

ii. To ascertain the outcomes of the existing project status reporting processes;
iii. To establish the key variables of the reporting processes that have been put in place to promote accurate flow of project status information to stakeholders;
iv. To identify the challenges emanating from the existing project status reporting processes; and
v. To propose a suitable, logical framework that is able to overcome the challenges identified at Transnet and Eskom.

1.8 Research Approach

A qualitative research approach was used to collect, measure and analyse data to ensure that research questions are effectively addressed in a coherent, logical and comprehensive manner. Choosing the appropriate research approach was determined by a number of factors suggested by Lancaster (2005), such as the objectives or purpose of the research study, the researcher's skills and expertise, the available budget and inherent cost implications, the allotted time for data collection, the availability of the research sample, preferences and values pertaining to the research study, as well as ethical and legal considerations. Qualitative research typically utilises four methods for collecting data, namely participating in a setting, observing directly, interviewing in-depth, and analysing documents and material culture with varying emphases (Marshall and Rossman, 2016). This study predominantly utilised the latter two. Secondary literature was engaged to better understand the underlying dynamics of large, geographically dispersed SOCs frequently executing megaprojects of strategic importance to the South African economy. Thereafter, a three-part interview guide was developed to collect primary data. NVivo software was utilised to find relationships, differences and interconnectedness between the themes in the primary data in comparison with those in the secondary data, with the aim of developing a framework for project status reporting within South African SOCs.

1.9 Ethical Considerations

First and foremost, permission to conduct the study was requested from the SOC in which the primary data were collected (see *Appendix 3*). However, during discussions that ensued, management preferred that the organisation remain anonymous for confidentiality reasons. After the organisational consent was acquired, as is protocol concerning scholarly research conducted through the institution, permission was then sought from the University of

KwaZulu-Natal's (UKZN) Humanities and Social Sciences Research Ethics Committee to conduct a study of this nature. The application was considered by the committee and granted full approval (see *Appendix 4*). Thereafter the process to collect primary data got well and truly underway. In addition to the organisational permission and the approval of the UKZN's Humanities and Social Sciences Research Ethics Committee, informed consent was obtained from each and every individual that was interviewed. Since the study collected primary data utilising self-administered, semi-structured interview guides, an informed consent form was attached as part of the documentation that was emailed to the research group. Taking the above into account, the researcher will respect the confidentiality and anonymity of the individuals participating in this study as well as that of the organisation to which they belong.

1.10 Expected Contribution to Knowledge

This research study primarily argues that the challenges of holistic project status reporting, as outlined in section 1.3 above, may be addressed by development and subsequent utilisation of a project status reporting framework. In summary, the first challenge is lack of literature pertaining to formalised project status reporting in the construction industry. The second challenge pertains to inadequate utilisation of enterprise management offices as a means to improve accurate stakeholder feedback even though numerous benefits await (Hyväri, 2014; Khalema *et al.*, 2015; Malatji and Marnewick, 2016; Marnewick and Labuschagne, 2010; Smith and Sonnenblick, 2013). Insufficient project status reporting that has a holistic view of all project management constraints (*PMI, 2013*) is the third challenge. The fourth is the bureaucratic project management structures often present in large, geographically dispersed SOCs executing megaprojects of strategic importance to the South African economy. Considering the scope of the study, and in order to be deemed sufficient, the proposed conceptual framework will have to, at the very least, overcome these challenges.

The left side of the conceptual framework will be founded on the project management 'iron triangle' developed by Dr Martin Barnes, which describes constraints that all projects – regardless of shape, size, or location – must face (Atkins, 1999; Lock, 2007; Phua, 2004; *PMI, 2013*; *PMWL, 2017*; Toor and Ogunlana, 2010). It essentially stipulates that cost, schedule, scope, and quality can never be divorced from each other since they interact in such a way that one cannot be changed without affecting the others. Therefore, shortening a project schedule and increasing the quality demands will, without fail, increase the cost. Shortening a schedule

and decreasing the cost will religiously lower the overall quality. Whereas increasing the quality requirements and decreasing the budgeted cost will certainly increase the time needed to execute the project. The term project management 'iron triangle' comes from the way in which the cost, schedule and scope form the points of the triangle wherein the quality is the surface area. Over and above these project management constraints, this portion of the conceptual framework will consider various other constraints faced by strategically important megaprojects that are executed by large, geographically dispersed SOCs. These additions will be guided by primary and secondary data.

On the other hand, the right side of the framework will be founded on the enterprise management offices which, amongst other things, formally report these project management constraints to internal and external stakeholders. The management style where projects coalesce to form programmes which in turn merge to form portfolios is widely used in the project management environment, and within the organisations that are a subject of this study, hence the utilisation thereof.[1] As will be shown in section 4.3, enterprise management offices can be referred to using a variety of names, are depicted using a variety of models, and are purported to fulfil a variety of roles. In this study they are categorised into three, namely the Enterprise Project Management Office, the Enterprise Programme Management Office and the Enterprise Portfolio Management Office. In terms of organisational hierarchy, these function at operational, tactical and strategic levels respectively.

The 'iron triangle' and consideration of all other project management disciplines will partially address the first challenge and fully address the third. To fully address the first challenge, enterprise management offices at project, programme and portfolio levels will be employed. This portion of the framework will also effectively address the second and fourth challenges. In other words, enterprise management offices will be investigated as components that are able to formalise project status reporting, particularly within SOCs and, by and large, the construction industry. Their value will be evident in the manner in which they are able to improve accurate stakeholder feedback. Moreover, they will be explored in so far as they are able to address issues associated with bureaucratic project management structures often present in large, geographically dispersed organisations. There will be an investigation of a wide range of project-critical activities including tracking and monitoring, coordinating issue resolution, risks management, aggregating financial data, and safeguarding adherence to standardised

[1] Refer to Table 4.1 showing a Comparative Overview of Project, Programme and Portfolio Management

procedures, whilst ensuring coordinated enterprise-wide resource management all occurring at various levels of the enterprise management offices.

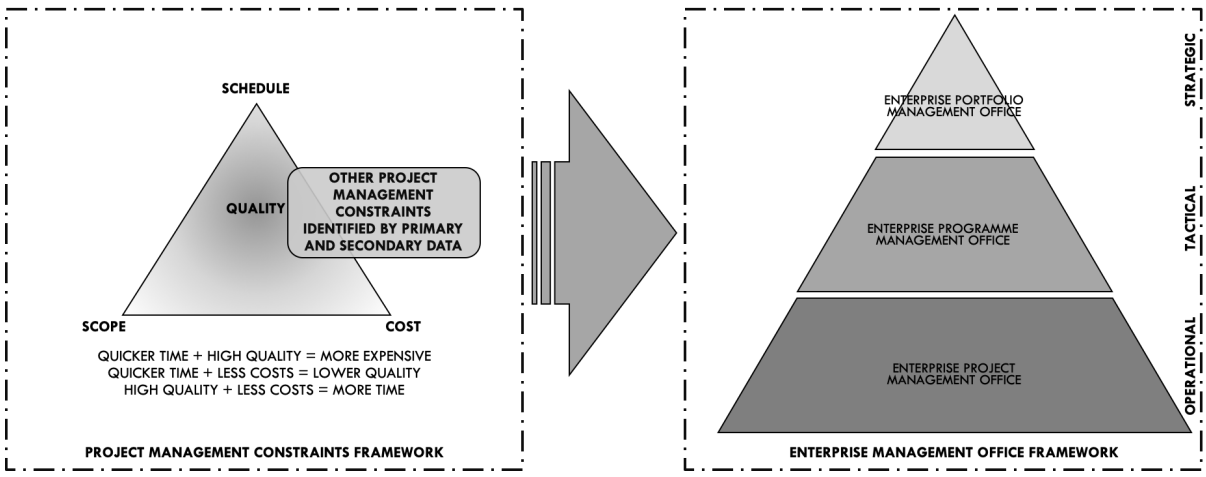


Figure 1.1: A rudimentary representation of the proposed conceptual framework

Source: The Researcher, 2019.

Utilisation of the 'iron triangle' model, addition of project management disciplines as pointed out by primary and secondary data, as well as consideration of the enterprise management offices will set a firm foundation for the study to clarify the central research question. Through this process, an appropriate project status reporting framework will become evident. The resulting framework should make a unique and meaningful contribution to the project management literature as well as the project management body of knowledge.

1.11 Scope of the Study

South Africa has 131 SOCs which undertake commercial activities on its behalf (South African Government [SAG], 2017). These companies are as diverse as the activities which they undertake. The common thread that runs through all of them is that they are partially or wholly owned by the government for strategic reasons. Of these SOCs, only two can be classified as large, geographically dispersed, tasked with executing infrastructural megaprojects of strategic importance to the country. The first is Eskom, which generates, transmits, distributes, and sells electricity to various customers within and beyond South African borders. The other is Transnet

which owns a wide-ranging rail, port and pipeline infrastructural network. If one considers the central question of this study, which is the ascertaining of an appropriate framework for project status reporting in large, geographically dispersed SOCs tasked with executing megaprojects of strategic importance, Eskom and Transnet are the only two companies that fall within this ambit. As such, this research study will concern itself with only these two organisations.

Furthermore, within Eskom and Transnet, the study is applicable to analysts, reporting coordinators and reporting managers since they have the following characteristics. Their primary role within the organisation is to conduct project status reporting. They utilise established processes to collect, collate, validate, and disseminate projects status reports. Moreover, they ensure that reporting to internal and external stakeholders is accurate, and that all the elements that should have been reported on are accounted for. Targeting these individuals allows the study to investigate the existent processes, evaluate the outcomes thereof, identify key variables of these processes, and thereafter identify challenges emanating therefrom.

1.12 Structure of Thesis

Chapter one provided the introduction and background of the research study. It summarised the theoretical gap found within present literature, rationalised the chosen topic, outlined research questions and respective objectives, and introduced the research approach. Further, it outlined ethical considerations, stated the expected contribution to the body of knowledge that the study aimed to make and framed the scope of the study. As a way of preparing the reader for what was to come, the structure of the thesis was then provided prior to the chapter summary.

Existing literature pertaining to the main themes of the study was reviewed in chapters two-to-five. These chapters engaged with this literature and summarised key points thereof. They were structured in the following manner:

- Chapter two provided an overview of the most prominent governmental stakeholders that influence the business conducted by Transnet and Eskom. It described these SOCs whilst indicating the types of projects they execute. Broader issues that affect these organisations, with a particular focus on state capture, were then discussed.

- Chapter three used the project management 'iron triangle' as a foundation to describe the constraints that projects managed by Transnet and Eskom encounter. Due to the composition of these organisations and the environment in which they operate, this study proceeded to argue that there are various other project management constraints to which they are exposed. Consequently, this chapter vigorously engaged relevant literature pertaining to the established project management constrains as well as the emerging constraints.
- Chapter four discussed the interaction between enterprise management offices functioning at project, programme and portfolio levels within an organisation. Since the management style that became apparent is widely used in the project management environment in which Eskom and Transnet operate, this chapter argued that it should form part of the conceptual framework being developed.
- Chapter five engaged the existing models in the discipline of project management to demonstrate a literature gap. Thereafter, a rudimentary conceptual framework with the potential to fill this gap was proposed. This framework became apparent as the secondary literature was reviewed in chapters two-to-five. However, this rudimentary conceptual framework could only be refined and finalised subsequent to the analysis of primary data.

Chapter six discussed the research methodology used, the rationale for choosing this methodology, as well as the concepts of validity and reliability. It discussed the population, the sampling strategy and how respondents were contacted. It also deliberated on how data were collected, analysed and presented. Finally, ethical issues were considered.

The primary focus of chapter seven was to present and give meaning to the primary data obtained through the various research approaches discussed in chapter six. This chapter first provided an overview of the respondents. It then reported on what was discovered by categorising the primary and secondary data under the study's secondary research objective. By and large, the results obtained were presented in the form of a narrative.

Chapter eight provided a comprehensive discussion of the findings of the analysed data if the secondary research questions are framed as objectives using a tabular view. This indicated the extent to which the research questions were addressed. Thereafter, as a contribution to the existing project management body of knowledge, this chapter developed a conceptual framework that was able to address all the challenges identified. It did this by building on the

rudimentary conceptual framework proposed in chapter five. Figure 8.2 summarised the sources of the themes used in the conceptual framework for ease of comparison. A rationale for inclusion of these elements was then provided prior to the objectives of the framework.

Chapter nine pulled the study together by reiterating key discussion points. Importantly, drawing from the research findings, the chapter made recommendations for future studies and identified other areas of further research on the themes of this study. A conclusion brought the thesis to a close.

1.13 Chapter Summary

This chapter endeavoured to provide an introduction and background to this research study. Transnet SOC and Eskom SOC were introduced as two prominent organisations that play a critical role in the everyday life of most South Africans, through freight logistics and electricity provision, respectively. Thereafter, they were rationalised as large, geographically dispersed organisations executing strategically important projects to develop infrastructure, whilst simultaneously creating jobs, enabling skills development and growing the South African economy. A problem statement was then articulated to indicate the literature gap that exists during formalised project status reporting. This was followed by a rationale for the study. Thereafter, the central research question and the subsequent secondary research questions were discussed. This was followed by a section outlining the research objectives. Research approaches that were used to collect, measure and analyse data were then considered. Subsequent to ethical considerations, this chapter then discussed the contribution to literature that this study aimed to realise. The scope of the study was discussed. And, finally, the structure of the thesis was outlined to prime the reader for what was to follow.

Chapter Two: South African State-Owned Companies, Key Stakeholders and the Broader Landscape

2.1 Introduction

Chapters two-to-five are aimed at engaging pertinent secondary literature. The review of this literature, which will culminate with the proposal of a rudimentary conceptual framework in chapter five, is aimed at examining the status of the project management environment in which Eskom and Transnet operate. It should be noted that this conceptual framework is not exhaustive. It will be re-evaluated and refined subsequent to the collection and analysis of primary data. To set the background for this study, this chapter will first outline the most prominent governmental stakeholders that influence the business conducted by Transnet and Eskom. Subsequent to providing this overview, it will describe the SOCs that are the subject of this study. It will do this whilst indicating the types of projects that are executed by these organisations, aimed at developing infrastructure, creating jobs and growing the South African economy. A brief discussion of the broader issues that affect business conducted by Eskom and Transnet, with a particular focus on state capture, will then follow. A chapter summary will conclude the chapter.

2.2 Background

The SOCs which are the concern of this study are large, geographically dispersed organisations that frequently execute megaprojects of strategic importance to the South African economy. There are two which fall into this category, namely Transnet and Eskom. Utilising the NGP as the cornerstone to the development of infrastructure in South Africa, Transnet and Eskom posit that investment in infrastructure will have a positive knock-on effect on growing the South African economy. The NGP (2011) is the principal driver towards investment in infrastructure, economic development and job creation. Similarly, the *NIP* developed by the PICC argues for investment in infrastructure as one of the key dynamics influencing job creation and a vital catalyst to economic growth (PICC, 2012). As will be shown below, internal and external stakeholders have, in more ways than one, vested interests in the infrastructure development capabilities of Transnet and Eskom as well as their ability to create jobs and to grow the economy.

Within these organisations and throughout the country, South Africa invests hundreds of billions of Rand of taxpayers' money into hundreds of projects each year. It has been shown

that, on the one hand, infrastructural investment in South Africa has a positive impact on the GDP and, on the other hand, increased production encourages further investment in infrastructure (Fedderke *et al.*, 2006). Hence, there is a strong correlation between investment in infrastructure and economic growth, occurring in both directions. The persistent, volatile economic climate which is stunting job creation and hampering GDP growth, places considerable pressure on the SOCs to succeed in their endeavours. There is a need to understand the role that Transnet and Eskom play in developing infrastructure, creating jobs and growing the economy. But before clarifying this role, this study will outline the mandates of the key governmental stakeholders which play a pivotal role in regulating the activities of Transnet and Eskom. The aim is to put into perspective some of the regulatory obstacles that need to be navigated.

2.3 Stakeholders

2.3.1 Department of Public Enterprises

The Department of Public Enterprises (DPE) is perhaps the most prominent governmental stakeholder. It is responsible for providing investment, regulatory, productivity, and transformational guidance to the SOCs to assure alignment with South Africa's growth strategy in the medium to long term *(DPE, 2017a)*. The DPE is a shareholder representative for government, with oversight at Eskom, Alexkor, Denel, South African Forestry Companies Limited, South African Express Airways, Transnet, and South African Airways *(DPE, 2017a*). This ministry realises the importance of SOCs in advancing economic growth, since these organisations are responsible for development of key infrastructure and manufacturing capacity for the country. Moreover, organisations are at the core of creating and sustaining opportunities for investment programmes aimed at growing the country's economy.

The DPE utilises four indicators to implement government's strategic initiatives *(DPE, 2017a)*. It improves the delivery and maintenance of infrastructure and monitors the rollout of the Transnet and Eskom build programmes. Second, it achieves policy and regulatory clarity in the environment in which these SOCs function. Third, it improves operational efficiencies of SOCs, 'particularly in relation to the reliable delivery of rail and ports services and the reliable generation, distribution and transmission of electricity'. Fourth, it develops 'operational indicators for each of the required sub-outputs identified as part of the delivery agreement'.

2.3.2 Department of National Treasury

The Department of National Treasury (DNT) aims to manage government finance in a manner that encourages socio-economic development as well as responsible and accountable governance at local, provincial and national levels (*DNT, 2017*). The *Public Finance Management Act* mandates the Department to promote government's fiscal policy framework aimed at coordinating macroeconomic policy and intergovernmental financial relations and to manage the preparation of budgets, and for the provision of equitable distribution of revenue at national, provincial and local levels of government *(DNT, 2017)*. The Department strives to provide optimal allocation and utilisation of financial resources, to reduce poverty amongst the most vulnerable members of society whilst simultaneously encouraging economic inclusivity. National Treasury has prioritised an increased investment in infrastructure and industrial capital, skills development, regulation of markets and public entities, and in the reduction of poverty and inequality.

2.3.3 Department of Energy

The Department of Energy (DoE) 'is responsible for ensuring exploration, development, processing, utilisation, and management of South Africa's energy sources' (*DoE, 2017)*. The Department does this through six programmes specifically structured to achieve these goals *(DoE, 2017*). Programme one provides administrative support and management services. Programme two ensures evidence-based policy formulation as well as planning and execution of strategies aimed at improving energy security, and at the regulation of the energy sector to improve supply and demand. Programme three manages the regulation of petroleum as well as petroleum products to ensure optimum functioning of the petroleum industry to achieve government's developmental goals. Programme four manages, coordinates and monitors projects that are focused on access to energy. Programme five manages the South African nuclear industry and controls the nuclear material in terms of international obligations, nuclear legislation and various other nuclear policies to ensure safe and effective use of nuclear energy. Programme six facilitates the development and implementation of clean and renewable energy initiatives.

2.3.4 National Energy Regulator of South Africa

The National Energy Regulator of South Africa's (NERSA) objectives are aimed at the regulation of electricity, piped-gas and petroleum products industries in terms of the corresponding governmental laws, policies, standards and international best practices intended to support sustainable development (*NERSA, 2017)*. NERSA's strategic objectives are to:

- Implement the relevant energy policy efficiently and effectively;
- Implement relevant energy laws efficiently and effectively;
- Implement relevant energy regulations efficiently and effectively;
- Identify, develop and implement relevant energy rules efficiently and effectively;
- Establish the credibility, legitimacy and sustainability of NERSA as an independent and transparent energy regulator;
- Create an effective organisation that delivers on its mandate and purpose; and
- Evaluate the Energy Regulator's effectiveness.

2.3.5 National Nuclear Regulator

The National Nuclear Regulator's (NNR) mandate is to 'provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and regulatory practices. It is responsible for granting nuclear authorisations and for exercising regulatory control' *(NNR, 2017*). On the one hand, it manages the siting, design, construction, operation, and manufacture of components and parts used in the nuclear industry. On the other hand, it regulates the decommissioning of nuclear installations and vessels propelled by nuclear power or vessels that have radioactive material on board with the potential to cause nuclear damage. The regulator also facilitates and controls the operation of nuclear installations using its power to grant, amend and revoke authorisations and permits, and to impose the necessary conditions upon authorisation.

2.3.6 Section Overview

The Department of Public Enterprises, the Department of National Treasury, the Department of Energy, the National Energy Regulator of South Africa, and the National Nuclear Regulator are perhaps some of the most prominent governmental stakeholders that influence the business conducted by Transnet and Eskom. There may be various other departments that influence the

business conducted by these organisations on a day-to-day basis, which this study has not engaged because they do so in an inconsiderable way. Now that the background in which these organisations operate has been set, this study will now move on to discuss organisational activities aimed at developing infrastructure, creating jobs and growing the South African economy which occur within Transnet and Eskom.

2.4 State-Owned Companies

2.4.1 Transnet

In 2012, Transnet embarked on an ambitious R300 billion capital investment programme dubbed the MDS *(Transnet, 2013)*. The MDS aims to expand South Africa's rail, port and pipeline infrastructure, to effectively address freight logistics constraints, minimise road congestions, reduce the freight-related carbon footprint, and develop world-class infrastructure. It will do this whilst creating jobs, enabling skills development and growing the South African economy. The strategic programme embodies a seven-year Transnet corporate plan, approved by the Board of Directors and optimised annually considering the strategic organisational objectives and prevailing market conditions. The objectives of the sole shareholder of Transnet, the DPE, as reflected by the Transnet's mandate, is to 'assist in lowering the cost of doing business in South Africa, enabling economic growth and ensuring security of supply' (*Transnet, 2014*) through providing the appropriate rail, port and pipeline infrastructure.

To understand the diverse nature of the MDS as a rail, port and pipeline infrastructural expansion programme, it is of vital importance first to understand the diverse nature of the divisions that fall under the parent company Transnet Limited through which this strategy will materialise. The five core operating divisions are Transnet Freight Rail (TFR), Transnet National Ports Authority (TNPA), Transnet Port Terminals (TPT), Transnet Pipelines (TPL), and Transnet Engineering (TE) (*Transnet*, *2017b*). In addition, Transnet Limited encompasses three specialist units, namely Transnet Group Capital (TGC), Transnet Foundation (TF) and Transnet Property (TP) that, in addition to the five operating divisions, are headed by the Transnet Corporate Centre (*Transnet, 2017b*). Understanding the diverse nature of this organisation will put into context the varied nature of the capital projects executed by the company. Strategically important projects that are in execution and those that are in the pipeline are, for the most part, aimed at developing infrastructure, growing the South African economy and creating jobs.

2.4.1.1 Transnet Freight Rail

Transnet Freight Rail, the largest of the divisions in terms of workforce and turnover, sustains an extensive rail infrastructure, giving it a firm foundation to be a freight logistics specialist throughout the Southern African region (*Transnet, 2017d*). In order to ensure continued growth in cargo transported by rail, TFR 'aims to increase the rail market share of rail-friendly cargo in market sectors' through the retention of the existing customers whilst incubating a new customer base (*Transnet, 2017a*). This approach will be bolstered by a shift from road freight to rail freight which is projected to increase by 66 million tonnes per annum (mtpa) from 223 mtpa to 289 mtpa over the next seven-year period. Strategically important projects encouraging a shift from road to rail that are executed by TFR pertain to freight rail capacity maintenance and expansion. Execution of these projects will lower the cost of doing business in South Africa, enable economic growth and promote security of supply.

2.4.1.2 Transnet National Ports Authority

Transnet National Ports Authority, 'is responsible for the safe, effective and efficient economic functioning of the national port system, which it manages in a landlord capacity' *(Transnet, 2017e)*. The eight seaports under the control and management of TNPA are, in a clockwise manner, from the east coast to the west, Richards Bay, Durban, East London, Ngqura, Port Elizabeth, Mossell Bay, Cape Town, and Saldanha. Projects that are executed by this division aim to provide, maintain and improve port-related infrastructure, marine-related services and navigational assistance to vessels within port limits. It also provides port-related services and performs other functions in accordance with the *National Ports Act, No. 12 of 2005*. Fundamental business facilities that require regular upkeep and expansion include '19 container berths, 36 dry-bulk berths, 29 break-bulk berths, 13 liquid-bulk berths, and 8 entrance channels with supporting breakwaters, turning basins, networks and utilities' distributed throughout South African ports *(Transnet, 2017e*).

2.4.1.3 Transnet Port Terminals

Transnet Port Terminals handles containers, mineral bulk, agricultural bulk, break-bulk, and ROROs *(Transnet, 2017g*). The latter refers to ships and vessels that are designed to transport wheeled cargo such as light and heavy automobiles which essentially roll-on and roll-off under their own steam and using their own wheels, without the need for heavy machinery to load and offload this cargo. With the exception of Mossell Bay, TPT has cargo handling terminals in all of South Africa's ports. This Transnet Limited division 'plays a strategic role in the South African economy by facilitating the effective flow of imports, exports and transhipments

through its cargo terminal operations' *(Transnet, 2017g)*. Infrastructural upkeep and expansion for this division pertain to business facilities that increase the number of vessels utilising TPT infrastructure and equipment aimed at reducing the vessels' turn-around-time. Furthermore, the widening and deepening of harbour entrances and berths within the port limits aim to increase the size of vessels calling in.

2.4.1.4 Transnet Pipelines

Transnet Pipelines, 'the custodian of the country's strategic pipeline assets, is currently servicing two key industries, fuel and gas, by transporting petroleum and gas products over varying distances' within Southern Africa *(Transnet, 2017f*). The liquid bulk handled by this Transnet Limited division includes crude oil, diesel, leaded petrol, unleaded petrol, and aviation fuels (*Transnet, 2017f*). These hydrocarbons are supplied by the major fuel companies in South Africa, namely British Petroleum, Caltex, Engen, Exel, Sasol Oil, Sasol Gas, Tepco, Shell, and Total. Most of South Africa's bulk petroleum products are transported via its 3 800km integrated pipeline systems. Infrastructural maintenance and expansion programmes for the division relate to integrated pipeline systems for fuel and gas transportation, petro-chemical and gas storage tanks, and ancillary infrastructure. Furthermore, there is a national operations centre that provides comprehensive management solutions for the division's infrastructure.

2.4.1.5 Transnet Engineering

Transnet Engineering, the last of the five Transnet Limited divisions, is responsible for 'manufacture, upgrading and conversions, and repair and maintenance of railway rolling stock, spares and associated transport equipment' *(Transnet, 2017c*). Infrastructural expansion and maintenance for the division is aligned to the provision of these products and respective services which make it a key partner to TFR. These products and services are provided in seven certified factories located in Bloemfontein, Durban, Germiston, Kilner Park, Koedoespoort, Salt River, and Uitenhage, with a workforce of approximately 14 500 personnel. The key purpose for this division is to improve operational efficiencies through ensuring availability and reliability of freight wagons, main-line and suburban coaches, diesel and electric locomotives, rotary machines, and auxiliary equipment.

2.4.1.6 Specialist Units and the Transnet Corporate Centre

Lastly, the three specialist units which provide ancillary services to the group of Transnet companies are as follows (Transnet, 2014). Transnet Property administers the organisation's

property, comprising commercial and residential properties that are not central to the operations of the company. Transnet Foundation implements the organisation's corporate social investment projects, aimed at giving back to the community. And the majority of the large infrastructural projects executed for the five core divisions are undertaken by Transnet Group Capital, a specialist unit that manages Transnet's capital projects in conjunction with the respective operating division bearing ownership of the project. Lastly, Transnet Corporate Centre heads the five operating divisions and the three specialist units. It encompasses organisation-wide leadership in key areas such as strategic planning and support services, internal auditing, financial management, procurement, business development, regulatory office, human resources, and information communications and technology.

2.4.2 Eskom

Eskom 'is the world's eleventh-largest power utility in terms of generating capacity' (*DPE, 2017b*), with 'approximately 95% of the electricity used in South Africa and approximately 45% of the electricity used in Africa' (*Eskom, 2017b*) generated by the power utility. It generates, transmits, distributes, buys, and sells electricity to various customers in the industrial, mining and resources, commercial, agricultural, and residential sectors *(Eskom, 2017b*). This organisation maintains a diverse portfolio of power plants, including gas turbines, hydroelectric, pumped storage, and nuclear. However, since coal is one of the most abundant and the most established sources of energy in South Africa, it comes as no surprise then that power-generation infrastructural development at Eskom is aimed at exploiting this natural resource. A good example of this is the building of Kusile and Medupi, two coal-fired power stations currently under construction which qualify as megaprojects of strategic importance to the South African economy.

The Kusile power station is located close to the existing Kendal power station in the Mpumalanga province. Upon completion, the power station will be able to produce 4 764 Megawatts (MW) from its six units, with each unit producing 794 MW of electricity *(Eskom, 2017e)*. Due to labour unrest, technical difficulties and inadequate funding, the power station has experienced numerous delays. On the other hand, the Medupi power station is located on a piece of land that has not previously been built-on, west of Limpopo province. Construction of the Medupi coal-fired power station began in May 2007. Once complete, Medupi 'will be the fourth largest coal plant in the southern hemisphere, and will be the biggest dry-cooled power

station in the world' *(Eskom, 2017d)*. At full capacity, the power station will be able to produce 4 800 MW from its six units, with each unit producing 800 MW of electricity.

Erecting infrastructure pertaining to coal-fired power stations is an expensive, time-consuming and complicated process. During building of power stations and related infrastructure many deciding factors have to be considered with regard to geographic location *(Eskom, 2017a)*. These include availability of water and coal, ease of integration of the new power station into the national grid, environmental considerations, impact on society, emissions, cost impact, and schedule impact. From an engineering perspective, coal and water availability are at the top of this list. Furthermore, pre-requisite operating licences have to be obtained from respective governmental departments. NERSA has to issue the licence to construct the power station with additional licences for transmission and distribution of electricity also issued by this regulator. A water use licence has to be issued by the Department of Water and Sanitation (DWS). An air emissions licence is issued by the Department of Environmental Affairs (DEA). And other emissions licences are issued by the district and local municipalities.

2.5 The Broader Landscape

2.5.1 State Capture on the International Stage

State capture, corruption and lobbying are all forms of rent-seeking by role players aimed at influencing the mechanism of a state to achieve their own ends. The difference however is that lobbying is done legally and transparently, whereas the other two forms of rent-seeking are not considered legal from any perspective. The World Bank argues that state capture are 'the efforts of firms to shape and influence the underlying rules of the game (i.e. legislation, laws, rules, and decrees) through private payments to public officials' (Hellman, Jones, Kaufmann and Schankerman, 2000: 03). Dassah (2018: 01) argues that this definition should be reworked, since it shifts the focus to firms by neglecting the role of individuals or private officials being captured as well as the means of capture in the form of funding and political activities. The author posits that state capture should be regarded as:

> 'one of the most pervasive forms of corruption, where companies, institutions or powerful individuals use corruption such as the buying of laws, amendments, decrees or sentences, as well as illegal contributions to political parties and candidates, to influence and shape a country's policy, legal environment and economy to their own interests.'

State capture has major ramifications for state institutions. According to Swilling (2019: 24) state capture

> '…destroys public trust in the state and its organs, it weakens key economic agencies that are tasked with delivering development outcomes and it erodes confidence in the economy.'

As public trust wanes, large organisations are dis-incentivised from paying tax, investment in infrastructure, good and services takes a hit, criminality proliferates, and there is an exodus of skills and capital. On the other hand, low-levels of state capture positively impact income equality and institutional development. Kemperman and Lensink (2008: 423) demonstrate that

> '…the influence of income and state capture on institutional development is inter-related. Specifically, the suggestion is made that a rise in income positively affects institutional quality only if the level of state capture is low.'

The collapse of communism in the Union of Soviet Socialist Republics in 1991 led to the breakup of the old Soviet empire and the creation of 15 new independent states (Heywood, 2007). Key differences between these states are that the Czech Republic, Poland and Hungary are more industrialised and westernised, whereas Bulgaria, Romania and, in some respects, Russia are more backward (Heywood, 2007). Most of these countries resolved to join the European Union. The new European Union Member States, such as Poland, Hungary, Estonia, Slovenia, Czech Republic, Slovakia, Romania, Bulgaria, and Latvia, have been seriously hampered by state capture via two dominant modes of party competition (Innes, 2014). Poland, Hungary, Slovenia and Estonia are driven by predominantly ideologically committed elites and relatively 'electoral professional' party competitions, only to be hampered by deepening financial constraints on mainstream ideological competition. Meanwhile, Czech Republic, Slovakia, Romania, Bulgaria and Latvia are indicative of high levels of corporate capture, wherein power vested in public servants is exercised for private gain. These findings indicate obstruction of the optimistic expectations of state building and democratic consolidation (Innes, 2014).

The interaction between the business and the state in Russia has evolved from state capture to business capture by means of two strategies (Yakovlev, 2006). One strategy is of isolation from the state using legal methods of internationalisation. The other is of close cooperation with the state to enable efficiency when switching from conventional lobbying of private interests to providing rational modes of sustainable economic development. These strategies are being formalised and publicised in comparison with the 1990s (Yakovlev, 2006). They are also indicative of the transformation that has taken place during Russia's transition from the Soviet Union. Furthermore, similar characteristics are evident between the 2008 financial crisis and the collapse of the Soviet Union. 'Financialised' capitalism on the eve of the 2008 financial

crisis exhibits similar traits to the oligopolistic economy of the Soviet Union on the eve of its collapse, which can be used to interpret failings of the neo-liberal economy (Visser and Kalb, 2010). This is under-pinned through state capture by the oligopoly, a large virtual economy, the inability of agencies to obtain insight into economic and financial operations, the short-term orientations of managers not coinciding with enterprise viability, and a 'mystification of risk' by 'high science' (Visser and Kalb, 2010).

As an indication of its prevalence within modern states in general and Europe in particular, the concept of state capture has been engaged by numerous authors. Fazekas and Tóth (2016) develop a new conceptual and analytical framework for gauging state capture-based micro-level contractual networks in public procurement. They demonstrate the abilities of this framework by exploring how radical centralisation of the governing elite following the 2010 elections in Hungary affected centralisation of state capture. Aslund (2016) examines the issues of whether Ukraine's reforms, especially those of 2015 pertaining to the unification of energy prices, large budget cuts, floating exchange rates, halved payroll tax, and a major bank purge, have been able to break the shackles of state capture. There seems to be an indication that this question still remains unanswered. Elbasani (2018) interrogates the influx of highly intrusive international capital, administrators, assistance and funds into Kosovo, and questions whether these should be viewed as state-building or state capture as a contribution to empirical insights aimed at this state. Bagashka (2014: 165) found that

> '…a greater number of veto players is associated with less state capture. By contrast, the number of veto players does not have a significant impact on bureaucratic corruption.'

2.5.2 State Capture in South Africa

In South Africa, state capture became topical when, on national television, the then Deputy Minister of Finance, Mcebisi Jonas, alleged that the Gupta brothers, who are former President Jacob Zuma's business partners and friends, offered him the position of Minister of Finance before Nhlanhla Nene, the then incumbent, was dismissed on the 9th of December 2015 and replaced by Des van Rooyen (Dassah, 2018). This move put the markets into a tailspin. Mounting pressure on Zuma compelled him to replace Des van Rooyen with Pravin Gordhan within a couple of days. On the 14th of October 2016, the former Public Protector, Advocate Thulisile Madonsela (2016) published the *State of Capture Report* showing wide evidence of improprieties at state level, between the Gupta family and Zuma, implicating numerous high-ranking government officials. The Gupta family was alleged to have influenced the removal

and appointment of ministers and directors responsible for state-owned enterprises, resulting in improper conduct, including the award of state contracts and benefits.

The former Deputy Minister of Finance, Mcebisi Jonas, a long-time political activist in the ranks of the African National Congress and the South African Communist Party, and former uMkhonto weSizwe member has, in his personal capacity, expressed views on the subject of state capture using a variety of platforms. In a speech delivered during the launch of the Kgalema Motlanthe foundation, which has since been published as an article, entitled *Locating State Capture within a Broader Theory of Change*, Jonas pinpoints the detrimental impacts that state capture has had in South Africa. He contends that the capture of the state has weaken South Africa's standing in global economics, it has affected GDP output, and the job market and revenue growth have shrunk as a result of weakened institutions necessary for nation building, service delivery and inclusive growth (Jonas, 2018). In turn this has caused a rise in populist political parties which are taking advantage of these macro issues that have the greatest impact on the most vulnerable members of society (Jonas, 2018). Whereas in an article entitled *The Commercialisation of Politics and Hazards of State Capture*, Jonas (2016: 11) had previously argued that the undermining of the state through capture occurs through a three-pronged scheme:

> 'Firstly, we need to better understand how state capture is weakening the developmental state. State capture undermines the efficiency of the state, especially in instances where there is a direct relationship between state capture and corruption. This is particularly significant in the context of our current fiscal challenges. It happens primarily through the state paying more than it needs to for outsourced goods and services (what I would call a "patronage premium"); through goods and services being outsourced that could and should be done in-house by state employees; and through extensive delays and additional costs (including litigation costs) arising from non-compliant procurement decisions being challenged. Treasury's efforts to centralise procurement is an attempt to cut back on these inefficiencies.
>
> Secondly, state capture undermines the effectiveness and impact of the state. This happens through poor quality services and public goods being delivered by patronage networks and less-than-capable service providers; through sub-optimal economic impacts being derived from beneficiaries of state resource extraction licenses; through fiscal resources being redirected away from the provision of public goods for the poor or from value-adding economic endowments and towards servicing some or other patronage network; and by weakening state capacity through the appointment of pliable but less than capable people in key positions (especially in finance and procurement, but also as accounting officers and even political office bearers).
>
> Thirdly, state capture undermines the legitimacy of the state and, by implication, [the ANC] itself. This happens through governance and rules being flouted with, at best, only partial accountability and consequence management. In the context of a very capable and transparent auditing function in the auditor-general of South Africa, a robust public protector, and a vibrant (what some may call a hostile) media, our inappropriate transactions do not escape the public eye, nor the eye of other influential players such as the ratings agencies. This is a two-sided

> sword. The fact that our dirty laundry is on public display reflects as positively on the robustness of our democratic and watchdog institutions as it reflects negatively on our own integrity. But there is no escaping the fact that it seriously undermines our ability to lead society through the current phase of the National Democratic Revolution.'

Pieter-Louis Myburgh's (2017) book, *The Republic of Gupta: A Story of State Capture*, details the degree and extent to which institutionalised corruption affected the functionality of the South African state under the presidency of Jacob Zuma. Corruption became normalised and was not seen as inherently negative or dangerous in the manner that influenced the state's affairs and its ability to deliver services and implement policies. As a result, shadowy characters within and outside government functioned with impunity alongside established bureaucratic processes. Contrary to popular belief that state capture took root when Zuma became president, the author argues that the seeds of state capture were planted under the presidency of Thabo Mbeki, when one of the Gupta brothers, Atul, served as part of the secretive council which Mbeki described as a think tank that enabled him to stay in touch with the views of the South African population. With this in mind, Myburgh seems to suggest that Mbeki should shoulder some of the blame for events pertaining to state capture and subsequent institutional decay.

Myburgh's book further enunciates the view that the Gupta brothers are not the sole players within the state capture arena in South Africa. Not only are there other players in this covert scheme, but the country has also experienced a leadership crisis in the past decade which acted as an enabler to state capture (Myburgh, 2017). The late Gavin Watson's Bosasa (now known as African Global Operations) has also been implicated in the Zondo Commission (Swilling, 2019). In February 2019, former Chief Operations Officer of Bosasa, Angelo Agrizzi, former Department of Correctional Services (DCS) Chief Finance Officer, Patrick Gillingham, and former Commissioner of DCS, Linda Mti were arrested for collusion and misappropriation of state funds to the tune of R2 billion between 2004 and 2005 *(News24, 2019*). State tenders for a procurement of various services and by DCS were awarded to Bosasa and its affiliated or subsidiary companies in exchange for cash, cars, homes, flights and holidays – among other gifts.

Stephan Hofstatter's (2018) book, *Licence to Loot: How the Plunder of Eskom and other Parastatals almost sank South Africa*, details how Eskom, Transnet and other organisations became a site of rampant corruption that threatened to undermine the stability of the entire country. The author traces the origins of the Eskom looting to Transnet and the arrival of the executive pairing, Brian Molefe, former Chief Executive Officer of Transnet, alongside Anoj

Singh, former Chief Finance Officer, where the blueprint for the plunder of these organisations was developed and refined. This was done with the help of top-dollar consultancy firms including McKinsey, Regiments and Trillian. These firms helped the Gupta family extract billions of Rand in suspected kickbacks from state contracts and backroom deals, in the process enriching themselves and Eskom members of the executive, senior management and their families, allies and close friends at the power utility's expense. The state of the power utility is now so perilous that it only has cash reserves to meet its obligation until the end of October 2019, President Cyril Ramaphosa said in his recent state of the nation address (Paton, 2019). The President will pass a special appropriation bill which will allocate R230 billion to the power utility. Eskom has R440 billion in debt, which it is unable to service from the revenue it earns. Moreover, it is unable to repay the R45 billion of debt that is due in 2019 or to raise new funding from financial markets, hence the need for this earlier than planned appropriation.

In an article titled *Can Economy Policy Escape State Capture?* Stellenbosch University's Professor Mark Swilling (2019: 25-27) recommends that three things need to happen if the state capture crisis is to be averted in South Africa. Because of its particular relevance to the present study, the extract is quoted in full.

> 'Firstly, the rent-seeking networks must be broken and dismantled. This will require political action within and outside the Tripartite Alliance. Zuma has been dislodged as the kingpin. However, this must be coupled with legal action to criminalise and bring the perpetrators of state capture to justice. To a large extent, the election of Ramaphosa as President marks a major political shift. A new Director of the National Prosecuting Authority is in place, and a total of 28 major commissions, inquiries and investigations have taken place (with some ongoing, such as the Zondo Commission).
>
> A total of 15 of these 28 investigations are related to the Gupta-Zuma network. This means 13 are related to other networks. We are flooded with information, but hardly any prosecutions. Instead, Ramaphosa's focus is on maintaining the unity of the ANC, while condoning the taking out of 'sore thumbs'. This will not go to the root of the rot in the ANC itself. To really regain the credibility of the ANC, Ramaphosa may well need to decide to act against many of its most important functionaries. Unity of the ANC plays into the hands of the 're-Zumafication' campaign. The public protector's recommendation that a judicial commission of inquiry be established has now been implemented – this is the Zondo Commission. This is a major step forward, even though many in the ANC would prefer that it is closed down. It is, however, not enough. It will require bold action by the banking sector and the Reserve Bank to expose and shut down the financial mechanisms that the shadow state uses.
>
> Secondly, a new national economic consensus is required…While the external environment in the wake of the global financial crisis has certainly had adverse effects on South Africa's growth outlook, governance failures and policy uncertainty have inflicted the most damage. The promises made by the ANC to its Alliance partners after the final draft of the National Development Plan was published, that there would be further efforts to strengthen the economic policies of the National Development Plan, were never carried out.

> In short, there has never really been a broadly shared and fully supported economic policy framework. Radical economic transformation is already a factional political football. One can speculate that a positive outcome of this political crisis would be the adoption, for the first time ever, of a new economic consensus that can unite the different factions of the Alliance by giving real substance to radical economic transformation while enjoying broad stakeholder support in the business community, labour sector and civil society. Without this, the power elite that formed around Zuma will be able to continue co-opting radical economic transformation in order to mask ongoing rent-seeking practices by manipulating SOC procurement spend. This is unlikely to crowd in private investment.
>
> The nuclear deal was justified in terms of radical economic transformation, masking how Eskom's procurement system and the issuing of a sovereign guarantee will be used to effectively hand over the South African economy to (Russian) foreign interests. The nuclear deal is the ultimate 'big and shiny' capital-intensive project that reinforces the mineral-energy-complex, crowds out investment in the cheapest energy available (which is renewable energy), increases indebtedness to foreign lenders and, of course, benefits the cohort of rent- seeking corrupt insiders.
>
> The third thing that is needed to enable resolution of the crisis is for all stakeholders, in particular the political actors who replace the Zuma-centred power elite in the future, to commit to realising the vision of a new economic consensus within the framework of the Constitution and relevant legislation. The recent trend towards regarding the Constitution and the rule of law (such as the *Public Finance Management Act*) as an obstacle to radical economic transformation is dangerous, and must be stopped. Transformation is perfectly compatible with the Constitution and consistent with respect for the judiciary. Indeed, without this, the trust required for 'triple helix'-type employment- and livelihood-centred economic development will not materialise.
>
> That said, so-called 're-Zumafication' is a distinct threat. The Russian-backed nuclear deal was at the centre of the political project of state capture… [The deal with Russia] was to be funded from loans generated from a state guarantee that both Pravin Ghordan and Nhlanhla Nene refused to sign which is what cost them their jobs. If either had signed, South Africa would have become another Russian- controlled failed state held together with violence and fear.
>
> It is time to recognise the need for truly innovative and radical interventions that will cut to the very root of our structural contradictions. It is quite simply impossible to grow an economy if 36% of the population do not have enough money to stay above the poverty line. Returns on financial assets are declining, which means we must finally accept that financialisation has run its course. Entrepreneurship of various kinds is key to success, but not if Development Finance Institutions cannot find ways of supporting them through the failures that are the key to success. Capital deepening via infrastructure spending without job-creating growth is fruitless. And the transition to renewable energy holds the key to the next phase of South African industrialisation. None of this is rocket science. But it does mean removing the blinkers that have limited our economic vision over the past 25 years.'

As shown above, Eskom and Transnet have been heavily implicated in the commotion surrounding the State of Capture. This led to the Board of Directors and company executives from both companies ordered to appear before the Standing Committee on Public Accounts (SCOPA). Before leaving for the World Economic Forum in Davos, Ramaphosa announced a new board at Eskom, mandating it to appoint a permanent chief executive officer and chief finance officer within three months (Singh, 2018). This was, in some part, a measure to minimise the downward slide of Eskom necessitated by the embattled power utility's

precarious financial position, an issue that demanded immediate intervention. The move, however, did not bolster investor confidence as Eskom was again downgraded on Friday, the 26th of January 2018 by the ratings agency Moody's. When Transnet executives and the Board of Directors appeared before SCOPA on Tuesday, the 23rd of January 2018, the former Minister of Public Enterprise, Lynne Brown, suggested that Transnet was in a much better financial and managerial position *vis-à-vis* Eskom (Brown, 2018).

At the time of writing, it is important to note that the investigations into State of Capture were at a premature stage. As such, the events surrounding Eskom and Transnet are a moving target, which means they are ever-changing, thus making them difficult to theorise at this moment in time. For these reasons, this study will not engage this issue in extensive detail. But, without a doubt, they needed to be mentioned since they form part of a background in which the two organisations operate. In developing a conceptual critical success factors model for construction projects, Gudienė, Banaitis, Banaitienė, and Lopes (2013) describe seven major groups of factors that influence project success, including political, social and legal. In the Zondo Commission of Inquiry into State Capture, these factors will come to the fore. Indeed, these events serve to make a case for a study aimed at developing a holistic project status reporting framework for South African SOCs, to formalise project status reporting, increase transparency to internal and external stakeholders, and to reduce factors capable of undermining proper governance.

2.5.3 Commission of Inquiry into State Capture

To investigate the allegations levelled in the *State of Capture Report*, Madonsela (2016) directed Zuma to, within 30 days, appoint a judicial commission of enquiry headed by a judge solely selected by the Chief Justice, and ordered the National Treasury to ensure that adequate resources were made available to the commission. Zuma, disregarding these recommendations, went on to challenge the *State of Capture Report* by taking it on judicial review. Opposition parties considered this move a delay tactic (Nguepe, 2016). In the court documents filed on the matter, Zuma argued that this challenge was aimed at shielding the inquiry by ensuring that the report passes constitutional muster because the integrity of the commission depended on the constitutional foundations (Maughan, 2018). With mounting pressure on the former state president to step-down after Cyril Ramaphosa was elected the new African National Congress president at the 54th Elective Conference, Zuma's stance changed. Deputy Chief Justice

Raymond Zondo was swiftly appointed to head the commission and the terms of reference to guide the investigations were released (Madia, 2018).

The judicial inquiry is appointed in terms of section 84(2)(f) of the *Constitution of the Republic of South Africa, Act No. 108 of 1996* to investigate the following nine claims (*SAG, 2018*):

i. Whether members of the National Executive were offered inducements or unfair gains. In particular that the former Deputy Minister of Finance, Mcebisi Jonas, and Ms Mentor were offered cabinet positions by the Gupta family;
ii. Whether the former President Jacob Zuma had any role in the alleged offers of cabinet positions to Mr Mcebisi Jonas and Ms Mentor;
iii. Whether the appointment of any members of the National Executive was disclosed to the Gupta family or any other unauthorised person before such appointments were formally made, and if so whether the former President or any member of the National Executive is responsible;
iv. Whether the former President, any member of the present and previous National Executive or any public official facilitated the awarding of tenders by SOCs or any organ of state to benefit the Gupta family or any other family, individual or corporate entity;
v. The nature and extent of corruption, if any, in the awarding of contracts or tenders to companies, business entities or organisations by public entities listed under Schedule 2 of the *Public Finance Management Act, No. 1 of 1999* as amended;
vi. Whether there were any irregularities, undue enrichment, corruption and undue influence in the awarding of state contracts, mining licenses, government advertising in the *New Age* newspaper, and any other government services in the business dealings of the Gupta family with government departments and SOCs;
vii. Whether any member of the National Executive, including deputy ministers, unlawfully, corruptly or improperly intervened in the matter of the closing of banking facilities for Gupta owned companies;
viii. Whether any advisers in the Ministry of Finance were appointed without proper procedure. In particular the appointment of two senior advisers by former Minister Des van Rooyen to the National Treasury; and,
ix. The nature and extent of corruption, if any, in the awarding of contracts and tenders to companies, business entities or organisations by government departments, agencies and entities. In particular, whether any member of the National Executive (including the

former President), public official, functionary or organ of state influenced the awarding of tenders to benefit themselves, their families or entities in which they held personal interest.

The terms of reference may be added to, varied or amended from time to time. All organs of state, including Transnet and Eskom, are required to cooperate fully with the commission of inquiry. The commission will submit its report and recommendations to the President of the Republic within 180 days of commencement. Where appropriate, it will refer matters for prosecution, further investigation or the convening of a separate inquiry to the appropriate law enforcement agency, government department or regulator regarding the conduct of certain individuals implicated in the proceedings.

2.6 Chapter Summary

This concludes the setting of the background for SOCs executing megaprojects of strategic importance to the South African economy, namely Transnet and Eskom. An overview of the most prominent governmental stakeholders that influence the business conducted by these organisations has been provided. These stakeholders provide investment, regulatory, productivity, and transformation guidance. The types of projects that are executed by these organisations, aimed at developing infrastructure, creating jobs and growing the South African economy were articulated. The study then provided context to and engaged the broader issues that affect business conducted by Eskom and Transnet, with a particular focus on state capture and the Zondo Commission of Inquiry into State Capture which has been established to deal with this vice. Elements discussed herein play a critical role in informing the framework that was developed.

Chapter Three: Holistic Project Status Reporting

3.1 Introduction

This chapter aims to review literature pertaining to project management disciplines that affect projects executed by Eskom and Transnet. It will first review *Integrated Reports* of these SOCs as a benchmark to determine project management disciplines that are included therein. *A Guide to the Project Management Body of Knowledge*, will then be used to elucidate various other project management disciplines not included in the *Integrated Reports*. Thereafter, it will use the project management 'iron triangle' as a foundation to describe constraints that all projects must face regardless of shape, size or location, namely cost, schedule, scope, and quality. However, due to the composition of these organisations and the environment in which they operate, this chapter will demonstrate that they are exposed to numerous other project management constraints. Therefore, this study will review other disciplines that are of principal importance in ensuring holistic project status reporting. Relevant literature will be cited to better understand the role played by each discipline. This foundation will inform the left side of the proposed project status reporting framework.

3.2 Project Status Reporting

The *Eskom Integrated Reports* and the *Transnet Integrated Reports* both from 2012 to 2018, as indicated by figures 6.1 and 6.2 below, are key documents whose contents were analysed to determine disciplines that are of principal importance within reports published by these SOCs. These reports demonstrate that cost, social capital, health, safety, environment, and risk, are some of the project management factors which must be included in reports published by these organisations as these play an important role in informing holistic project status reporting as proposed by this study. Secondary literature in the project management field is then used to unpack each discipline.

Thereafter, *A Guide to the Project Management Body of Knowledge*, 5th ed. published by the Project Management Institute (PMI), a leading global project management association, is used to elucidate various other project management disciplines not included in the integrated reports. Over and above cost, social capital, health, safety, environment, and risk, project management disciplines that the PMI deliberates on are: schedule, scope, quality, procurement, and communication. These factors are also expounded using secondary literature.

Furthermore, as the literature pertaining to the aforementioned was reviewed, the researcher was on the lookout for literature pertaining to other disciplines which could form part of this portion of the framework. After considering the project management disciplines present in the *Transnet and Eskom Integrated Reports*, those shown to be important by the PMI, and those alluded to in the reviewed literature, it became evident that document control and contract lifecycle management should also be included in a quest to achieve holistic project status reporting. Therefore peer-reviewed literature was also collected to investigate these emerging disciplines. Figure 3.1 below provides a summary of the sources of the various project management disciplines discussed in this section.

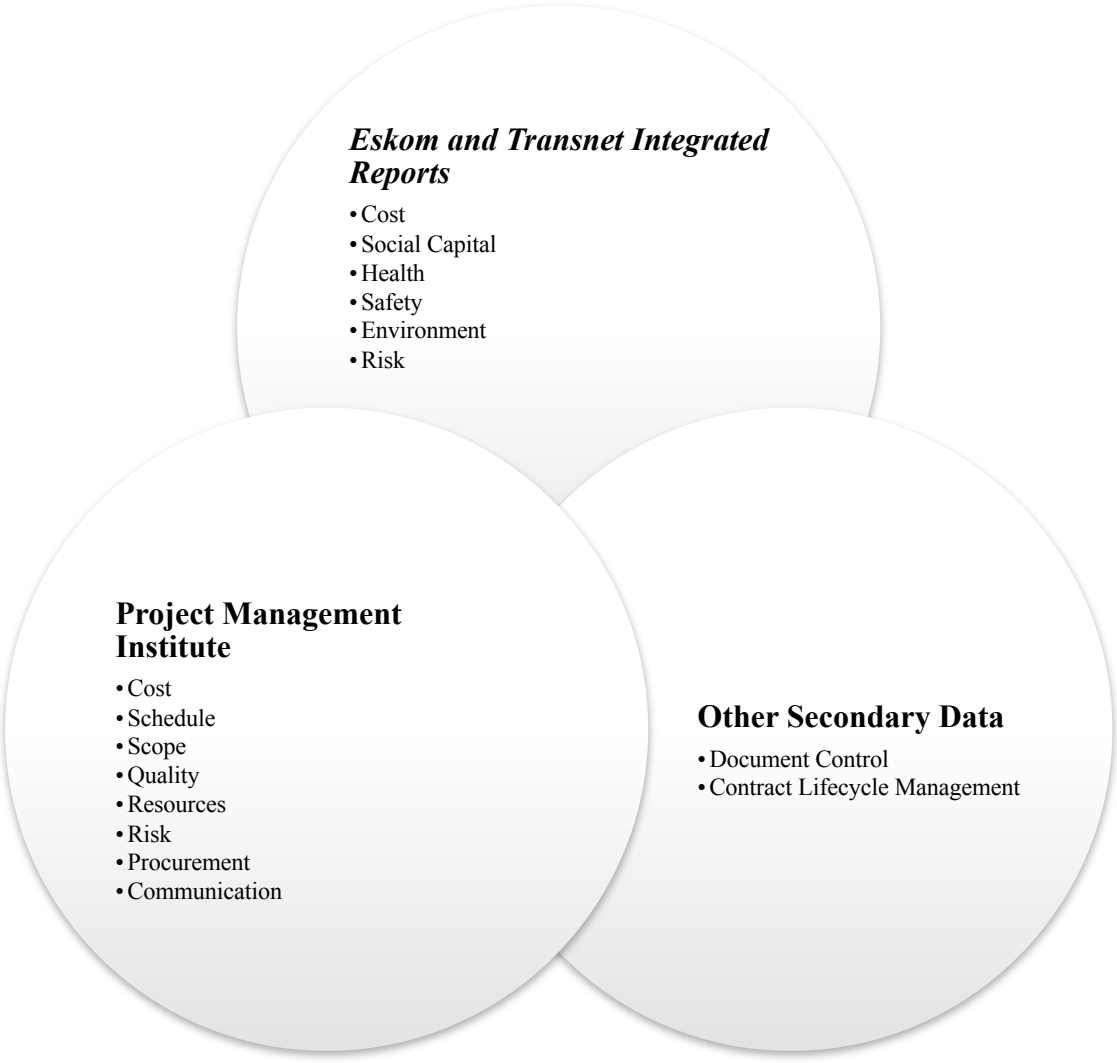


Figure 3.1: Sources of the project management disciplines reviewed in this chapter

Source: The Researcher, Compiled from Reviewed Secondary Data, 2019.

3.2.1 The Project Management Triangle

Dr. Martin Barnes developed perhaps the most popular model in the field of project management, called the project management 'iron triangle' (Lock, 2007; *PMWL, 2017*). According to this model, project management constraints are regarded as cost, time, and quality/performance. Wysocki (2009) proposed the name 'scope triangle', arguing that the project management triangle is constrained by scope, quality, cost, time and resources, which must maintain their equilibrium for a project to, likewise, remain in an equilibrium. Lock (2007) argues that the factors for success or failure during project execution are: the cost objective, the performance (or quality objective) and the time objective.

Evidently, there are many derivatives of a project management triangle. There are also many constraints that inhere within these spin-offs. As a foundation for the framework proposed in chapter five, this study will utilise the project management triangle as depicted by figure 3.2 below.

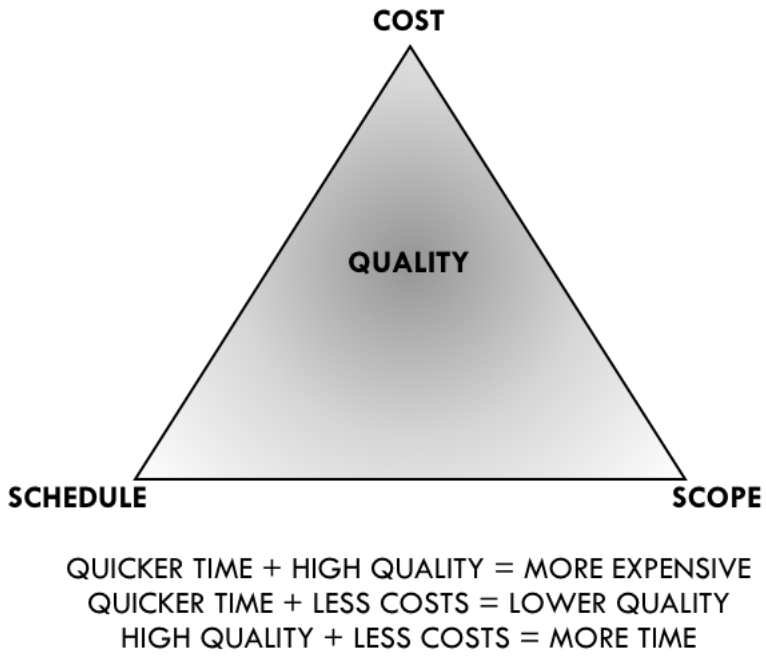


Figure 3.2: The project management triangle

Adapted from Lock, D. 2007. *Project Management*, Hampshire, Gower Publishing Ltd.

This adapted project management triangle demonstrate that: shortening a project schedule and increasing the quality demands shall, without fail, increase the cost; shortening a schedule and decreasing the cost will religiously lower the overall quality; whereas increasing the quality requirements and decreasing the budgeted cost will certainly increase the time needed to execute the project. The common thread that runs through all project management triangles is that they attempt to describe constraints that all projects must face regardless of shape, size or location. In doing so, they stipulate that cost, schedule, scope, and quality can never be divorced from each other since they interact in such a way that one cannot be altered without fundamentally affecting the others. This study will now turn to the task of considering these constraints.

3.2.1.1 Cost

In a paper examining universal issues and challenges in the field of project cost management, Smith (2014) suggests that there needs to be greater awareness created within the discipline through the development of global professional standards and certified programmes. Moreover, that there has to be acknowledgement of the complex nature of cost status reporting on projects. Smith argues that worldwide standardisation and formalised recognition needs to take place. In an article published two years later, Smith (2016: 124) further argues that

> '…cost management (be it Quantity Surveying, Project Controls or cost management carried out by the Project Manager) is a specialist technical field that requires its own specific standards.'

He then proceeds to examine various national and regional professional standards that have been developed in the field of project cost management and, thereafter, concludes that there is still an absence of global standards. He further argues that professionals in this field as well as respective organisations must play a fundamental role in the development of global standards, with the aid of the International Construction Measurement Standard.

To understand the nature of the standards that Smith is alluding to and the role that they are supposed to play in encouraging transparency in the discipline, we must first understand what project cost management is. For the purposes of this exercise the four-steps of project cost management as described by the *PMI (2013)*, a leading global project management association, will be utilised.

Figure 3.3: An overview of project cost management

Adapted from Project Management Institute, 2013. *A Guide to the Project Management Body of Knowledge*, 5th ed., p. 194, PMI, Pennsylvania.

Project cost management, one of the cornerstones of project management, is a set of processes involved in planning, estimating, budgeting and controlling costs in a manner that will allow the project to be completed within the approved budget (*PMI, 2013*). Planning cost management, estimating costs, determining the required budget, and controlling the costs is informed by inputs and specialised tools and techniques aimed at producing the desired result, as follows (*PMI, 2013*): Planning costs is informed by the project management plan, project charter, factors that affect and influence the environment within an organisation, and organisation-wide cost control processes. Specialised tools and techniques that are used in planning cost management are expert judgement, analytical techniques, and meetings that are undertaken with the purpose of informing cost planning. The output from all these prior steps is a cost management plan.

The second step of project cost management is estimating costs. This step is informed by the cost management plan, human resource management plan, scope baseline, project schedule, risk register, enterprise environmental factors, and organisational processes that have been put

in place to regulate the discipline. Specialised tools and techniques that are used to process cost estimating information include expert judgement from the experiences of seasoned professionals, comparing like-for-like elements of the current project with those of similar projects, estimating the parameters of the project, and consulting the team that will partake in the project. One should also undertake a three-point estimate for the purposes of comparisons, allocate a contingency for unforeseeable yet probable circumstances, and consider organisational quality guarantees. Furthermore, project management estimating software should be utilised, vendor bids analysed, and decision-making strategies should consider the entire team. The three expected outputs are activity cost estimates, basis of estimates, and the relevant information to update the project document.

The third step of project cost management is determining the budget required for the project. This is informed by activities pertaining to cost estimation, the first step of project cost management discussed above. Moreover, it is informed by documentation detailing the premise, or basis, for the cost estimating exercise, including the scope baseline, project schedule, the availability of requisite resources, potential contracts that may be entered into during the course of the project, and other project management processes present within the organisation. Specialised tools and techniques that are used to determine the budget consist of cost aggregation, allocations for contingency plans, expert judgement, historic relationships that have been established by the organisation, and considering the available cash-flows within a given time period. There are three expected outputs from the budget determination exercise. The first output is an authorised time-phased budget used to indicate the desired cost performance throughout the lifecycle of the project. The second is the determination of the funds that will be required throughout the lifecycle of the project. The third is the updating of all documents that have a potential to be impacted by the project budget.

The fourth and final step of project cost management is controlling project-related costs. Cost control is informed by the project management plan, the allocated budget, work that has been completed on the project up to a given period in time, and project management processes that are present within the organisation. There are a variety of specialised tools and techniques that are used. These include earned value management (which is essentially the percentage of work completed onsite in a given time period multiplied by the total budget), forecasting project-related costs, and verification of the accuracy of independent estimates. In addition, performance review sessions, analysing the variance between planned activities and completed activities, and the project management software of choice. The expected outcomes from a cost

control exercise is a reliable measure of the activities that have been completed onsite, budgets that are aligned to all forecasted activities, and updated organisation-wide cost control processes to encourage continuous improvement. The outcome should be adjusted costs-related indices, revised project management plans, and updated project plans.

In totality, planning cost management, estimating costs, determining the budget and controlling project-related costs form the basis of cost management of any project. In an environment where costs escalate regularly or drastically, it should be noted that these steps may be applicable in an iterative manner throughout the lifecycle of the project.

3.2.1.2 Schedule

Much like project cost management, project schedule management is the foundation of project management. A project schedule details the activities that comprise the project, major milestones that should be achieved as well as the project deliverables that should be completed in order to realise the scope. It details the logical sequencing order of activities, including their respective start and end dates. A project schedule considers dependencies and permutations between the activities, including which activities need to commence so that others can follow suit, which activities should be completed before others can commence and which activities can be executed concurrently. Moreover, it contains significant project milestones and details of key deliverables, including their respective target dates.

In a nutshell, a project schedule is a timetable containing activities, milestones and deliverables for the entire project, reflecting all the work that is to be completed during the lifecycle of the project – from inception through to close-out. Due to sheer complexity and the number of possible scenarios pertaining to a project scheduling exercise, more often than not, the project management teams use dedicated software to manage, update, revise, and track the project schedule.

According to Newton (2015b), there are three processes and five sub-processes involved in project schedule management, as shown in the figure below.

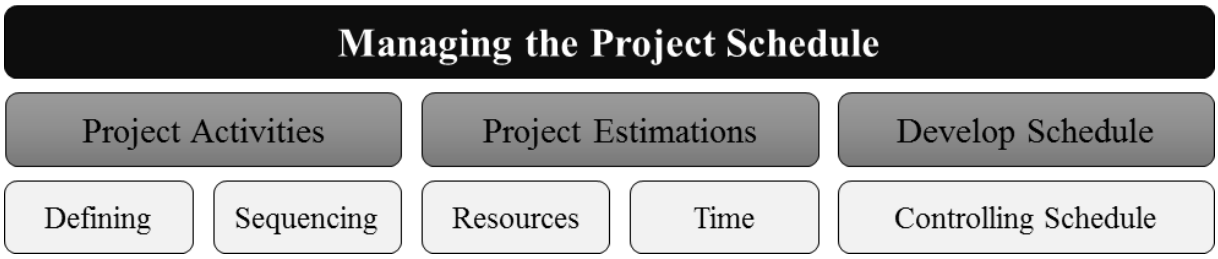


Figure 3.4: Managing the project schedule

Adapted from Newton, P. 2015. *Managing the Project Schedule: Project Skills*, Online Publication, www.free-management-ebooks.com [Accessed 04 January 2018].

Project schedule management processes include defining the project activities, sequencing those activities, estimating requisite resources, approximating respective durations, developing a project schedule, and, finally, controlling the produced schedule (*PMI, 2013*). Newton (2015b) unpacks this summarised statement as follows: Defining activities is the breaking-down of high-level requirements into low-level tasks, deliverables or manageable components, and further into a Work Breakdown Structure (WBS). Activities identified in the previous step are then sequenced in a logical manner considering their interdependencies – such as start-to-start, finish-to-start, start-to-finish, and so forth. Thereafter, resources that are going to be required for the work are identified and the quantities determined, with a clear understanding of availability, capability and cost. Subsequently, the project duration can be determined considering the critical path. The critical path is a project management concept that is based on the interrelated activities that will take the longest time to complete. For a project to be completed on the due date, the sequenced critical path activities must be completed on time. Based on the above, the schedule is then determined, revised and controlled as activities onsite progress.

Management of scheduling activities is, to a large extent, a process that is dependent on experience. Logical thinking is also a critical component of this process. If, for instance, the project scheduling team allocates too much time to certain activities the project schedule may be elongated needlessly. However, if too little time is allocated the team may fall behind the schedule, causing the project to be delivered late. Both scenarios – overestimating and underestimating the required time to complete activities – have the potential to cause cost overruns. Therefore, there is a critical interdependence between cost and schedule. Taking this

into consideration, it is of vital importance for the project manager to work with an experienced project team when drafting the project schedule. Field experts play a key role in estimating the amount of time it will take to execute project activities and the order in which the activities should be sequenced. It is also imperative that the team that is going to carry-out the work be involved in the scheduling process as they may provide the scheduling team with an invaluable perspective during the schedule development phase. Involvement of the project team will ensure that the durations are realistic and, more importantly, that the team takes ownership of the resultant project schedule. A team that is involved from the outset is more likely to take ownership of the process they are part of, compared to one that is seemingly imposed from above.

Depending on the size and requirements of the project, each scheduling process can involve a small team or a large group of diverse disciplines working together. Projects executed by Eskom and Transnet involve substantial teams with diverse professional backgrounds. These teams work together to ensure that the project schedule is a correct and accurate reflection of the activities taking place onsite. As mentioned earlier, activities identified during the project schedule development phase interact with each other in complex ways. In addition, they interact with other project management constraints throughout the lifecycle of the project, including during the definition and sequencing of activities, and the estimation of resources and time. Hence for a large project to be well-managed, project-related cost, scope, quality, resources, risks, safety, health, environment, document control, procurement, and contract lifecycle management may need to be considered as factors that have a potential to influence the project schedule. A multi-disciplinary approach is extremely important during project schedule development.

Megaprojects of strategic importance to the South African economy pertaining to Transnet and Eskom are, for one reason or the other, unevenly distributed throughout the entire country. To a large extent, this uneven distribution is a consequence of the manner in which the South African economy is distributed, with the Gauteng province being the economic hub of this country *(Statistics South Africa [SSA], 2018*). In a study conducted in this province, aimed at uncovering the effects of construction projects schedule overruns, Mukuka, Aigbavbao and Thwala (2015: 1690) found that ‘cost overruns, loss of profit, disputes, [and] poor quality of work due to hurrying the project’ resulted in the contractor being unwilling or unable to meet the project schedule. These factors conspired to create tension between the contractor and the client. This tension subsequently translated into antagonism between the client and the

contractor, a bad reputation for the contractor and delayed realisation of profits by the client. Further, it created an incubation room for potential claims by the one party on the other. The study by Mukuka *et al.*, also indicated that cost overruns, loss of profits, disputes and resolution thereof, and poor workmanship due to time pressures, ranked top among the effects of schedule overruns in this province. For these reasons, it is important for the project team to understand the causes of schedule overruns so as to be able to mitigate the detrimental issues pointed out in this study.

The complex nature of project scheduling and management means that problems will and do arise. Suggestions have been made on how such problems may be mitigated. Meyer and Visser (2006) suggest that utilisation of historical data as well as enlisting of relevant models aimed at simulating or replicating the project environment may improve project scheduling estimates. Historical data may allow experience to play a role in informing the project schedule whereas relevant models are likely to obtain more informed estimates. However, any output is only as good as the input it receives. Utilising high quality data, resources and processes is imperative in ensuring that historic data modelling is a successful endeavour. It is important that the historical data being employed is of the highest order and that the models are utilised by personnel with the appropriate knowhow. Moreover, models have to be of the highest order; they must be up to the job they are being enlisted for. Taking the project management iron triangle into account, this means that factors such as cost, scope or quality must be like-for-like in order for the model to produce results that will add value, thus allowing the project management team to make appropriate decisions.

3.2.1.3 Scope

Scope definition, also known as scoping, is a process of developing a comprehensive description of the desired outcome of a project to ensure that all the requirements are included, and that no additional work is accounted for (*PMI, 2013*). It is a five-step process where each step occurs at least once during the lifecycle of the project, moreover these steps tend to overlap and interact in a number of ways (*PMI, 2013*). Scope definition can be an iterative process where information generated over time feeds back into the system (Khan, 2006). At the outset, project requirements and objectives are collected through a detailed process of interacting with stakeholders. Thereafter a detailed impression of the project is produced. Third, a WBS is created by breaking-down the high-level requirements into low-level tasks, activities, deliverables, or practical components. Fourth, project tasks, activities, deliverables, and components are verified to check that all the requirements of the project have been included

and that no additional work has been considered. Finally, the scope is controlled through the monitoring of the project status, including any deviations from the project baseline. Baseline monitoring, verification and control are activities that occur from project inception through to project close-out. In large projects, a multi-disciplinary approach needs to be adopted since tasks, activities, deliverables, and components interact with each other in numerous ways.

Project management is a discipline that is primarily concerned with completing project deliverables and project goals within the tight confines of scope, time and cost (Newton, 2015a). The most effective way of balancing these is to develop a clear and comprehensive scope statement (Newton, 2015a). To ensure that the scope statement is absolutely comprehensive it should consider all the project-related constraints. Since projects vary in shapes and sizes, accordingly, respective constraints should be considered during scope development. After taking all the constraints into account, the resultant scope should then be managed appropriately. Project constraints that may need to be considered during scope formulation include cost, schedule, quality, resources, risks, safety, health, environment, document control, procurement, contract lifecycle management, and project reporting and communication.

If the project does not take all the necessary constraints into account then it will be ill-prepared for the challenges ahead. On the other hand, if it takes more constraints into account than will actually affect the project, then resources would have been wasted in attempts to deal with constraints that will not materialise. Therefore, getting the scope just right is an element of project management that ensures that every constraint is considered and accounted for. Furthermore, that all considerations fall into their rightful place. If this does not happen during the scope definition phase, then scope creep, as will be discussed below, may become a reality.

Adequate scope definition is absolutely vital in any project management environment. For instance, Woolridge, Hale, Hale, and Sharpe (2009) conclude that, in a software project management environment, inadequate scoping may have at least one of the following effects. The delivered project may fail to provide the requisite value for the project owner. The project may experience scope creep or feature creep at the expense of schedule, budget, and resources estimation during its lifecycle. Or the project may become a runaway project leading to either cancellation or discontinuation. Although these elements were revealed in a software project management environment, they are just as applicable in the infrastructural project environment.

Meanwhile, Landim and Sánchez (2012) show how the scope definition of environmental impact assessment projects has been widened and its content deepened over a period of time as a result of new legislation being enacted or better regulation and administrative control coming to the fore. The article by Woolridge *et al*., implies that top-notch scope definition is a concept that is ubiquitous in the project management environment, no matter the size, shape or location of the project. Whereas the article by Landim and Sánchez shows that a change in project requirements can trigger a change in the scope definition process. The continuous nature of change means that fundamental changes can happen even when the project is already underway. A change in stakeholder, functionality or business requirements are typical examples of change triggers.

It must be noted that change is nothing to be afraid of in a project management environment. Indeed, change is to be expected, and it can happen for a variety of reasons. It may be initiated by any project stakeholder, whether directly or implied, for any business requirements reason. However, there is clear differentiation between scope change and scope creep. Scope change is formalised and official, considering cost and schedule implications. Whereas scope creep happens gradually and unofficially, without revising the schedule or adjusting the budget. Scope creep is the addition of new features and functionality to the project scope without addressing the effects on time, costs, and resources, or without customer approval (*PMI, 2013*). Scope creep occurs when change is not properly defined, documented or controlled. It is closely related to a phenomenon known as feature creep. The latter is the indiscriminate addition of features or functions by the project team in the hope that the customer would want to have these as part of the final deliverable (Wysocki, 2009). To minimise the potentially terminal effects of scope creep and feature creep on a project, the scope planning process should only occur after all foreseeable project variables have been considered.

As part of the scope planning process, scope definition should only take place after the project manager has been assigned, the project management team has been formed, feasibility studies have been completed, a summary of the WBS has been outlined, the project budget, schedule, and key outputs and parameters have been outlined, the design basis memorandum has been completed, bids have been invited, and the basic engineering package contracts have been awarded (Khan, 2006). In fact, the latter marks the beginning of the scope definition phase (Khan, 2006). Indeed, if the scope planning and definition phase of the project occurs after the necessary arrangements have been put into place the detrimental effects of scope creep and feature creep will be minimised. Moreover, the goal of developing a comprehensive description

of the desired project deliverables, through ensuring that all the requirements of the project are included and no additional work is accounted for, will be achieved. Moreover, all project management constraints would have been considered, and this without wasting any resources.

From the above, it can be seen that the process of scoping, or scope definition and planning, is a complex one that may be an obstacle to holistic project status reporting. It is a process which may prove difficult to manage in a project environment concerning large, geographically dispersed organisations such as Eskom and Transnet. Moreover, it may prove difficult to report effectively and to communicate to relevant internal and external stakeholders.

3.2.1.4 Quality

Project quality is a three-dimensional philosophy of adherence to standards, encompassing design quality, process quality, and organisation quality (Basu, 2012). In the context of the construction industry, in which the projects executed by Eskom and Transnet are a part, these aspects can be unpacked in the following manner: The quality of design is concerned with the project deliverables conforming to the customer requirements and ultimately to the customer needs. The quality of process considers how the processes that were put in place to deliver the project to the customer performed in terms of cost, schedule, scope, quality, and so forth. The quality of the organisation considers how, during the lifecycle of the project, stakeholders were managed, skills and training were disseminated, long-standing and fruitful partnerships were strengthened with suppliers, teamwork was encouraged, and effective and efficient communication was nurtured. It is imperative for an organisation executing megaprojects of strategic importance to implement a project quality management process and to manage the design quality, process quality and organisation quality.

Project quality management is a three-stage process that comprises activities regulating quality policies, objectives, roles, and responsibilities during project execution to ensure that the project will satisfy the needs for which it was undertaken (*PMI, 2013*). The first stage is to identify and document the project quality requirements and standards. These requirements and standards will serve as evidence of how a project demonstrates compliance during its lifecycle. The second stage is to audit the quality requirements and standards to verify the level of compliance with the project requirements and standards that were determined during stage one. And the final stage is to perform quality control via monitoring and recording of results of the previous stage to gauge the level of conformance and to recommend necessary changes for improvements should performance be regarded as subpar.

The three stages interact with each other throughout the lifecycle of the project. Furthermore, they apply to all projects, regardless of shape, size or location. These basic project quality management stages are not specialised or supreme by any stretch of the imagination. If quality is of paramount importance then specialist techniques will need to be utilised to assure quality of the highest order. These techniques include the Total Quality Management system as well as the proprietary quality management methodologies of Six Sigma.

Six Sigma is one of the most fundamental and prevalent concepts in the field of high-end project quality management (Knowles, 2011). It is a rigorous, focused, and highly effective implementation of proven quality principles and techniques (Pyzdek and Keller, 2010). Sigma, symbolised as б, is a metric value that denotes how well quality management processes, principles and techniques are performing, measured by their respective capabilities to perform defect-free work (Pyzdek and Keller, 2010). As the sigma value increases so does quality, value and subsequent customer satisfaction. For instance, Three Sigma produces 66, 708 defects per million units, Four Sigma yields 6, 210 defects per million units, Five Sigma produces 233 defects per million units, whereas Six Sigma is capable of outputting an impressive 3.4 defects per million units. This extraordinary figure is indeed what makes Six Sigma such a sought-after project quality management method. In this case a unit can be virtually anything from a mechanical component, a line of programming code, or a process involved in the erection of a large-scale physical structure, to the designing of a rail wagon, performing a mathematical calculation, or constructing a megaproject. Used in project management, Six Sigma can assure quality of the highest magnitude. Among other things, impeccable quality management has the added benefits of improving the organisation's processes, reducing the cost of defects, eliminating product recall costs, and encouraging the documentation and subsequent utilisation of lessons learnt (Streun, 2004).

Six Sigma is principled on a simple, iterative performance improvement model known as Define-Measure-Analyse-Improve-Control, or DMAIC (Pyzdek and Keller, 2010). DMAIC can be unpacked as follows: One must first define the project goals and customer needs of the activity that require improvement. Thereafter, the current system, process, activity, or standard must be measured to gauge the as-is condition. During the analysis phase, an analysis is undertaken to eliminate the gap between the current system, process, activity, or standard and the desired goals or customer requirements that were defined during the first step. Step four is then to implement the outcomes of the analysis so as to improve the current systems to move it towards the desired state. Controls are then put in place to regulate the new system.

Continuous improvement is an ongoing effort to improve the system, process, activity, or standard yielded by the final step as input into the first step; this is what makes DMAIC iterative in nature.

If utilised appropriately, continuous improvement processes have the potential to yield breakthrough results. Nonetheless, simply training people in a new process improvement method without putting in place mechanisms for managing and maintaining initiatives or selectively managing key aspects thereof means that continuous improvement will not be effective, and will not yield the desired results (Anand, Ward, Tatikonda and Schilling, 2009). It should also be noted that the process can only really add value if and when it includes the entire organisation and its comprehensive systems, processes, activities and/or standards (Anand *et al.*, 2009; Kwak and Anbarib, 2006). And in order to be effective the organisation must accept the strengths and weaknesses of Six Sigma and thereafter properly utilise its principles, concepts and tools (Kwak and Anbarib, 2006). Likewise, organisations must understand that concepts need to be embedded in the design phase instead of being implemented at the tail end of the system, process, activity and/or standard.

3.2.2 Rationale for Other Project Management Constraints

Subsection 3.2.1 above has reviewed literature pertaining to four project management constraints that all projects must face regardless of shape, size or location. Namely cost, schedule, scope and quality. These constraints can never be divorced from each other since they interact in such a way that one cannot be altered without fundamentally affecting the others. As was indicated earlier, this study will also review other project management constraints that should form part of the project status reporting framework. The rationale behind this is business exposure of Transnet and Eskom as large, geographically dispersed organisations, which execute megaprojects of strategic importance to the South African economy. As a result, these organisations are exposed to numerous project management constraints in addition to the abovementioned. Further literature concerning these emerging constraints was then reviewed with this in mind. The effects that selective reporting has on effective communication as discussed below will demonstrate the need for a holistic project status reporting framework.

As will be articulated below, and supported by relevant secondary literature, there are a variety of elements which complicate the project management terrain in which Eskom and Transnet

operate. These organisations require diverse resources for project execution. They are exposed to a wide range of risks, which can be natural, physical, financial, political, and environmental. Moreover, these risks can fall within or outside the jobsite. All employees at work and on the jobsite are governed by legislation such as the *Occupational Health and Safety Act*, *No. 85 of 1993* (*OHSA*) and the *Basic Conditions of Employment Act*, *No. 75 of 1997* (*BCEA*). The natural, physical, ecological, and biological environments in which they operate are regulated by the *National Environmental Management Act*, *No. 107 of 1998* and its subsidiary acts. Document control, which is the creation, review, modification, and distribution of project-related documents, is a key constraint that has to be considered. Another is of procurement of pertinent goods and services. Yet another is the proactive, methodical management of project-related contracts from initiation through to award, compliance and renewal. These constraints are difficult to manage in even the smallest of projects. It goes without saying that the difficulty levels increase substantially in megaprojects.

In a nutshell, internal and external stakeholders of Eskom and Transnet may need to be informed of project progress during the lifecycle of all projects in terms of cost, schedule, scope, quality, resources, risks, safety, health, environment, document control, procurement, and also project-related contracts. Effectively communicating these project management constraints to stakeholders is a fundamental attribute that the project management team, at all levels, must possess. Zulch (2014) has shown the importance of stakeholder communication as the foundation on which all other key elements of project management are based. It was found that the ability of the project manager to communicate the cost, scope, and schedule plays a key role in delivering a project of the highest quality (Zulch, 2014). Communication is a primary skill that a project manager must have so as to become an effective leader. In this regard, the project manager must be able to acquire all the relevant information pertaining to the project and, subsequently, simplify this information for ease of understanding by the project management team and other stakeholders. Thereafter the information should be shared with the rest of the team to ensure that all activities undertaken are aimed at realising the goal of the project.

Similar to communication, reporting the status of the project to internal and external stakeholders should consider all the project management constraints in cases where the information is applicable and available at the time of reporting. In cases where the information is not applicable, this should be clarified to the stakeholders. And in cases where the information is pending at the time of reporting, this should also be clarified to the stakeholders,

explaining that the information will be made available in due course. The aforementioned alternatives are aimed at giving the stakeholders holistic project progress. Reporting the status of any project without accounting for all constraints is tantamount to 'selective reporting', which is yet another impediment that project managers must deal with.

Selective reporting refers to an act by the project team member of conveying inaccurate or incomplete project status to his/her seniors (Iacovou *et al.*, 2009) with the aim of suppressing information that will allow management to ascertain the true status of a project (Smith *et al.*, 2001). The primary reason this phenomenon occurs is management's inability to tolerate negative project information, or anticipation by the reporting member of negative repercussions should project status reports reflect performance that is regarded as subpar (Iacovou *et al.*, 2009). Iacovou *et al.*, (2009) further distinguish selective reporting into two dyadic components, 'optimistic biasing' and 'pessimistic biasing'. The former occurs when the project management team report that a project is in better stead than the team honestly perceived. The reverse is true for pessimistic bias. This occurs when the project management team report that a project is in worse shape than the team truthfully believe.

Selective reporting can be detrimental for any project. Again, the implications tend to be amplified in a megaproject. Selective reporting has the ability to negatively influence the entire project management structure in a costly, time-consuming and generally destructive manner. Depending on the complexity, size and strategic importance of the project under execution, reporting structures at Transnet and Eskom, may include, from low-level to high-level, supervisors, project managers, senior project managers, principal project managers, project directors, principal project directors, general managers, and chief executives. Considering this bureaucratic structure, the effects of selective reporting in the form of optimistic bias, pessimistic bias and erroneous reporting can quickly reverberate and amplify throughout the entire organisation and beyond. And the implications thereof are devastating and wide-ranging.

Selective reporting is a dynamic that is difficult to deal with because it prevents decision-making stakeholders, in particular the project sponsor, from detecting projects in distress at an early stage and effectively altering their course. More often than not, this translates into spiralling costs, runaway schedules, ever-changing scopes, and substandard quality. The construction of Medupi and Kusile power stations as well as the construction of Transnet's multi product pipeline epitomise these consequences. On Medupi and Kusile, the expenses have escalated by billions of Rand from the initial projected cost-to-completion of R69.1 billion

and R80.6 billion respectively communicated by the energy utility in April 2007 to R195 billion and R225 billion as at September 2016 (Yelland, 2016). Transnet's New Multi-Product Pipeline, a 555km pipeline designed to transport petroleum fuel from Durban to Heidelberg and the neighbouring regions, has experienced numerous delays and massive cost overruns, from R12.7 billion in 2008 to R30.4 billion in 2017 (Groenewald, 2017). This shows that if selective reporting is present within the project management structure senior management will be unable to ascertain the true status of a project. Likewise, if management is unwilling to accept and manage the true status of the project the negative implications of selective reporting will be incubated.

However, effective management of selective reporting is easier said than done. As a matter of fact, holistic reporting is an endeavour that should not be taken lightly. At least two reasons are responsible for this. Firstly, the reporting structures in large, geographically dispersed organisations executing megaprojects of strategic importance, depending on the complexity of the project, are usually very large and extremely bureaucratic, as mentioned earlier. Taking into consideration such a structure, the effects of selective reporting can quickly reverberate and amplify throughout the entire organisational structure and beyond, with devastating consequences. In the case of Eskom and Transnet, external stakeholders such as the DPE, National Treasury, DoE, NERSA, and the NNR can also become victims of this bias. The same applies to interested and affected parties as well as the tax-paying public as a whole.

In attempting to realise holistic reporting, a second consideration is the sheer number and complexity of elements that have to be considered during the project status reporting process. The capital projects have to be delivered on time, within budget and at once achieve the desired scope and quality. Resources should be managed in an effective manner. Internal and external risks have to be minimised. The health and safety of individuals on the jobsite or in close proximity must be assured. The natural and physical environments should be protected. The document management system used must be comprehensive. Right goods and services must be procured at the right price. Project-related contracts must be managed appropriately throughout the lifecycle of the project. These are a set of tasks that can become overwhelming very quickly even for the most skilled and experienced of project management teams.

During the development of a framework aimed at overcoming challenges of holistic project status reporting in SOCs, this study will, at the very least, have to consider the bureaucratic project management structures present in megaprojects and the sheer number and complexity

of elements to be reported on. To understand the daunting nature of this undertaking, this study will, as mentioned earlier, first need to unpack the project management constraints that should form the basis of project status reporting in South African SOCs as illustrated in figure 3.1 above. Since cost, schedule, scope, and quality have already been dealt with, this study will now turn to the task of unpacking and rationalising various other project management constraints identified in the *Eskom Integrated Reports*, the *Transnet Integrated Reports* and those identified in *A Guide to the Project Management Body of Knowledge*.

3.2.2.1 Resources

Resources are people, equipment, materials, or supplies required to perform a project activity or task (*PMI, 2013*). By all accounts this definition can be further expounded, especially in the context of megaprojects of strategic importance executed by large, geographically dispersed organisations. Broadly speaking, there are two types of resources, tangible and intangible. Tangible resources include things such as tools, machinery, infrastructure, facilities, funding, raw materials, and the like. Intangible resources include skills, intellectual property, trademarks, patents, authorisations, permits, and so forth.

The process of estimating resources that are required to execute a project is closely linked to that of estimating costs and schedules (Saputra and Latiffianti, 2015). During a resource estimation exercise, all activities as well as corresponding resources are identified. The sequencing of activities within the schedule determines how many resources will be needed at what time. In the case of people, information detailing their availability, such as a resource calendar, is used for estimating utilisation as well as resource availability during the lifecycle of the project. Such information must include details pertaining to people's skill-level, experience as well as geographic location. The latter is used for logistic purposes. Resource estimation will then determine the practical time at which certain project activities may be executed. The inverse may also occur wherein the project activities determine which resources, and how many, will be needed at which time. The respective cost estimation will also be determined during this period.

Of all tangible and intangible project resources, human capital is by far the most important. Not only is human capital the most important, it is extremely difficult to manage and certainly one of the most neglected after the completed project has been delivered to the customer (Homayounfard and Safakish, 2016). The reasons behind this are as follows: Individuals working on a single project may be from different professional backgrounds, with no long-term

relationships with each other or with the project manager; they may be concerned about long-term job security instead of the job at hand; or they may have strategic objectives that are misaligned to that of the organisation.

During project staffing, it is important to consider the Departments that will be involved and affected by the project, communication between technical disciplines, lessons learnt from previous projects, relationships and influences that already exist, and the physical and geographic location of the project (Towe, 2004). To facilitate project staffing, Homayounfard and Safakish (2016) developed a human resource toolkit for megaprojects to allow project managers to circumvent project-based resource impediments whilst encouraging a productive environment. Teamwork may also benefit from utilisation of the human resource toolkit. In any project environment, teamwork enhances success, promotes creativity, builds synergy, motivates problem-solving, facilitates decision-making, encourages a fun environment, and teamwork is well-equipped to respond to challenges and change (Towe, 2004). Clearly, there are many benefits to be reaped if project resource management is implemented correctly.

In a study exploring a resource allocation strategy, Klingebiel and Rammer (2014) found that innovation-based performance within an organisation benefits immensely from a broad allocation of resources at an early-stage. Since a large spectrum of resources is covered by this strategy, it increases exposure, cross-functional learning and the probability of success. A more focused approach can then be adopted during the project execution phase, with benefits reaped in the previous phases feeding into the current phase. Organisations that utilise this view stand a better chance of understanding the importance of deploying their project management resources in a value-adding manner.

In successful organisations, project management has shifted its focus from doing projects right to doing the right projects. A shift that has strengthened the link between project resource management and the notions of strategy, organisational structure and knowledge management. With this argument in mind, Gardner (2014) undertook an exploratory research to understand the dynamics by which project resource management contributes to sustained organisational performance. He suggested that organisations should attempt to understand the interaction between dynamic capabilities, learning processes and knowledge management so that resources can be managed appropriately. This adds business value within small-scale and large-scale megaprojects. There is a growing realisation that project management excellence lies beyond the dimensions of project success, business results and benefits management,

networking and alliances, strategy implementation, and the consequences of national culture (Gardiner, 2014). Resource management is a key part of the jigsaw.

In a multi-project environment pertaining to large, geographically dispersed organisations, and in an effort to minimise wastage, it is to be expected that there will, at some point, be resource scarcity. Resource scarcity occurs when there is a gap in the market between supply and demand. In a project environment, this phenomenon will also have time and cost implications as outlined above. In cases where resources are constrained, or resource variability is present, Maheswa, Charlesraj, Goyal, and Mujumdar (2015) have shown how the Relationship Diagramming Method (RDM) can be used to ascertain alternative sequencing to achieve the objectives of a project whilst preserving the logic of construction. RDM can check which activities can be executed in sequence or which can be executed in parallel depending on the resources that are available at a particular point in time. This approach will, therefore, minimise schedule and cost overruns. Meanwhile, Saputra and Latiffianti (2015) have demonstrated how a Monte Carlo mathematical simulation can be used to measure project reliability in terms of cost and schedule by considering resource availability under conditions of uncertainty.

From what has been said above, the implications relating to resource management and planning and its effects on the organisation should become clear. For resources – as a project management constraint – to be managed accordingly, and for stakeholders to have the desired influence, it is important that there be a view in terms of formal project status reporting.

3.2.2.2 Risk

Risks are present in all projects, emanating from uniqueness, complexity, change, assumptions, constraints, dependencies, and people, within and outside the project (Hillson, 2004). By definition, risk is a situation involving exposure to danger, harm or loss that has a potential to adversely affect project-related objectives. Risk, however, can also provide an opportunity to increase the probability and impact of the positive events and decrease the probability and impact of the negative (Hillson, 2004).

According to the *PMI (2013)*, risk management is a six-step process that includes planning, identification, qualitative analysis, quantitative analysis, response planning, and monitoring and control. During the planning phase, the process that defines how risk management should be conducted is outlined. The risks that have a potential to affect the project are then identified and their characteristics documented during the risk identification phase. Thereafter, a qualitative risk analysis is performed by prioritising risks based on their likelihood or

probability of occurrence and resulting impact. This is followed by a quantitative risk analysis, which is underpinned by numerical ranking and analysis of the effects of the identified risks on project objectives. Depending on the outcome, alternative options and mitigation actions are then developed as part of a risk response plan. The final step is to put into effect the risk response plan, track identified risks, monitor residual risks, and evaluate the effectiveness of the risk management processes throughout the project lifecycle.

Despite the fact that risk is present in all projects, risks do not affect all the projects in the same way (Thamhain, 2013). In an effort to illustrate this point, Thamhain (2013) argues that risk management has three dimensions or variables; degree of uncertainty, project complexity and impact of risk on the project and the enterprise. The first dimension – degree of uncertainty – comprises four elements. The first element is variation such as cost, time, technical requirements, and so forth, which differ from project to project. The second element is contingencies or known events that could occur and negatively affect the project performance. The third is accidents that can be identified in principle but whose probability of occurrence and impact are difficult to quantify. And the fourth are events that can never be known, also referred to as 'unknowable-unknowns'. The second dimension pertains to the scope and complexity of the project in terms of structure, novelty or innovation, pace, and technology. The third dimension comprises four risk-based categories. Category 1 risks are those with little or no impact on the project performance. Category 2 risks are those with a potential for limited impact on the project performance. Category 3 risks have a potential for significant impact on the project performance. Whereas category 4 risks are those that have a potential for significant irreversible impact on the project and the organisational performance. Using Thamhain's dimensions it can be seen that projects will be exposed to risk in varying degrees depending on the project variables.

In a paper assessing scope and risk management in highway development projects, Le, Caldas, Gibson, and Thole (2009) argue that the potential level of risk to which a project is exposed can be determined by a comprehensive assessment of the scope elements. The view expressed by Le *et al*., refers to the importance of comprehensive scope definition as discussed above in subsection 3.2.1.3 and the inextricable connection between scope definition and risk management. After an exhaustive scope has been finalised, a risk mitigation plan can then be developed to deal with the high-risk elements (Le *et al.*, 2009). The inextricable connections between scope definition and risk management as highlighted by Le *et al*., is just a tip of the iceberg. Cost, schedule, scope, quality, resources, risk, health, safety, environment, document

management, procurement, and contract lifecycle management as project management constraints which can materialise in projects executed by Eskom and Transnet may also be connected in a number of ways yet to be truly studied and understood.

Megaprojects, by virtue of their size, include many risk factors – such as design, legal, political, contractual, construction, operational, labour, client, society, and financial – that have a potential to derail the project, with devastating consequences (Irimia-Diéguez, Sanchez-Cazorla and Alfalla-Luque, 2014). Risk management is essential in minimising costs and maximising profits during the project lifecycle since risk is present at every stage (Kumar and Harison, 2016). It should also be noted that risk will vary as the project progresses through its lifecycle (Toth and Sebestyen, 2015). The risk management team should keep this in mind as action plans are developed, continuous risk monitoring systems are implemented and resources are deployed in attempts to mitigate risks. To develop an acceptable risk mitigation plan, the project management team must have a view of all the risks that have the potential to impact the project either positively or negatively.

There are various methods that may be employed to assist the project management team in reaping the benefits of effective risk management. Regardless of which method is chosen, the project management team should ensure that the chosen method of risk assessment and analysis is guided by practicality, readability and ease of results interpretation (Dziadosz and Rejment, 2015). Moreover, it should be a complementary, interdisciplinary, flexible approach that is able to capture the fluid nature of risk factors at hand, and simultaneously enable organisation-wide involvement as well as interdisciplinary participation (Dziadosz and Rejment, 2015). It is crucial that the risk management team encourages open lines of communication within the project team and amongst all stakeholders as this is considered an important method for early risk detection and management (Thamhain, 2013). The risk management team should also understand the dynamic forces at play within the organisation that impact project performance as this is an essential precondition and catalyst to bringing together an all-inclusive team to mitigate risks (Thamhain, 2013).

Nevertheless, effective risk management can be extremely complicated in a complex project management environment such as the one in which Transnet and Eskom operate. Adhering to the above imperatives as outlined by Thamhain (2013) and Dziadosz and Rejment (2015) improves the odds in favour of the project management team. It is all but a guarantee that the resulting risk register will indeed consider the widest range of risks that are likely to have an

impact on the project during its lifecycle. In turn, this will allow for timely mitigation or minimisation of imminent risks.

3.2.2.3 Health and Safety

As can be seen in legislation that governs health and safety, the two disciplines are intertwined. This is the case not only in the construction sector but industry-wide. The *OHSA*, supported by a set of 21 subordinate legislations, regulations and codes of practice, outlines practical guidelines on the management of health and safety issues in the workplace. The primary objective of this Act is to ensure that work-related injuries and illnesses are prevented across-the-board in industries operating within the South African borders, from ordinary office environments to more hazardous working environments. The *OHSA* aims to provide for the health and safety of persons at work and for health and safety of persons in connection with the use of plant and machinery (*Republic of South Africa [RSA], 1993*). It provides for the protection of persons other than persons at work against hazards and also makes provisions for health and safety arising out of, or in connection with, activities at work. It further provides for the establishment of a 20-member occupational health and safety advisory council whose duties, under section 3 of the Act, include the following: Advising the minister with regard to matters of policy; advising the Department regarding the formulation of standards and specifications; and the education, training and dissemination of information on occupational health and safety.

Even though health and safety are highly regulated industry-wide, the construction industry is a sector that experiences a high number of work-place accidents and illnesses. Notwithstanding mechanisation taking place in other industries, the construction industry is still largely labour-intensive. The construction site is also a work environment that is frequently changing as construction progresses. The International Labour Organisation (ILO) reported that each year there are at least 60 000 fatal accidents on construction sites worldwide, which is equivalent to one death every 10 minutes (ILO, 2005). The statistics for back pains or other musculoskeletal disorders were just as damning, with an estimated 30% of construction workers affected by these illnesses in some of the countries surveyed (ILO, 2005). The industry should be concerned about these statistics. The industry should also be concerned about the population that is getting younger each year. A younger population means that there is less on-the-job experience and training to circumvent fatalities. It also means that ingenious working methods to prevent back pains and musculoskeletal disorders have not yet been acquired, as these come with experience. A case in point is the European Union which has experienced an incident rate

for non-fatal accidents as high as 50% in the younger population compared with their mature colleagues in other age categories (ILO, 2005). No doubt the terrain has changed from when the quoted study was commissioned by the ILO more than a decade ago, but until other similar studies supersede it, one will have to continue referring to these figures.

An organisation needs to employ ingenious ways of dealing with health and safety matters. An organisation also needs creative strategies for promoting and socialising legislative compliance. Biggs and Biggs (2013) identified training, categorised as critical to the success of culture improvement strategies within an organisation, as a means to improve the outcomes of occupational health and safety. Such strategies may help prevent incidents and accidents from becoming disasters. According to the *Disaster Management Act, No. 57 of 2002*, a disaster is:

> 'a progressive or sudden, widespread or localised, natural or human-caused occurrence which causes or threatens to cause death, injury or disease, damage to property, infrastructure or the environment, or significant disruption of the community, that is of a magnitude that exceeds the ability of those affected by the disaster to cope with its effects using only their own resources' (*RSA, 2002: 08*).

Ineffective enterprise occupational health and safety management, business continuity planning and overall risk management can become a disaster with devastating consequences for the organisations, employees, management and the community at large if not managed appropriately (Hindley, 2010). Specifications, standards and legislation have been put in place to prevent incidents, accidents, and potential disasters. Nevertheless, the over-representation of the construction industry in work-place injuries and death statistics means that more ingenious, preventative ways that go beyond this compliance-based approach need to be adopted. It also means that the entire organisation has to be hands-on with regard to occupational health and safety.

During occupational health and safety management, both the top-down and bottom-up approaches need to be employed. As a top-down approach, Hindley (2010) posits that good corporate governance, underpinned by principles of effective strategy and policy development, has been shown to contribute positively towards risk reduction and disaster management. It is essential that occupational health and safety become part and parcel of organisational strategy and policy planning. As a bottom-up approach, the reporting of health and safety incidents as well as initiatives aimed at preventing work-place fatalities, musculoskeletal disorders and serious bumps and bruises plays a vital role in giving management insight into the activities taking place on the jobsite. Information gathered therefrom can then be used during strategy

and policy formulation. That is why management should encourage the bottom-up approach. Furthermore, occupational health and safety training initiatives need to be given the spotlight and the visibility they deserve to prevent incidents and accidents before they occur.

3.2.2.4 Environment

Much like health and safety, the discipline of environmental management is highly legislated. And similarly, there are implications for Transnet and Eskom. The *National Environmental Management Act*, *No. 101 of 1998* (*NEMA*) aims to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, establishing institutions that will promote co-operative governance and outlining procedures for co-ordinating environmental functions exercised by organs of state (*RSA, 1998*). It further aims to provide for certain aspects of the administration and enforcement of other environmental management laws. There are 5 subsidiary environmental management Acts that support *NEMA*. Namely the *National Environmental Management: Air Quality Act*, *No. 39 of 2004*. The *National Environmental Management: Biodiversity Act*, *No. 10 of 2004*. The *National Environmental Management: Integrated Coastal Management Act*, *No. 24 of 2008*. The *National Environmental Management: Protected Areas Act*, *No. 57 of 2003*. And the *National Environmental Management: Waste Act*, *No. 59 of 2008*. These Acts are in turn supported by numerous regulations in their respective areas of speciality.

Transnet is in the business of moving freight from one location to another, using its port, pipeline and rail infrastructure. Transnet does not own or operate ships. TNPA, one of the company's operating division, only owns tugs that provide navigational assistance to vessels within the port limits. However, the company has a responsibility to use its influence to minimise port-related pollution and environmental degradation as regulated by *NEMA* and its subsidiary Acts. Port-related pollution and environmental degradation which can be regulated by TNPA include routine discharge of oily bilge and ballast water, dumping of non-biodegradable solid waste into the ocean, accidental spillage of oil, fuel, toxins, or other cargo, air emissions from vessels, and ecological harm due to the introduction of exotic species transported by vessels calling into South African ports (*Organization for Economic Co-Operation and Development [OECD], 1997*).

Meanwhile, pipeline freight, which falls under the purview of TPL, also has factors that have the potential to cause environmental pollution (OECD, 1997). It can cause accidental spills of petroleum products that can contaminate land, surface water and ground water. And it can also

cause air pollution as a result of pumps and compressors used to pump product through the pipeline. TFR, the largest Transnet division, sustains an extensive rail infrastructure. The Association of American Rail argues that the following environmental benefits will be reaped when freight is moved by rail (*Railroads, 2017*). Rail is four times more efficient than trucks. In addition, it reduces highway traffic. Several hundred trucks can be replaced by one freight train, thus reducing road wear-and-tear and costs associated with highway maintenance. Rail freight reduces emissions of particulate matter and those of nitrogen dioxide, it lowers greenhouse gas emissions by 75%, and it lowers the emissions of other harmful substances. Evidently, Transnet as an organisation influences the 'carbon sink' – which is the ability to regulate carbon dioxide in the atmosphere – both adversely and positively depending on the operating division under consideration.

On the other hand, Eskom seemingly has only negative implications for the 'carbon sink'. The building of coal-fired power stations is strongly associated with environmental degradation, climate change and air pollution. Of course, there are benefits to be had with the utilisation of coal-fired power stations (Chris, 2017; Sun, 2015). These include tried and tested reliability in the supply of power during on- and off-peak hours, the production of cheaper and more affordable energy, and the abundance of coal as a raw commodity used to fuel these power stations. Moreover, long-standing know-how and institutional knowledge pertaining to the building of coal-fired power stations make coal-fired power stations considerably safer than nuclear power stations. Nevertheless, when one looks holistically at the costs-benefits analysis for a coal-fired power station it will reveal that the costs far outweigh the benefits. The disadvantages of coal-fired power plants include: greenhouse gas emissions as a by-product that contributes to climate change and environmental pollution, the damaging nature of coal mining which results in the destruction of scenery and natural habitat, displacement of people in efforts to establish mines, generation of tonnes of waste containing harmful substances during the mining process, and the emission of harmful substances from the electricity generation process.

Despite the fact that coal-fired power stations contribute to environmental degradation and externalities costs, the building of Kusile and Medupi power stations is premised on electricity production capacity having been reached by Eskom. But this reasoning does not change the fact that activities associated with coal-fired power stations, from coal mining to power generation, are harmful to flora and fauna. Coal mining and associated activities have a negative impact on the environment which causes habitat loss. It also increases the pressure on

the transportation network system resulting from the increase in the number of heavy trucks transporting coal, which further exacerbates climate change. Meanwhile, the process of combusting coal for electricity generation produces by-products such as carbon dioxide, carbon monoxide, methane, total mass of suspended particulate matter, oxides of nitrogen, sulphur, and mercury, and a wide spectrum of carcinogenic radionuclides and heavy metals (Blignaut, Koch, Riekert, Inglesi-Lotz, and Nkambule, 2011). Moreover, unavoidable externalities costs include the negative effects on the health and wellbeing of South Africans as a result of particulate matter emissions such as sulphur dioxide and oxides of nitrogen, and the negative effects of coal mining and power generation on water consumption and available water supplies (Blignaut *et al.*, 2011).

Due to inabilities to localise environmental incidents, accidents and disasters, stakeholders largely affected by the environmental activities of business conducted by Eskom and Transnet must have a view of the measure of compliance within these organisations in terms of legislation, standards and common codes of practice. One way of achieving this goal is through holistic project status reporting that includes how the natural environment is being managed.

3.2.2.5 Document Management

Document management, otherwise known as document control, is a discipline responsible for the creation, review, modification, storage, issuance, distribution, accessibility, and destruction of documents. Document management in megaprojects or in projects that are geographically dispersed can be a daunting task due to the sheer number of documents that may need to be managed. During the lifecycle of the project many documents with varying purposes will be produced for diverse stakeholders. Some of the documentation will be permanent and some will be temporal. Permanent documents may be produced, for instance, to assist the project team during project construction, to assist the asset owner during the operation of the asset, or for institutional knowledge after project completion. These documents may include user manuals, information guides, maintenance documents, and so forth. Temporal documents may include documents to assist the project team when sharing project-related information internally and externally, such as project status reports as well as discussion papers. Documents can also be produced in such a way that they are solely meant for the consumption of one team or the other – the project team or the asset owner's team. Nevertheless, all projects involve the creation, review, modification, storage, issuance, distribution, accessibility, and destruction of documents in large quantities.

To ensure that the tenets of this discipline are realised, a functional document management system in a construction site must have seven characteristics, according to Inglesis (2013). There should be ease of access to all requisite documents by all relevant project members, whether in the form of hardcopies, electronic format or from a shared network drive. Second, changes on any document should be shared with the project team timeously to prevent people from working with superseded or outdated documents. Third, when documents are changed or updated, there should be clear and visible ways of identifying the changes. Fourth, every document should contain a unique identifier number to differentiate it from other documents and to also differentiate it from previous revisions. Moreover, this unique identifier number must enable users to ascertain how the document fits into the bigger scheme of things. Fifth, once documents are superseded or revised, previous versions thereof should be removed from circulation to avoid unintended use. Sixth, the status of the document should be easily identifiable by all users – that is to say, whether the document is a draft or an approved copy. Finally, there has to be a single and unique document distribution system, such that it is made clear to the project team that any documentation received through any other means is not valid and should not be used on the jobsite or for construction purposes.

In the construction industry, document management can be undertaken using a variety of means. It may be a manual endeavour, a fully automated process or a combination of the two. In today's information age it makes business sense for an organisation to move away from a purely manual system, towards a hybrid system or one that is fully automated. In a study presenting the results of a broad survey investigating the various aspects of document management, Al-Qady and Kandil (2013) made the following findings: Top firms in the construction industry generally utilise computer software and electronic methods for the creation, storage and management of project-related documents. However, electronic document management systems have not replaced the roles and responsibilities of the document control staff. The main reason for the latter is that automated systems have not significantly changed the way that documents are managed in comparison with traditional manual methods. Electronic management systems essentially mimic traditional methods of document organisation and retrieval. Moreover, documents managed by an automated system tend to be transmitted manually to a receiving party, especially if this party has a propensity to store documents manually, or if documents are going to be used in meetings, consultations or gatherings.

Upon undertaking a cost-benefit analysis of the implementation of an Electronic Document Management System (EDMS) in the United Kingdom's free healthcare system, Kain and Koshy (2013) made these key findings. EDMS is a major positive step forward in records management. Its foremost benefits are speed, multi-user access and hierarchical access. Whereas the major drawbacks pertain to the amount of time it takes to scan existing documents onto the system as well as erroneous categorisation of documents during the capturing process. Again, it must be noted that Kain and Koshy's findings were in the free health care system. If they were to be transposed into a project management environment, the first drawback becomes redundant when applied to a project that commences with EDMS already in place. There would be no existing project documents that will need to be scanned.

Transnet and Eskom do not have a fully automated EDMS in place. If anything, EDMS is a system that may be phased as advancements in the field of document management become necessary, more pronounced and indispensable. Groenewald (2004), however, warns that the introduction of EDMS may backfire in an event where the necessary groundwork has not been done, since this is an intervention that requires comprehensive, organisation-wide support and implementation. Human resource policies must be reviewed to create a conducive environment for appraisals, performance-related compensation, recruitment and selection, education, employee relations, empowerment, teamwork, and training and development, amongst others. Groenewald (2004) further argues that the management of human factors, insofar as they affect project document management system, is especially important in the public sector. From the above review of literature pertaining to document management, it becomes evident that this is a discipline that should be included as part of holistic project status reporting.

3.2.2.6 Procurement

If not managed appropriately, the procurement of project-related goods and services may stall progress onsite, resulting in schedule and cost overruns. Therefore, it is imperative that the procurement of goods and services be strategically planned and executed. For this to happen, management must have a view of the key issues obstructing the project procurement team. Procurement involves the activities and processes of acquiring goods, services and/or works from an external source at the best possible price, considering quality, quantity, turnaround time, and location, with the aim to promote fair and open competition at minimal risk.

We live in a world where outsourcing activities not forming part of the core company competencies has intensified. However, the outsourcing of procurement-related activities

within the construction industry is impractical, and companies have duly chosen to keep this strategic competency in-house (Acimovic, Mijuskovic and Colic, 2016). If the procurement of goods and service is outsourced, it tends to cause more harm than good. In terms of the project procurement, there are two principal systems, as will be shown below, that are used in a variety of industries worldwide; the design-bid-build and the design-build project procurement delivery systems (Ling, Chan, Chong and Ee, 2004). The two systems are essentially dichotomous.

Ling *et al*., (2004) constructed a model identifying several variables that predict project performance of the design-bid-build and the design-build procurement delivery systems. They recommend that this model be used to predict the project's probable performance. The characteristics of the design-bid-build, also referred to as the traditional method of procurement, will be assessed first. The activities and processes associated with traditional methods of procurement are, by their very nature, time-consuming, resulting in cost uncertainty and impact on the capacity to build caused mainly by the division between organisational interfaces (Kong and Gray, 2006). Traditional procurement is a system where the contractor is not responsible for the design or the documentation of the work. In this system, there is a clear division between design and construction. This system has continued to exist because the separation of design and construction eliminates opportunistic business behaviour, it allows flexibility during the construction phase, it takes advantage of the free-market economics during the contractor selection phase, and it takes advantage of the best talents from design and construction to produce the most desirable results with greater certainty (Kong and Gray, 2006). Nevertheless, the traditional procurement system has cons which can make it undesirable to some.

An alternative to the traditional procurement system is the design-build procurement delivery system. In this type of procurement, the project owner, or client, enters into a single contract with an entity that is responsible for both the design of the project and the construction thereof. Hence it is imperative that the contractor selection process is as comprehensive as possible to ensure successful execution when this type of procurement is used. The design-builder is not prohibited from subcontracting some of the goods and services, however this entity is wholly responsible and answerable to the project owner for all the activities taking place during project construction. In a paper analysing the correlation between the design-build procurement method and its performance in terms of cost, schedule and quality metrics, Wardani, Messner and Horman (2006) conclude that the usage of this procurement method has increased in both

the public and the private sectors due to the time and cost-savings benefit it can offer. In essence, the design-build resulted in better front-end quality, a decreased amount of quality recalls, and improved operation and maintenance quality (Wardani *et al.*, 2006). Choosing the appropriate project delivery procurement method can determine the success or failure of a project.

A broader review of procurement as a discipline will reveal at least two vices which can be found in the present literature. The first is lack of innovation. The other is rampant corruption. In dealing with the first, one can say that procurement has certain characteristics that appear to retard progress, and that those characteristics make innovation difficult to achieve in building and construction projects. The financial incentive to undertake research and development in procurement delivery systems pertaining to the construction is minimal, leading to lack of innovation and deficiency in knowledge acquisition within the discipline (Valence, 2010). This prevents tenderers from going this route, because if tenderers innovate they might find that they do not conform to the tender specifications. Worse still, their ideas might benefit the client without the appropriate financial incentive being accrued.

The second vice is corruption that is as a result of the bureaucratic nature of project procurement which, from any philosophical view considering the good and evil actions of men, is wrong. Osei-Afoakwa (2012) argues that the philosophical view of consequentialism and that of deontology can be used to explain why corruption may not be beneficial for the public procurement system. Osei-Afoakwa (2012: 630) further argues that, even though corruption may yield some benefits its resulting evil consequences may supersede any benefits; it must be avoided like the plague, 'it constitutes a breach of the corrupt official's duty to his employer, it is illegal, immoral, unconventional and against the public good'. This review of literature pertaining to the management of project procurement indicates that this is a project management constraint that should form part of the holistic project status reporting framework.

3.2.2.7 Contract Lifecycle Management

A contract is a legally binding document between the contractor and the client detailing the terms of agreement, general conditions, supplementary clauses as well as special clauses, and any other relevant conditions for the delivery of the construction works (Butuza and Hedre, 2010). From this definition alone, it can be seen that Contract Lifecycle Management (CLM) is a constraint that concerns organisations that are in the business of project management and execution, such as those that are the subject of this study. Therefore, it should form part of the

holistic project status reporting framework. At any given time during the project lifecycle, Eskom and Transnet may have tens – if not hundreds – of contracts to manage on each project.

Selection of a type of contract to be used for the delivery of the construction project should consider the characteristics of the project as well as the prominent needs of the organisation. A framework for the development of a decision-support system for a contracting strategy formulation using a case-based approach has been developed by Chua and Loh (2006). It is an example of the importance of choosing a contracting strategy aimed at maximising the probability of achieving the desired organisational objectives required for project execution. They argue that some of the factors that need to be considered during the formulation of a contracting strategy include the project timelines, the type, size and location of the project together with the allocation and mitigation of risk. Also to be considered are the best possible way to separate the roles and responsibilities of relevant parties, the prevailing market conditions and the project cost constraints.

A contracting strategy should not be considered as an event. Rather it should be considered as a process that takes place throughout the lifecycle of a project. This process should enable appropriate management of the important factors of the project such as the client's requirements, the contractors' competences, desired objectives, and the client's competitive advantage. It should do this with the aim of maximising the possibility of overall project success. Management of these factors is especially important considering that all projects are prone to changes throughout the lifecycle of the contract in terms of cost, schedule, scope, and quality. Changes may well take place with regard to the management of resources, health and safety, the natural and physical environment, project-related documents, and interested and affected parties.

A well-defined contracting strategy will set a firm foundation for the management of the key dynamics of the contract by all parties concerned throughout the lifecycle of the project as part of CLM. CLM is the 'proactive, methodical management of a contract from initiation through to award, compliance and renewal' to improve efficiency, save costs and decrease liability, non-compliance and risk (Villanova University, 2018). It is an iterative process that is carried out from project inception to project close-out. The iterative nature of CLM can be encapsulated using the figure below.

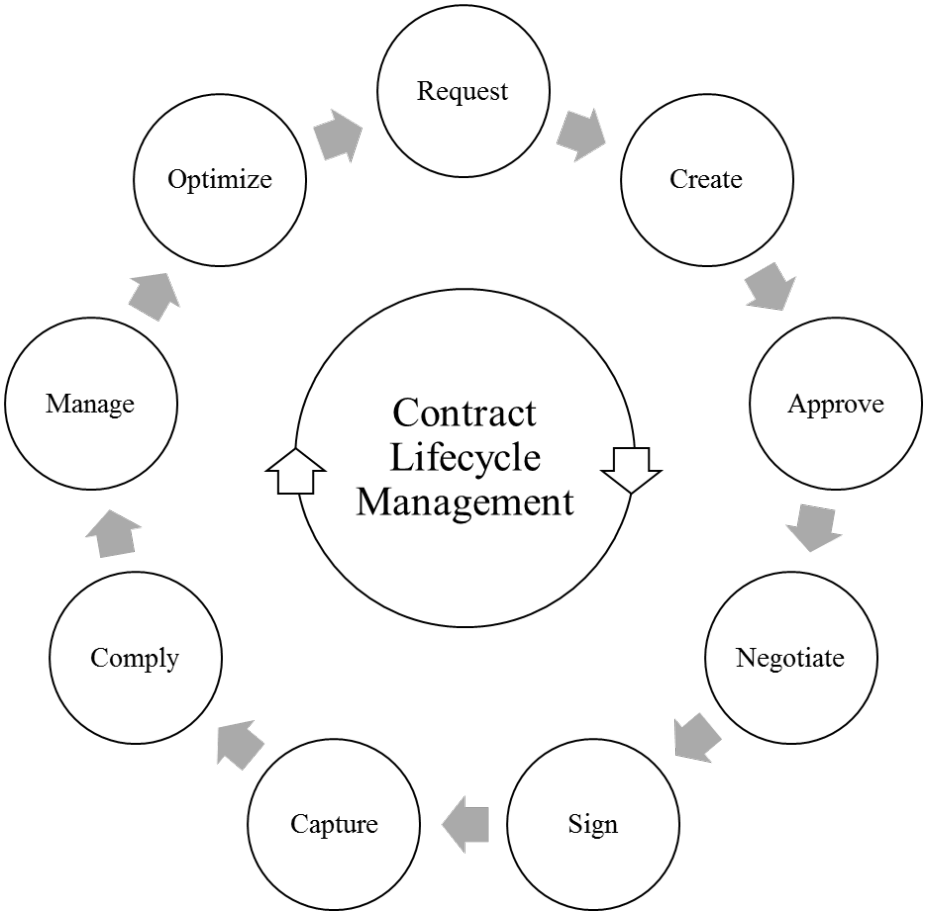


Figure 3.5: Contract lifecycle management

Adapted from EXARI. 2018. *What is Contract Lifecycle Management?* [Online]. Available: https://www.exari.com/learn/what-is-contract-lifecycle-management [Accessed 03 January 2018].

The nine key steps in the CLM process can be summarised as follows (Exari, 2018). First, a request describing the project needs is made to initiate the lifecycle. Thereafter a contracting strategy based on the approved templates and clauses is created. The next step is to get the contract approved by the appropriate parties, as per the 'delegation of authority', and then shared with the interested and affected parties. Fourth, the terms of the deal must be negotiated to balance risks against value, considering all legal obligations. Next, the contract is signed as a binding agreement between the parties. Step six, is to capture all contracts into a central systems to facilitate ease of management. Step seven, is to ensure compliance with the various contract obligations and commitments to avoid contract breaches and subsequent risks. Then the contractual rights, renewals, amendments, and relationships are managed by the contract

management staff and contract administrators. Finally, the portfolio may be optimised for better value and lower risk outcomes, creating a continuous feedback loop between the contract portfolio and business management. With the exception of a few steps, the model developed by Trinkūnienė and Trinkūnas (2014) is aligned to that described above, as reflected in figure 3.5.

3.2.2.8 Project Reporting and Communication

Project reporting and communication are

> '…the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information' (*PMI, 2013: 287*).

Communicating project status to internal and external stakeholders is essential in a project environment. To ensure that effective communication occurs, it is imperative that the following guidelines be observed throughout the project lifecycle, according to the *PMI (2013)*. People within and outside the organisation who are interested and affected by the project must be identified, and their interests, involvement and impact documented. A communication approach should then be devised based on their project needs. Relevant information must then be made available to the project stakeholders based on the communication approach. Thereafter, stakeholder expectations should be managed to meet their needs and to address issues as and when they arise. Finally, information including status reports, progress measurements and projections, needs to be collected and distributed to give stakeholders sight of the project. This is a traditionalist approach to project reporting, communication, and stakeholder management, done through a series of separate reports and disclosure documents.

However, the International Integrated Reporting Council (IIRC) recommends Integrated Reporting (IIRC, 2013). Integrated Reporting (IR) produces a far more cohesive and efficient approach to project status reporting. It breaks down the silo mentality, reduces information duplication, and improves the quality of the information available to stakeholders. More importantly, IR gives internal and external stakeholders sight of how the organisation strategically creates value over the short-, medium- and long-term with regards to financial, manufactured, intellectual, human, social and relationship, and natural capital in order to promote accountability and stewardship. The IR framework is designed to encourage companies to design reports that take these factors into account. IR may include traditional financial accounting information, but essentially it should make provision for how the company's mission, strategy, governance, and business model combine and interact with one

another to facilitate the company's ability to create value over time (Fried, Holtzman and Mest, 2014). It should do this in a concise, all-encompassing manner that describes how these factors interact with one another. It should also consider key issues, both negative and positive. Companies must voluntarily share this information with stakeholders to increase transparency and to encourage further financial investment.

In the traditional sense of the word, a stakeholder is a project owner or the contractor. This narrow use of the term does not suffice in modern times of project management. A stakeholder is 'an individual, group, or organisation who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project' (PMI 2013: 30). The PMI's definition of stakeholder is more extensive, however the stance taken by the IR is value-adding. The IR takes a more holistic view of the concept, stakeholder. It asserts that stakeholders should include shareholders, employees, customers, suppliers, partners, the physical environment, knowledge institutions, and society (Fried *et al.*, 2014). Therefore, this study adopts this definition of stakeholder, as an entity that should be party to project status reporting currently under investigation.

The IR also considers the nature of the relationship between the organisation and stakeholders as well as the tactics used to harness the relationships with key stakeholders. For instance, the traditional reporting framework would consider corporate social investment initiatives as a separate exercise to be excluded in the annual report. The same goes for investments made as part of environmental stewardship initiatives. Just because the report considers the elements of finance, manufacture, human capital, intellectual capital, corporate social investment, or environmental stewardship initiatives does not necessarily mean that separate reports addressing these elements should be published by the organisation. The argument for an IR as forwarded by the IIRC means that a project status report may be published as a single, standalone report or as part of a series of distinguishable, identifiable portions forming part of a larger report (IIRC, 2013).

Judging from what has been said above, there are benefits to be had if an organisation adopts the integrated reporting framework as outlined by the IIRC. Hoque's (2017) argument reiterates this position. He concludes by imploring all organisations to adopt the integrated reporting framework, arguing that, although the adoption of the framework could prove complex at first, IR is an important tool for an organisation trying to provide a holistic view of itself to stakeholders. As far as complexity of implementation of the integrated reporting framework is

concerned, Cheng, Green, Conradie, Konishi, and Romi (2014) argue that there is none. They hold that experiences in South Africa have shown that the adoption and implementation of the integrated reporting framework is not as complex as some would have us believe. The Johannesburg Stock Exchange, through the King III Code of Governance Principles for South Africa, has made it mandatory (on a comply or explain basis) for all listed companies to issue integrated reports (Cheng *et al.*, 2014; Leuner, 2012).

3.3 Chapter Summary

This study aims to develop a holistic project status reporting framework for South African SOCs. This framework will formalise project reporting in these large, geographically dispersed organisations tasked with executing projects of strategic importance. In attempts to consider all project management constraints that have the potential to influence projects managed and executed by these organisations. This chapter has reviewed the above literature pertaining to project management constraints that should form part of the proposed framework. Figure 3.6 below can be used to summarise the prominent themes identified within the present project management body of knowledge. It is important to note that these constraints are not exhaustive, they will be supplemented by others identified after the analysis of primary data. Figure 3.6 below forms the basis of the left side of the proposed project status reporting framework, discussed in chapter five.

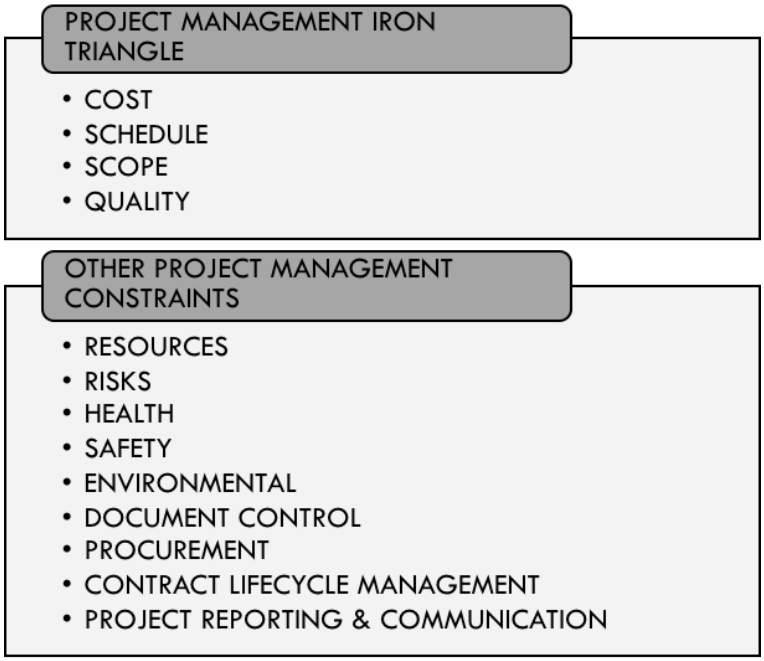


Figure 3.6 Project management constraints identified during the review of secondary data

Source: The Researcher, 2019.

Chapter Four: Enterprise Management Offices at Project, Programme and Portfolio Levels

4.1 Introduction

Literature pertaining to project management constraints that should form the basis of holistic project status reporting has been reviewed. This study now turns its attention to deliberating the tenets of project management, programme management as well as portfolio management. It will outline how projects coalesce to form programmes which in turn merge to form portfolios. This management style is widely used in the project management environment in which Eskom and Transnet operate. Thereafter, it will discuss how the Enterprise Project Management Office, the Enterprise Programme Management Office and the Enterprise Portfolio Management Office functioning at operational, tactical, and strategic levels respectively, are influenced by project, programme and portfolio management tiers discussed earlier. This chapter will demonstrate why these concepts should inform the framework being developed. A summary will then conclude the chapter.

4.2 Project, Programme and Portfolio Management

4.2.1 Project Management

The PMI's description of the word 'project' as well as the term 'project management' are some of the most accepted. A project is 'a temporary endeavour undertaken to create a unique product, service, or result. The temporary nature of projects indicates a definite beginning and end' (*PMI, 2013: 03*). Furthermore, project management is the application of knowledge, processes, skills, tools, and techniques to project activities to meet project requirements through the appropriate integration of logical project management processes (*PMI, 2013*). These processes include, initiation, planning, execution, monitoring and control, and project close-out. Collectively, they are referred to as the project lifecycle processes.

As shown in chapter three above, project management includes harmonising interdependencies that may include cost, schedule, scope, quality, resources, risks, safety, health, environment, document control, procurement, contract management, and status reporting and communication. Among these interdependencies, schedule, resources and scope were ranked in a study conducted by Wearne (2014) as being the most important project management constraints during the initial stages of project planning. In their entirety, project management constraints interact in such a way that one cannot be changed without affecting the others. To

ensure project success, the project management team has to manage these interdependencies in a holistic and skilful manner. It is therefore important for the project management team to have a diverse set of skills and knowhow.

A comparative view of Project, Programme and Portfolio Management can be summarised using Table 4.1 below (*PMI, 2013*).

Table 4.1: A comparative overview of project, programme and portfolio management

Adapted from Project Management Institute, 2013. *A Guide to the Project Management Body of Knowledge*, 5th ed., p. 8, PMI, Pennsylvania.

	PROJECTS	PROGRAMMES	PORTFOLIOS
Scope	Projects have defined objectives. Scope is progressively elaborated throughout the project life cycle.	Programmes have a larger scope and provide more significant benefits.	Portfolios have a business scope that changes with the strategic goals of the organisation.
Change	Project managers expect change and implement processes to keep change managed and controlled.	The programme manager must expect change from both inside and outside the programme and be prepared to manage it.	Portfolio managers continually monitor changes in the broad environment.
Planning	Project managers progressively incorporate high-level information into detailed plans throughout the project life cycle.	Programme managers develop the overall programme plan and create high-level plans to guide detailed planning at the component level.	Portfolio managers create and maintain necessary processes and communication relative to the aggregate portfolio.
Management	Project managers manage the project team to meet the project objectives.	Programme managers manage the programme staff and the project managers; they provide vision and overall leadership.	Portfolio managers may manage or coordinate portfolio management staff.
Success	Success is measured by product and project quality, timeliness, budget compliance, and degree of customer satisfaction.	Success is measured by the degree to which the programme satisfies the needs and benefits for which it was undertaken.	Success is measured in terms of aggregate performance of portfolio components.

Monitoring	Project managers monitor and control the work of producing the products, services or results that the project was undertaken to produce.	Programme managers monitor the progress of programme components to ensure the overall goals, schedules, budget, and benefits of the programme will be met.	Portfolio managers monitor aggregate performance and value indicators.

Hope and Moehler (2014) suggest that organisations have an opportunity to integrate visionary and strategic sustainability with operational sustainability as part of project, programme and portfolio management. This is in response to global environmental issues such as climate change, energy security, issues of social justice, and concerns of resource depletion, some of which were discussed in subsection 3.2.2.4 above. Meanwhile Todorov (2014) postulates that well-thought-out projects and programme tools and methods have a positive impact on economic and social development of communities and countries that successfully implement them. Such a coordinated approach plays a pivotal role in centralised financial planning, holistic risk management, modelling of project and programme interdependencies, sharing of resources, and an articulated strategy for the selection and prioritisation of projects to ensure sustainability and regularity. With this in mind, this study now turns to discuss the link between project management and programme management.

4.2.2 Programme Management

In larger organisations projects are ordinarily aggregated to form a programme. At first glance, it may seem like there are no fundamental differences between projects and programmes. This is far from the truth. Projects and programmes are quite different. Walenta (2016) posits five fundamental differences between projects and programmes. The first is that project management standards do not consider benefits realisation. A project is successful insofar as it is delivered within cost, schedule, scope, and quality; a successful project does not essentially consider the necessary organisational benefits, end-user adoption, business case attainment, and sponsor satisfaction. The second difference is that training for project managers is worlds apart from that which is normal for programme managers. Again, project management concerns itself with the project management ‘iron triangle’ whereas programme management considers organisational strategy implementation, benefits management, and c-suite communication. C-suite communication is essentially liaising with the highest executives in

senior management such as the chief executive officer, chief operations officer, chief finance officer, chief information officer, chief procurement officer, and so forth.

As a third difference, Walenta (2016) points out that even the capabilities of successful project managers differ from those of successful programme managers. Project managers focus on detail, whereas programme managers have a holistic view. The former are reactive, for example when deviations from the project plan occur, whereas the latter are proactive in that they anticipate changes and opportunities that interact with the organisation. Project managers are fixated on risk analysis, schedule management, cost management, and scope management. Whereas, programme managers look for alternatives to create expected benefits, anticipate and manage schedule changes, understand that cost estimates are uncertain and that additional funding may be sought, and also understand that scope may be fluid depending on revised benefits and requirements. The fourth difference is that any single project, even if successfully executed in terms of cost, schedule, scope, and quality, only serves to create deliverables which in turn might or might not result in benefits. Finally, Walenta (2016) posits that project managers are inward looking whereas programme managers are outward looking. The two magic triangles, one representing project management and the other programme management, shown below are an indication of this.

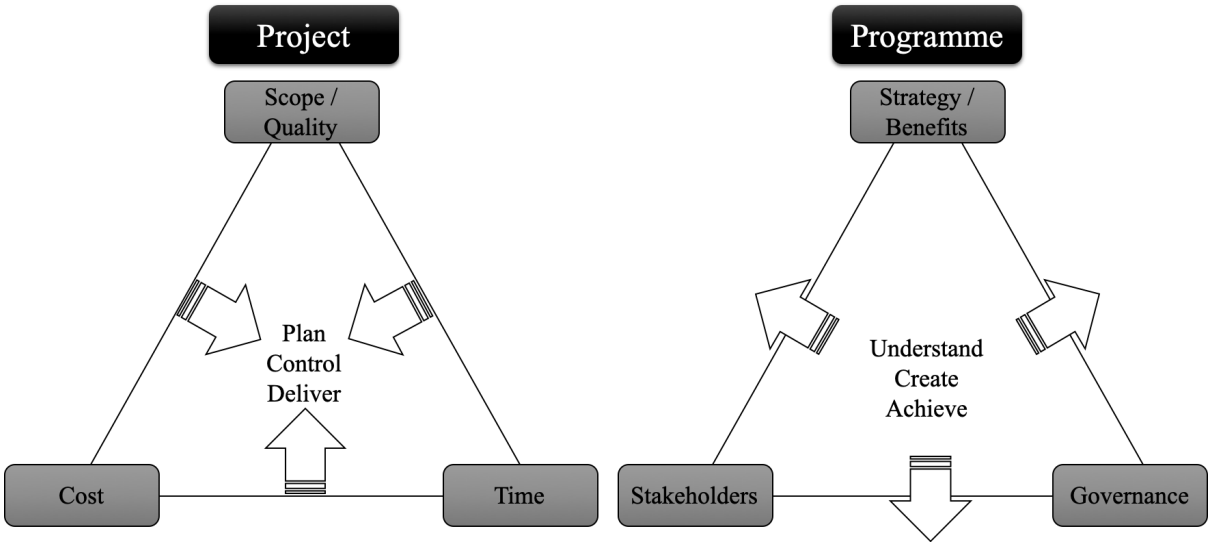


Figure 4.1: Differences between magic triangles for project and programme managers

Adapted from Walenta, T. 2016. Projects and Programmes are Two Different Animals, don't underestimate the Gap. *Procedia - Social and Behavioral Sciences*, 226, 365-371.

Effective governance of projects and programmes can increase the realisation of benefits and reduce uncertainties associated with strategic projects (Coulson-Thomas, 2016). Projects are, by their very nature, uncertain. It is not guaranteed that the project scope will be achieved within the desired cost and schedule. Nor is it guaranteed that the project will be of a certain standard of quality, as agreed between the project team and the owner's team. The logical connection between project management and programme management means that project uncertainty translates into programme uncertainty regarding stakeholder management, governance, strategy, and the expected benefits. Maravas and Pantouvakis (2013) have presented guidelines for the calculation of cost, schedule and benefits in project and programme strategies in the presence of uncertainty.

Due to their strategic nature and exorbitant costs, megaprojects are always in the limelight and they have many factors that influence them. Complex infrastructure projects are either negatively or positively affected by political, economic, social, technological, legal, and environmental factors (Tanaka, 2014). These factors can be mitigated and coordinated through effective project and programme management (Tanaka, 2014). Over and above these, the importance of a project or programme sponsor in enhancing corporate governance, accountability, transparency, and strategy implementation should not be underestimated (Crawford, Cooke-Davies, Hobbs, Labuschagne, Remington and Chen, 2008). The role of a sponsor tends to increase as the size and impact of the project or programme increases.

4.2.3 Portfolio Management

Similar to the merger of projects into programmes as discussed above, programmes logically roll-up to form portfolios. Strategic alignment between and among projects, programmes and portfolios makes business sense and, at the same time, improves the chances that projects will be able to manage their constraints (Buys and Stander, 2010). Structures that are set in place through portfolio formation ensure that projects within a portfolio that are earmarked for execution eventually serve to realise the organisation's strategy, vision and mission. Furthermore, it assures that projects are assigned to the appropriate programmes, and programmes to appropriate portfolios, for effective management and adequate resource deployment.

Project and programme selection for, and assignment to, an appropriate portfolio can be daunting because portfolio management transcends project and programme management by

integrating into the organisation's project selection strategy, implementation and subsequent benefits. Using this premise as a point of departure, Nowak (2013) has formulated requirements for a decision support system aimed at facilitating the project selection strategy. Utilisation of this strategy will assist in ensuring that projects are assigned to appropriate programmes, programmes to appropriate portfolios, and that portfolios realise the organisation's strategy, vision and mission. Moreover, the decision support system will ensure that benefits realisation occurs as far as the portfolio is concerned.

The most thorough of project selection strategies can sometimes still fail to provide the envisaged benefits. To realise benefits on high risk, expensive projects with elongated timeframes, Smith and Sonnenblick (2013) recommend the following: The portfolio management team should liaise with the executive to understand strategic objectives; project data should be collected to enable projects to be assigned to the correct portfolios; data must be vetted to ensure accuracy and consistency; alternative portfolios must be created to achieve organisational objectives in different ways or to different degrees; and, finally, taking the above factors into account, the portfolio that scores the highest should be selected for implementation. Portfolio management should be an inclusive process that accounts for all key stakeholder views. Beringer, Jonas, and Gemünden (2012) regard stakeholder behaviour and stakeholder management as the most important aspects of portfolio success. They argue that stakeholder management must focus on how multiple stakeholders influence one another during intricate interactions.

From project management to programme management and then portfolio management, the strategic outlook, expertise and – in some cases – skill-levels intensify. As such, portfolio managers need to have superior capabilities and know-how by comparison to project or programme managers (Filippov, Weg, Ogtrop, Beelen, and Mooi, 2014). Moreover, they must have a reasonably good understanding of project management and should have a holistic view of the organisation. After all, portfolio managers provide strategic advice to senior management while managing organisation-wide resource deployment. In a paper examining strategic resource allocation to organisational innovation, Klingebiel and Rammer (2014) concluded that resource allocation strategies have a substantially positive influence on portfolio efficacy especially when resources are allocated to a wide range of projects and programmes within a portfolio. When this happens, resources are able to apply lessons learnt from one portfolio, programme or project to various others, ultimately benefiting the entire organisation.

Over and above realising strategic business objectives and ensuring efficient business management, there are many benefits to be reaped when good project management influences organisational programme management, and when good programme management influences organisational portfolio management. Organisational efficiency, business innovation and systematic decision-making all stand to benefit (Görög, 2011). Hadjinicolaou and Dumrak (2017) posit that the most common benefits of implementing a project portfolio management structure are improvement in decision-making, resource usage maximisation, alignment with business strategy, and organisational risk reduction. On the other hand, the most prominent barriers are internal politics and culture, lack of executive support and sponsorship, and misalignment regarding common project prioritisation approaches (Hadjinicolaou and Dumrak, 2017). Meanwhile, Pajares and López (2014) argue that strategy and financial value are not the only factors that influence whether or not a project is included in the portfolio, how the candidate project interacts with the existing portfolio with regard to cost, schedule and risk is of vital importance.

The uncertain nature of projects and subsequent implications for programme management has been discussed in the subsections above. These uncertainties can also translate into portfolio uncertainties. Namazian and Yakhchali (2016) have proposed a model for solving project portfolio selection problems under conditions of uncertainty based on project schedules. Meanwhile, Esfahani, Sobhiyah and Yousefi (2016) suggest a project portfolio selection strategy based on harmony search algorithms and modern portfolio theory. To mitigate uncertainties, portfolio managers can predict and control portfolio financial milestones in large portfolios using the following three elements (Eik-Andresen, Johansen, Landmark, and Sørensen, 2016): Portfolio managers must over-budget so as to create a buffer for optimistic project budgets which may not be met; they must meticulously trend milestone deviations and subsequent risks throughout the portfolio; and they must also manage economic flexibility to govern pay-outs for unsuccessful projects come year-end. All things considered, to facilitate portfolio performance, programme and portfolio managers should then put tools in place to evaluate all the projects and programmes that over-perform. Outcomes should, on the whole, be extrapolated and applied to all other projects within a programme. Likewise, programmes that are over-performing should positively influence their portfolios.

4.2.4 Section Overview

Section 4.2 has outlined how projects coalesce to form programmes which in turn merge to form portfolios. The apparent link between these components as well as the benefits of integrated management have been discussed. The project, programme and portfolio management style discussed in this section is widely used in the construction industry in which Eskom and Transnet operate, hence the need for articulation. This study will now turn to how the Enterprise Project Management Office, the Enterprise Programme Management Office and the Enterprise Portfolio Management Office influence and interact with these project-, programme- and portfolio-management-tiers. As these management offices are engaged, the relationship between the components discussed above will become apparent at operational, tactical and strategic levels of the organisation.

4.3 Enterprise Management Offices

As will be shown below, supported by relevant literature, the relationship between project, programme and portfolio management discussed in section 4.2 above and enterprise management offices can be summarised using figure 4.2 below:

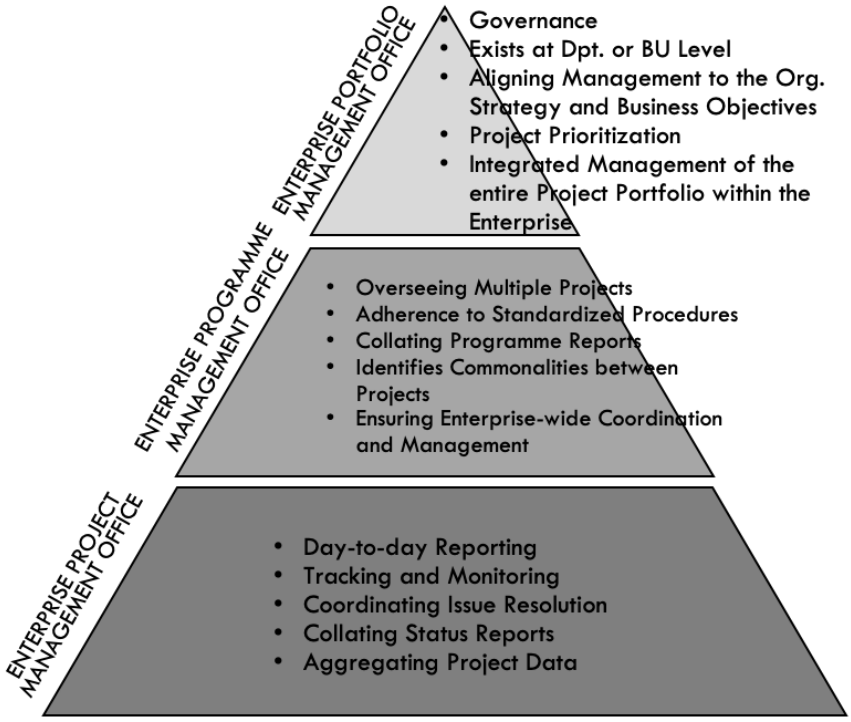


Figure 4.2: Enterprise management offices at project, programme and portfolio levels

Source: The Researcher, 2019.

To clarify the relationship between project, programme and portfolio management as well as enterprise management offices, the latter needs to be articulated. However, as will be shown, this is not as straightforward as it may seem. Enterprise management offices can be referred to using a variety of names. They can be depicted using a variety of models. They are also purported to fulfil a variety of roles. Difficulty will, therefore, be experienced in attempting to frame a standardised, universally accepted definition of enterprise management offices. Szalay, Kovács and Sebestyén (2017) concur with the problem faced in attempting to frame a standardised, universally appealing definition of management offices to the extent that they develop an integrated framework for project management office evaluation.

A review undertaken by Monteiro, Santos and Varajão (2016) revealed 47 models, reducible to 25 for namesake. Monterio *et al*., (2016: 1093) establish that management offices have a 'degree of authority, acceptance, adoption, and autonomy, for defining, distributing, and supporting project management practices somewhere within the enterprise'. Mariusz (2014) has developed models for management offices functioning within a multi-project environment.

One of the essential arguments in his paper is that management offices have distinct strengths and characteristics that add value within the organisation. Even though enterprise management offices are purported to fulfil a variety of roles, Malatji and Marnewick (2016) argue that they still do not have the desired extensive influence within the organisation. This is the case even though it has been shown that a mature enterprise management office has overall positive influence within the organisation (Khalema *et al.*, 2015).

On the subject of enterprise management offices, the *PMI (2013: 10-11)* refers to the term Project Management Office (PMO), further articulating it as follows:

> A project management office (PMO) is a management structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques. The responsibilities of a PMO can range from providing project management support functions to actually being responsible for the direct management of one or more projects.
>
> There are several types of PMO structures in organisations, each varying in the degree of control and influence they have on projects within the organisation, such as:
>
> - **Supportive**: Supportive PMOs provide a consultative role to projects by supplying templates, best practices, training, access to information and lessons learned from other projects. This type of PMO serves as a project repository. The degree of control provided by this PMO is low.
> - **Controlling**: Controlling PMOs provide support and require compliance through various means. Compliance may involve adopting project management frameworks or methodologies, using specific templates, forms and tools, or conformance to governance. The degree of control provided by this PMO is moderate.
> - **Directive**: Directive PMOs take control of the projects by directly managing the projects. The degree of control provided by this PMO is high.

This study subscribes to the notion that the enterprise management offices influence project, programme and portfolio management tiers as discussed in section 4.2 above. It concurs with the notion that the enterprise management offices assist the organisation in a variety of ways with varying degrees of involvement. These include the implementation and management of projects throughout their lifecycle, from initiation through to project close-out. When projects coalesce to form programmes, enterprise management offices ensure that governance processes are followed, the desired benefits are realised, key internal and external stakeholders are consulted, uncertainties are minimised, and a holistic view of the programme is visible to all stakeholders.

Furthermore, when programmes merge to become portfolios, enterprise management offices ensure that the appropriate programme selection strategy is utilised, stakeholder behaviour is managed, strategic objectives are realised, and ultimately that the vision, mission and values of

the organisation come to the fore. In complex project environments, enterprise management offices do more than just supply templates, enable best practices, undertake training, or assure access to information and lessons learnt. Widforss and Rosqvist (2015) hold that in a complex project environment, structure, tools and templates are less useful than governance, management support, soft skills, and experience.

4.3.1 Three Types of Enterprise Management Offices

Rathore (2010) and Behboudi and Zerrifi (2014) articulate three different kinds of enterprise management offices. The first type, called the Enterprise Project Management Office, is typical of large organisations where it aids tracking and monitoring, reporting, coordinating issue resolution, risks management, collating status reports, and aggregating financial data. The second type, named the Enterprise Programme Management Office, is operational at a programme level, overseeing multiple projects running within this programme. This type of enterprise management office assists programme managers, project managers and the project team in ensuring adherence to standardised procedures, collating project reports and assembling these for senior executives including the project sponsors. Simultaneously it identifies commonalities between projects running within the programme to ensure enterprise-wide coordination and resource management. The final type, referred to as the Enterprise Portfolio Management Office, exists at a departmental or business unit level with the purpose of aligning management to the organisational strategy and business objectives. This latter enterprise management office informs project prioritisation whilst facilitating integrated management of the entire project portfolio within the enterprise.

In terms of organisational hierarchy, the Enterprise Project Management Office, the Enterprise Programme Management Office and the Enterprise Portfolio Management Office function at operational, tactical and strategic levels respectively. They can be implemented in a wide range of industries including manufacturing, energy, information and communications technology, financial services management, and construction, to name but a few. Although the Enterprise Project Management Office and the Enterprise Programme Management Office are crucial, the Enterprise Portfolio Management Office is the most beneficial when it is implemented by a large organisation, managing multiple projects in geographically dispersed locations using shared and dedicated resources to deliver projects within scope, cost and schedule, whilst ensuring organisational efficiency, business innovation, systematic decision-making, and

benefits realisation. These characteristics are all pertinent to Transnet and Eskom. It should thus be noted that in this study the acronym EPMO strictly and solely refers to the Enterprise Portfolio Management Office. This study will now engage this concept in the subsection below.

4.3.2 The Enterprise Portfolio Management Office

An in-depth review of literature pertaining to the EPMO reveals the following: An EPMO provides centralised tools for managing and exercising oversight over multiple projects and programmes within the portfolio; and it reports to the executive management at enterprise-level to safeguard project management excellence (*Oracle Corporation, 2010*). The alternative yet comparable project management instrument would be the utilisation of multiple PMOs. These are at a sizable disadvantage *vis-à-vis* an EPMO. Traditionally, in large organisations or multinational corporations, PMOs are geographically dispersed, consequently fostering a silo mentality which is characterised by inadequate communication, lack of enterprise-wide standardisation, poor resource management and various other operational inefficiencies (McCormick, 2011). Moreover, because PMOs operate at a departmental level they are unable to articulate a holistic picture when communicating with the enterprise leadership (c-suite communication), hindering the decision-making processes that potentially impact on the entire organisation. As a result, the PMO's ability to provide enterprise-wide guidance to senior management and simultaneously attain their buy-in is undermined. In sharp contrast the EPMO addresses all these constraints and, at once, provides numerous other benefits.

In a project management environment, the EPMO grants the organisation an overall ability to identify, prioritise and execute enterprise-wide projects (Dunning and Lloyd, 2018). The EPMO allows the organisation to standardise processes, practices, techniques, and tools to ensure holistic visibility and accountability (*Oracle Corporation, 2010*). The EPMO 'does not eliminate the need for Project, Programme or Departmental level PMOs. It simply compliments these traditional PMOs' by integrating and aggregating project-related information at executive level (Rathore, 2010). Moreover, it provides a centralised entity to which the geographically dispersed PMOs will report. The *PMI (2013)* argues that, it is vital that PMOs become an extension of the organisation's culture and strategy if they are not to be labelled and rejected as an unnecessary bureaucratic layer. This warning is particularly pertinent to the EPMO since it will inevitably be subject to fierce scrutiny as a result of the level at which it operates. The EPMO must strive to improve, mature, grow, and evolve continuously, whilst providing crucial

strategic insight to the executive management (Behboudi and Zerrifi, 2014). This it must do prior to all other Departments if it is to remain indispensable to the organisation. The same applies to the EPMO staff who must endure constant skillset improvement and training to become and remain pioneers within the enterprise.

To be truly called an EPMO an entity should have an extensive programme for handling people requirements, processes, technologies, structure, and strategy for integration into the organisation's philosophy. Dunning and Lloyd (2018) refer to this as the end-to-end project process. Using such a process the EPMO identifies the most strategic projects to execute, provides the grounds for prioritising these projects so as to determine resource deployment and human capital development in order to facilitate acquiring and upgrading of essential skills. Furthermore, to earmark projects that will be utilised to pilot new technologies to ensure that the company is technologically savvy. Selecting the best projects for execution, whilst accounting for external variables, can therefore be done using an accomplished and all-rounded project management approach. Projects are thereafter executed using this educated methodology that has survived a rigorous assessment, thus assuring stakeholder confidence in project success and organisational prosperity.

Project success does not culminate at handover to the project owner. Ideally, the project management cycle should also account for project close-out, including review and the compilation of lessons learnt. Project review will give an indication as to the success of the project, whereas compilation of lessons learnt will help mature the EPMO. A progressive EPMO is able to apply lessons learnt from one project to various other projects within the portfolio. Hence project close-out is essential in gauging the ability of the organisation to implement projects and, more specifically, the ability of the EPMO to provide core services to the enterprise. If these ideals are achieved there is a higher probability that the organisation's project selection process will be well-informed and thereafter chosen projects will be delivered within the scope, budget and agreed timelines. It is imperative that an integrated approach to project identification, prioritisation, planning, authorisation, execution, close-out, review and utilisation of lessons learnt be agreed, documented and inculcated within the entire organisation including staff, management and all other stakeholders to ensure consistency in application. An integrated approach will thus clarify the roles and responsibilities of the EPMO including all other stakeholders that interact with it.

4.3.3 Key Characteristics of the Enterprise Portfolio Management Office

Gurtu (2010) has proficiently identified key characteristics that a successful EPMO must exhibit. This study now turns to discuss these characteristics which have been adapted from Gurtu, bundled into a set of ten considering coherency, and thereafter articulated using other supporting literature. Arguably the most essential property of an EPMO is ensuring that senior executives and key stakeholders have bought into the concept. This will ensure that the EPMO is strategically positioned as an agent of change by attaining organisation-wide support (Behboudi and Zerrifi, 2014). Moreover, it will reduce or eliminate unnecessary delays pertaining to resource deployment and funding reluctance.

Second, an EPMO must have an integrated project management plan with goals, objectives and milestones. Moreover, there should be a willingness to change these should the company's strategy change. This integrated plan should, at various levels, account for all projects within the entire portfolio to allow standardised cross-organisation measurement, thus ensuring meaningful articulation and comparison of information. A well drafted project management plan also accounts for the most important resource within an organisation, i.e. human capital.

Third, it is imperative for an EPMO to set adequate measures for project prioritisation to ensure that the best resources are assigned to the highest priority projects (Langley, 2010) and thereafter the setting of realistic timelines and expectations for project execution has to be determined. This also means avoiding the temptation to undertake more projects than can be executed. In addition, the organisation should not undercut human resource training and development. Industry research indicates that lack of finance is hampering professional training in the workplace (Langley, 2010). The likelihood of projects exceeding the scope, cost and schedule parameters will likely increase if this trend persists, which will inevitably hamper the organisation's bottom line. There is a pressing need to 'develop and nurture the right technical, strategic, business-management and leadership skills and capabilities within the organisation' (Behboudi and Zerrifi, 2014: 03).

The fourth characteristic, which – as far as human capital is concerned – bears close correlation with the third as outlined above, is that a well-respected and well-positioned EPMO is able to attract and retain the best resources in the industry and allow deployment of these resources to the highest priority projects in order to promote success (Ward and Illingworth, 2013). Deploying the best resources to high priority projects is envisaged to add value within the project management environment as well as to the organisation in general.

The fifth characteristic is that an EPMO must have comprehensive governance and decision-making processes, and at the same time provide consultancy and advisory services including business case development and review, cost-benefit analysis, risk management, post-implementation reviews, mentoring and evaluation, resource management, and multi-project scheduling and planning (Ward and Illingworth, 2013). The EPMO must be able to use its diverse set of skills to empower the organisation, to enable it to be agile enough to handle the complicated project, programme and portfolio management environment.

The last five characteristics as adapted from Gurtu can be summarised as follows. The EPMO must utilise a standardised set of reporting and measurement tools to allow for cross-organisational comparison and consistency in project reporting and evaluation. It must have an organogram as well as roles and responsibilities clearly set-out, thus ensuring that all human resources are aware of their functions, and that critical functions are occupied by the best performing resources within the organisation. There needs to be regular liaison between the EPMO and the entire organisation, allowing for continuous strategic alignment and EPMO mandate reviews (Julian, 2008). There must be regular progress review sessions allowing for revision of lessons learnt and respective organisational adaptations (Julian, 2008). Lastly, the EPMO should be able to minimise project-related risk, thus allowing the organisation to conclude projects within the scope, schedule and cost targets (Ward and Illingworth, 2013).

4.4 Chapter Summary

This chapter has reviewed the tenets of project management, programme management and also portfolio management. It has outlined how projects coalesce to form programmes which in turn merge to form portfolios. This is a management style that is widely used in the project management environment in which Eskom and Transnet operate. Thereafter, it discussed how the Enterprise Project Management Office, the Enterprise Programme Management Office and the Enterprise Portfolio Management Office functioning at operational, tactical, and strategic levels respectively, are influenced by project, programme and portfolio management tiers discussed earlier. The study then engaged the Enterprise Portfolio Management Office as the management office which exhibits the most authority within an organisation. These concepts played a vital role in informing the framework that developed.

Chapter Five: Existing Models and the Proposed Conceptual Framework

5.1 Introduction

This chapter will review a range of existing models in the project management discipline to illustrate a gap in literature. Importantly, the chapter will indicate what is missing from the present literature as justification for the present study. After presenting core elements of the existing project management models, a rudimentary conceptual framework will be proposed. The study will justify how elements discussed in chapters three and four can be synthesised to produce a conceptual framework that is better able to address the central research question. It does this by accounting for all project management constraints that have the potential to affect Transnet and Eskom, as discussed in chapter three. It then integrates this with the enterprise management offices functioning at project, programme and portfolio levels within the organisation, as discussed in chapter four, and summarised by figure 4.2 above. The proposed framework is an expression of these key project management concepts, which provide invaluable guidance to this research study.

5.2 Existing Project Management Models

A range of models applicable to the discipline of project management can be found within existing literature. Han *et al.,* (2013) developed a system dynamics model aimed at better understanding the complex nature of design errors and their negative impacts on project performance. They argue that a project management team tends to show optimistic biasing in estimating schedule delay recovery strategies, and as a result the project team underestimates the negative repercussion emanating from hidden design errors on schedule performance (Han *et al.*, 2013). The model is aimed at assisting construction managers understand the dynamics of design errors. Considering the disciplines discussed above in chapter three, this model only considers two – i.e. schedule and quality. Other disciplines are not accounted for. As such, it cannot address the primary research question and it shall not be considered for utilisation.

The challenging nature of assessing quality of construction compliance led Kalyan *et al.,* (2016) to highlight the potential advantages and limitations for new, faster, inexpensive, and easy to use three-dimensional modelling technology to streamline the quality control process. Meanwhile, Ko (2017) proposed a lean building design model aimed at improving design quality, based on the lean production system principles of the Toyota Production Systems

philosophy. As articulated in subsection 3.2.1.4 above, reporting on the status of project quality is, without a doubt, key to ensuring that stakeholders have sight of how the organisation is adhering to standards – encompassing the quality of design, the quality of process, and the quality of the organisation – to fulfil acceptable delivery objectives throughout the lifecycle of a project (Basu, 2012). Moreover, reporting on the status of project quality assures management that project quality management processes – comprising activities regulating quality policies, objectives, roles, and responsibilities during project execution (*PMI, 2013*) – satisfy the needs of the project. However, according to the project management 'iron triangle', including numerous spin-offs thereof, cost, schedule, scope, quality, and resources can never be divorced since these project management constraints interact in such a way that one cannot be altered without fundamentally affecting the others. In view of the foregoing, the models proposed by Kalyan *et al*., (2016) and Ko (2017) fail to address the research questions because they only consider one project management constraint – i.e. quality.

Chandra (2015) proposes a structural equation model aimed at investigating natural, design, resources, financial, legal, regulatory, and construction risk factors that have a potential to affect project success. Meanwhile, a risk management model enabling project owners to enlist the services of experts in improving construction project quality and performance whilst simultaneously excluding project owner decision-making was developed by Algahtany *et al.,* (2016). Risk management is an important discipline in project management since risks are present in all projects, emanating from uniqueness, complexity, change, assumptions, constraints, dependencies, and people within and outside the project (Hillson, 2004). The presence of risks in projects do not affect all of the project in the same manner (Thamhain, 2013). Risk management needs to be planned, so that risks can be holistically identified, analysed, responded to, monitored, and controlled (*PMI, 2013*). However, as mentioned above, the inextricable connections between scope definition and risk management, as highlighted by Le *et al*., (2009), is just a tip of the iceberg. Cost, schedule, scope, quality, resources, risk, health, safety, environment, document management, procurement, and contract lifecycle management as project management constraints are connected in a number of ways yet to be truly studied and understood.

Meanwhile, Gudienė *et al*., (2013) developed a conceptual critical success factors model for construction projects in Lithuania. The model describes seven major groups of factors that influence project success. The first group is external factors, including economic, social, political, physical, technological, legal, cultural, and nature ecological environments. The

second group is institutional factors, including construction permits, construction regulations, product and service certification, and standards. The third includes project-related factors such as value, size, realistic objectives, profitability, risk, and adequate resources. The fourth accounts for project management-related factors such as relevant past experience, competence, troubleshooting, risk identification and allocation, technical capability, and personnel issues. The fifth considers project manager-related factors such as competence, experience, technical capability, delegation of authority and responsibility, perception of roles and responsibilities, trust, and contract management. The sixth group includes client-related factors such as experience, type, size, goals and objectives, risk attitude, and ability to participate in different phases of the project. The final group is contractor-related factors such as company characteristics, technical and professional capability, experience, work conditions, advanced technologies, and extent of subcontracting. Even though numerous elements within this model should be reported on during the lifecycle of the project, this framework is aimed at determining factors which, when present or absent within a project, affect its success rate. Therefore, it cannot be used to achieve the objectives of this research study.

Dunović *et al.,* (2014) move towards a new model of complexity in the case of large-scale infrastructure projects. They explore the current view on project complexity and its development through history in an attempt to investigate perception and elements of complexity. In defining a new structure of project complexity as basis for a new model, they conclude that existing models in this area are not sufficient since they do not consider the holistic nature of project complexity. Upon review of this model, the complex nature of the project management environment, as alluded to by Dunović *et al*., is indeed one of the reasons why this study has been commissioned. It attempts to develop a framework for project status reporting in South African SOCs which considers the holistic nature of project complexity. Literature reviewed in chapters two, three and four is an example of the complex nature of the environment in which these organisations operate.

Hajdu (2013) utilises two scheduling models on a single project in a quest to ascertain the relevance of models for real life application. The argument here is that scheduling models are not adequate should it be the case that all possible trade-offs that occur within the complex projects are investigated and relevant connections made. Subsection 3.2.1.2 demonstrated the importance of the project schedule as a timetable containing activities, milestones and deliverables for the entire project, reflecting all the work that is to be completed during the lifecycle of the project – from inception through to close-out. Moreover, it emphasised the use

of dedicated software by the project management teams to manage, update, revise, and track the project schedule. However, upon review of the model by Hadju, one would have to discount it since it only considers one project management constraint, but does so from multiple perspectives. Hence it is only useful at focusing on the schedule management and reporting, and does not realise other objectives of this study.

From the models currently present within the discipline of project management, it can be seen that there is no model that facilitates formalised project status reporting pertaining to large, geographically dispersed SOCs tasked with executing megaprojects of strategic importance. Evidence of this can be seen in the reviewed secondary literature. This subsection demonstrates this. The preceding chapters two, three and four also provide further evidence of this. Hence section 5.3 develops this framework. It does this by accounting for all project management constraints that have the potential to affect Transnet and Eskom, as discussed in chapter three. Thereafter, it integrates this with the enterprise management offices functioning at project, programme and portfolio levels within the organisation, as discussed in chapter four, and summarised by figure 4.2 above.

5.3 Proposed Conceptual Framework

The premise of this study is that the challenges of holistic project status reporting may be addressed by development and subsequent utilisation of a project status reporting framework. The proposed conceptual framework, shown in figure 5.1 below, is premised on the literature reviewed in the preceding chapters three and four. As secondary data were engaged it became apparent that a framework of this nature may indeed satisfy the objectives of this study if it is capable of achieving the following results: To formalise project status reporting; to consider and account for all the project management constraints to give internal and external stakeholders a holistic view during project status reporting; to eliminate bureaucratic project management structures as a factor that has a potential to negatively affect reporting; and, finally, to show the potential that enterprise management offices have in improving accurate and holistic stakeholder feedback. This rudimentary conceptual framework is an expression of the key concepts in project management that have provided guidance to this research study in the preceding chapters.

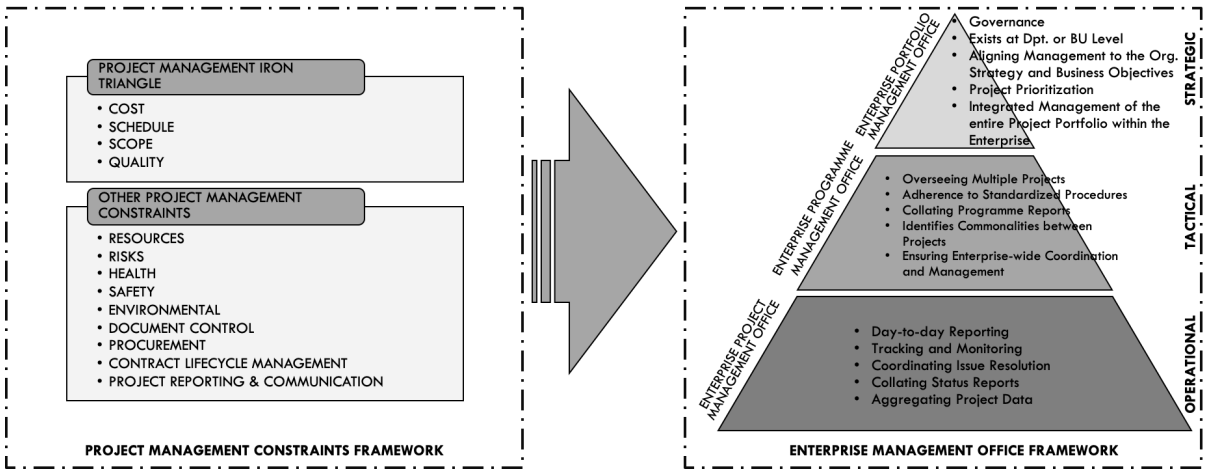


Figure 5.1: A diagrammatic representation of the proposed conceptual framework for holistic project status reporting in South African SOCs

Source: The Researcher, 2019.

In an attempt to understand the daunting nature of developing a conceptual framework for project status reporting in South African SOCs, this study has unpacked the project management constraints that should form the basis of this framework, using the project management 'iron triangle' as its foundation. On the left, the framework utilises this foundation to show that stakeholders within Eskom and Transnet may need to be informed of a variety of other project management constraints during the lifecycle of all projects. These include resources, risks, safety, health, environment, document control, procurement, management of project-related contracts, and project reporting and communication. As such, the framework that is being developed must consider these. It is important to note that these project management constraints are not exhaustive. They will be re-evaluated subsequent to the collection and analysis of primary data.

On the right, the proposed framework depicts the utilisation of the Enterprise Project Management Office, the Enterprise Programme Management Office and the Enterprise Portfolio Management Office functioning at operational, tactical, and strategic levels respectively. The enterprise management offices influence project, programme and portfolio management tiers, as discussed in chapter four above. They fulfil a variety of roles and have distinct strengths, weaknesses and characteristics. As such, they assist the organisation in a variety of ways with varying degrees of involvement, depending on the nature of the project, programme or portfolio under consideration. Therefore, within the proposed conceptual

framework, enterprise management offices may be used to report the status of all constraints under each project, programme or portfolio, depending on the internal and external stakeholder needs at Transnet and Eskom.

5.4 Chapter Summary

Existing project management models were reviewed in this chapter to illustrate a gap in literature. The chapter provided an indication of what is missing from the present literature as justification for the present study. After presenting core elements of the existing project management models, a rudimentary conceptual framework was proposed. The study justified how elements discussed in chapters three and four can be synthesised to produce a conceptual framework that might be appropriate for addressing the central research question. The proposed framework accounts for project management constraints that have the potential to affect Transnet and Eskom, as discussed in chapter three. Thereafter, it integrates this with the enterprise management offices functioning at project, programme and portfolio levels within the organisation, as discussed in chapter four. It is important to note that this conceptual framework is not exhaustive, it will be re-evaluated subsequent to the collection and analysis of primary data. This rudimentary framework is an expression of the key concepts in project management that have provided guidance to this research study.

Chapter Six: Research Methodology

6.1 Introduction

The aim of this chapter is to provide an in-depth account of the research methodology that was used to collect and analyse data in a manner aimed at addressing the research questions. This chapter is structured in the following manner. First, it will discuss the research design and approaches. Thereafter, the rationale for choosing a qualitative research methodology is considered. The means used to ensure data trustworthiness will then be deliberated. A consideration of the three types of population that any research study should consider so as to curtail sampling bias then follows. A clear definition and identification of the research population is important because it guides the reader in apprising sampling credibility, the techniques used and the outcomes of the research study (Asiamah, Mensah and Oteng-Abayie, 2017). After the research population, this chapter will then touch on the sampling strategy used. The overview of how respondents were contacted and interviews administered immediately follows. This chapter then moves on to discuss how the data collection methodologies were correlated to achieve the purpose of the study and, subsequently, how data were analysed and presented. A concise outline of the ethical considerations which are key to any research collecting primary data immediately follows. Finally, key points of discussion are reiterated as a concluding summary.

6.2 Research Design

A research design is the overall strategy that is used to collect, measure and analyse data to ensure that research questions are effectively addressed in a coherent, logical and comprehensive manner. It is the blueprint that has been designed to find answers to the research questions. Choosing the appropriate research design is determined by a number of factors, such as the objectives or purpose of the research study, the researcher's skills and expertise, the available budget and inherent cost implications, the allotted time for data collection, the availability of the research sample, preferences and values pertaining to the research study, as well as ethical and legal considerations (Lancaster, 2005). Therefore, this study took the said factors into account during the selection of an appropriate research design for developing a project status reporting framework. A research design of this nature helps the study gain an understanding of the fundamental motivations, reasons and opinions necessitating development

and utilisation of a framework. With these factors in mind, the researcher chose a phenomenological research design.

Phenomenological research requires the researcher to 'invest time and effort' aimed at observing and listening to the research subjects in their natural setting (Robson and McCartan, 2016). In this study, phenomenology is an approach to qualitative research that focuses on the commonality of a lived experience within a group of analysts, reporting coordinators and reporting managers. The fundamental goal of this approach is to arrive at a description of the nature of the particular phenomenon (Creswell, 2014), viz. conducting project status reporting within the organisation; utilising established processes to collect, collate, validate, and disseminate projects status reports within these organisations; and ensuring reporting to internal and external stakeholders is accurate, and that all the elements that should be reported are accounted for. The data is then read, reread and culled for like phrases and themes that are then grouped to form clusters of meaning (Creswell, 2014). This technique was used to construct the universal meaning of project status reporting and to arrive at a more profound understanding of the phenomenon, in order to develop a holistic framework.

In order to propose a cogent project status reporting framework, the chosen research design must be able to achieve the following:

i. Identification of the reporting processes currently in existence;
ii. Identification of the outcomes of the existing project status reporting processes;
iii. Identification of the key variables of the reporting processes that have been put in place to assure accurate flow of project status information to internal and external stakeholders;
iv. Articulation of the challenges emanating from the existing project status reporting processes; and
v. Evaluation of whether or not the proposed project status reporting framework is suitable, and whether it is able to overcome the challenges that have been identified.

6.3 Research Approaches

6.3.1 Utilised Research Approaches

There are numerous research approaches that can be utilised when conducting research, such as qualitative, quantitative, literature review, interview, observational, experimental, and so forth (Blumberg, Cooper and Schindler, 2005). Of these research approaches, this study utilised

four, namely qualitative research, literature review, interview, and observation research. These research approaches were considered sufficient for the purposes of gathering data aimed at developing a framework. Prior to the framework being developed, a critical evaluation of existing models and frameworks was undertaken to ascertain one that is most suited to assuring holistic project status reporting within large, geographically dispersed South African SOCs. After this exercise was undertaken, it was found that no existing model or framework considered all project management constraints that are the basis of holistic project status reporting. Instead, the search uncovered a model known as the project management 'iron triangle', which was subsequently used as a foundation for addressing the primary research question.

Qualitative research typically utilises four methods for collecting data, namely participating in a setting, observing directly, interviewing in-depth, and analysing documents and material culture with varying emphases (Marshall and Rossman, 2016). Of these data collection methods, this study predominantly utilised the latter two – in-depth interviews and document analysis. Considering the secondary research questions, secondary literature was engaged to better understand the underlying dynamics within Eskom and Transnet, the project environment in which they operate, the function of the enterprise management offices at various levels of such organisations, and the broader landscape. After this foundation had been established, a three-part interview guide, as discussed below, was developed to collect primary data. With regard to the former two qualitative research methods – participating in a setting and direct observation, they were merely used to generate information that was useful in complementing the primary data collection methods.

Developing the proposed framework considered the following factors. First, it had to articulate the shortcomings of the existent frameworks, which cannot happen without an in depth understanding thereof. Thereafter, existing literature on the discipline of project management was engaged with and evaluated to build upon the 'iron triangle'. The next step was to understand the underlying reasons and motivations for inclusion of the identified project management constraints towards development of a new framework. After this exercise was undertaken, it was complemented by the collection and analysis of primary data, during the gathering of which, observation research was also undertaken to better understand existing project status reporting processes and challenges thereof. Moreover, the study was cognisant of the implications that the resultant framework would have on stakeholders.

6.3.2 Interview Guides (Primary Data)

The study utilised an empirical design employing both primary and secondary data. Primary data were collected using two methodologies. Self-administered, semi-structured interviews targeting the identified research sample were undertaken as well as observation research. Development and structuring of interview guides was informed by observation research and, thereafter, by an analysis of secondary data. The interview guides that were utilised were divided into three parts (see *Appendix 2*). Part 1 outlines the respondents' background to help the research study with locating the sample in the realm of project status reporting. Part 2 elicits information pertaining to the project management environment that the sample was drawn from at the time to help establish the variables of that environment. Part 3 interrogates project status reporting processes and assesses outcomes and challenges thereof. Hence questions contained in the interview guide were aimed at identification, description, investigation, and evaluation of key variables and challenges of the project status reporting processes. This plays a fundamental role in ensuring the development and evaluation of a framework suitable for application within the SOCs that are the subject of this study.

There are numerous advantages and disadvantages pertaining to the use of interview guides as a data collection method (Lancaster, 2005). On the positive side, interview guides can provide depth and complexity, can be adapted to particular circumstances, and are simple to utilise. On the negative side, they are open to respondent bias, can be difficult to analyse, and can provide unreliable data under certain circumstances. This study took these factors into consideration during collection and analysis of primary data. The positives are indeed the reason why this method was chosen as the primary data collection method. With regard to the negatives, triangulation – as discussed in section 6.5 – was used and NVivo software – as will be discussed in section 6.10 – was enlisted to assist with data analysis. The interview guides were structured in such a way that they would play a fundamental role in both the development of a project status reporting framework and, likewise, assessment thereof, for applicability within Eskom and Transnet considering the complex environment in which these organisations operate.

6.3.3 Observation Research (Primary Data)

Observation research requires the researcher to 'invest time and effort' aimed at observing and listening to the research subjects in their natural setting in order to generate information that will be useful in complementing other techniques (Robson and McCartan, 2016). A hybrid of

participant and non-participant, semi-systematic observation was used. Participant observation requires the researcher to become a member of the study group so as to conduct the study from the inside, whereas in non-participant studies the research can be conducted externally (Sarantakos, 2013). In both cases, however, the subjects may not be aware that they are being observed so as to prevent undesirable behavioural changes. Semi-systematic observation lies in the continuum of systematic and unsystematic observation. Systematic observation is specified and planned in advance since it is

> '…a formal and strictly organised procedure with a set of well-defined observation categories, and is subjected to high levels of control and standardisation' (Sarantakos, 2013: 232).

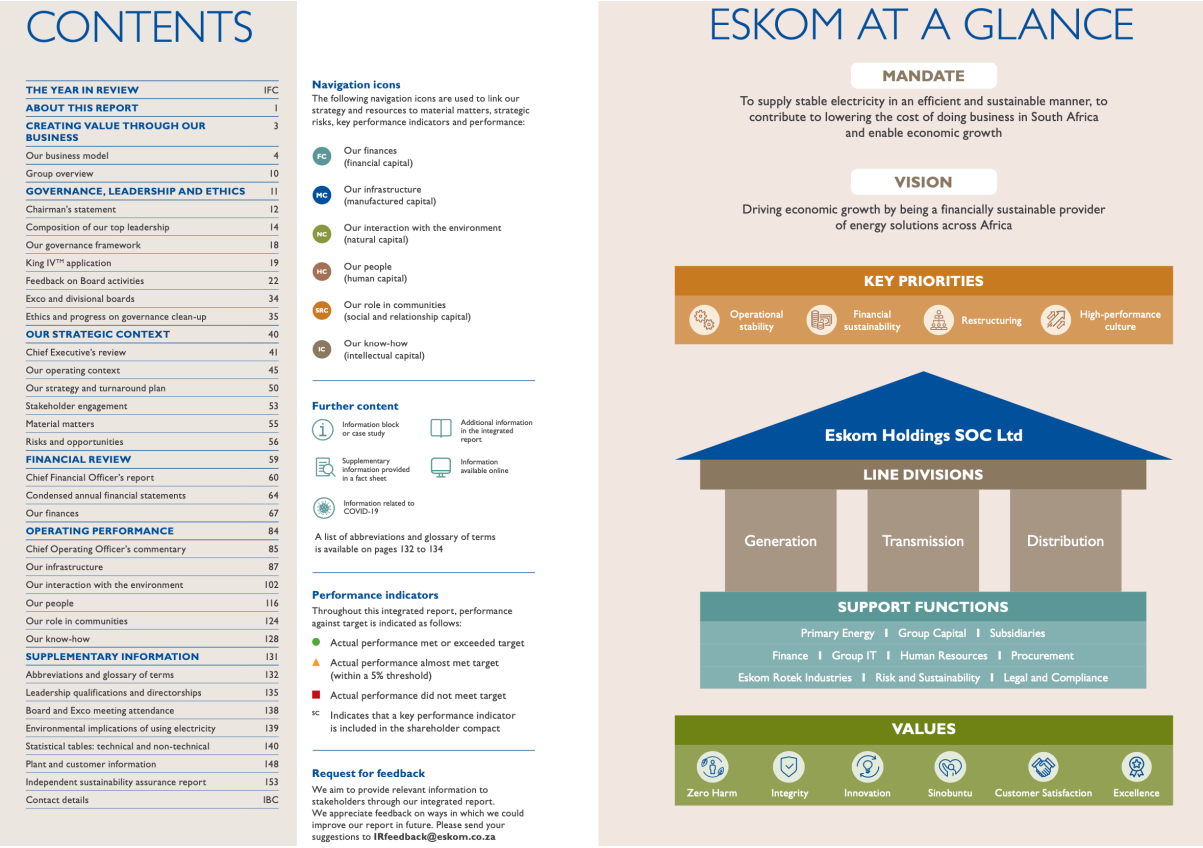
Whereas, unsystematic observation is loosely organised and the process of observation is largely left to the observer (Lancaster, 2005).

6.3.4 Content Analysis

Content analysis should cover the 'complete content of the particular construct being measured (Maree, 2012). In assessing content validity, one compares the content of the items under observation with relevant content domain of the construct being measured (Wagner, Kawulich and Garner, 2012). In this study, content analysis was aimed at rationalising the main research question. In particular, it illuminated the project management constraints that should be considered during a move towards holistic project status reporting within SOCs, as discussed in chapter three. Moreover, in accordance with observation research, it informed the structuring of self-administered, semi-structured interviews.

The *Eskom Integrated Reports* and the *Transnet Integrated Reports* both from 2012 to 2020, as indicated by figures 6.1 and 6.2 below, are key documents whose content was analysed to determine factors that are of principal importance within reports published by these SOCs. The *2020 Eskom Integrated Report* is a consolidation of key information from the *Annual Financial Statements* and the *Foundation Report* of the same year (*Eskom, 2020*). Likewise, the *2020 Transnet Integrated Report* is an amalgamation of vital information from the *Annual Financial Statements*, *Sustainability Report* and the *Operating Division Report* also of the same year (*Transnet, 2020*). These reports demonstrate that cost, social capital, health, safety, environmental factors, and risk, are some of the project-related themes included in reports published by these organisations. Hence a project status report must take these into account. To inform the holistic project status reporting framework proposed by this study, project-

specific secondary data is, thereafter, used to shed light on these and other identified project management constraints.



CONTENTS

Navigation icons

The following navigation icons are used to link our strategy and resources to material matters, strategic risks, key performance indicators and performance:

- FC Our finances (financial capital)
- MC Our infrastructure (manufactured capital)
- NC Our interaction with the environment (natural capital)
- HC Our people (human capital)
- SRC Our role in communities (social and relationship capital)
- IC Our know-how (intellectual capital)

Further content

- Information block or case study
- Additional information in the integrated report
- Supplementary information provided in a fact sheet
- Information available online
- Information related to COVID-19

A list of abbreviations and glossary of terms is available on pages 132 to 134

Performance indicators

Throughout this integrated report, performance against target is indicated as follows:

- Actual performance met or exceeded target
- Actual performance almost met target (within a 5% threshold)
- Actual performance did not meet target
- SC Indicates that a key performance indicator is included in the shareholder compact

Request for feedback

We aim to provide relevant information to stakeholders through our integrated report. We appreciate feedback on ways in which we could improve our report in future. Please send your suggestions to **IRfeedback@eskom.co.za**

ESKOM AT A GLANCE

MANDATE

To supply stable electricity in an efficient and sustainable manner, to contribute to lowering the cost of doing business in South Africa and enable economic growth

VISION

Driving economic growth by being a financially sustainable provider of energy solutions across Africa

KEY PRIORITIES

Operational stability | Financial sustainability | Restructuring | High-performance culture

Eskom Holdings SOC Ltd

LINE DIVISIONS

Generation | Transmission | Distribution

SUPPORT FUNCTIONS

Primary Energy | Group Capital | Subsidiaries
Finance | Group IT | Human Resources | Procurement
Eskom Rotek Industries | Risk and Sustainability | Legal and Compliance

VALUES

Zero Harm | Integrity | Innovation | Sinobuntu | Customer Satisfaction | Excellence

Figure 6.1: The Eskom Integrated Report for 2020

Source: Eskom. 2020. *Integrated Report* [Online]. Available: www.eskom.co.za/IR2017 [Accessed 24 March 2021].

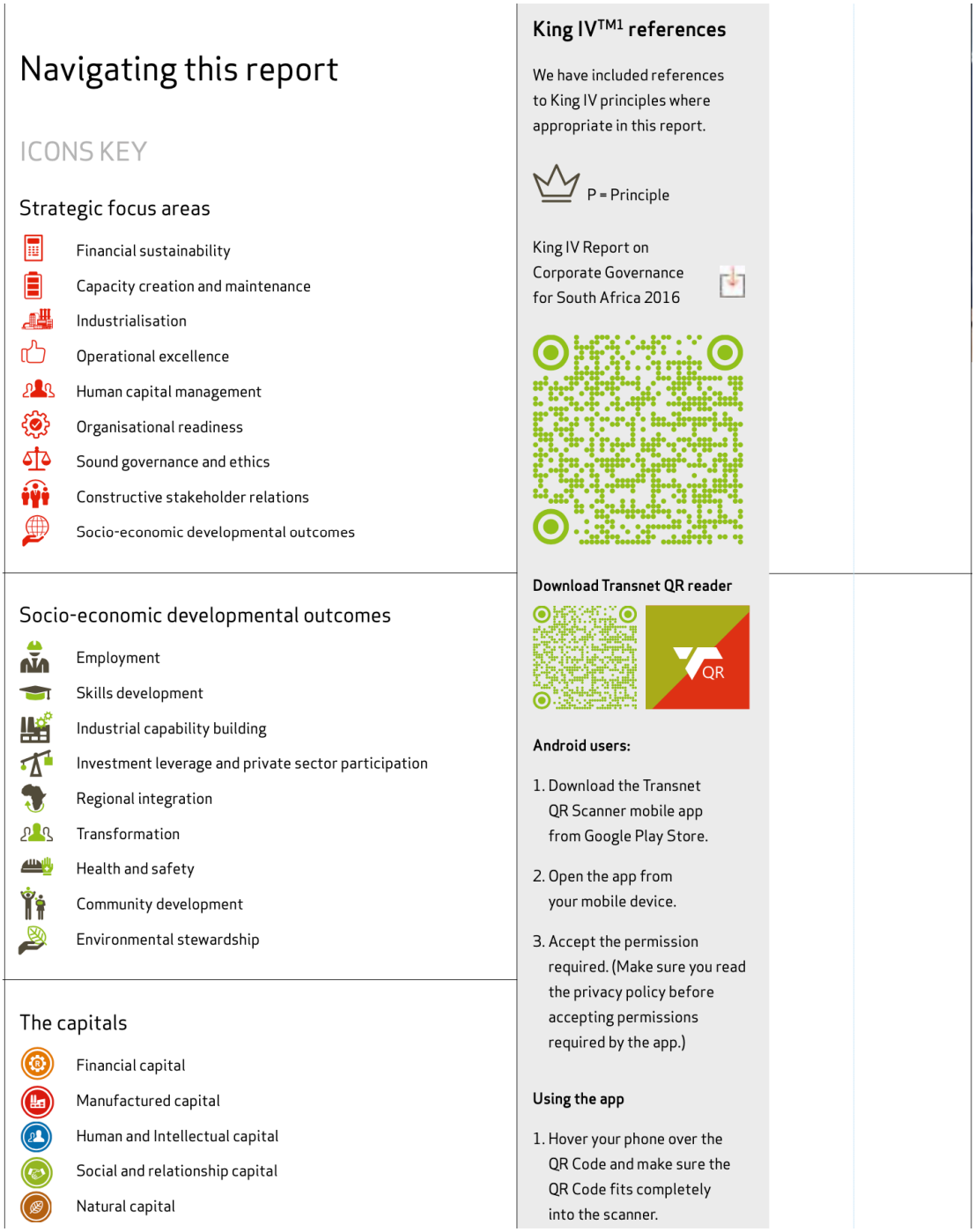


Figure 6.2: The Transnet Integrated Report for 2020

Source: Transnet. 2020. *Integrated Report* [Online]. Available: www.transnet.net [Accessed 24 March 2021].

6.3.5 Secondary Data

Peer-reviewed articles, books and online data sources as secondary data sources were specifically analysed with the aim of uncovering and understanding the following: The background in which Transnet and Eskom operate; the most prominent governmental stakeholders that influence the business conducted by these organisations; the types of projects they execute; and the broader issues, all discussed in chapter two. Secondary data will also be used to elucidate, enrich and deepen the understanding of holistic project status reporting as discussed in chapter three and to understand the tenets of project management, programme management as well as portfolio management, as discussed in chapter four – which outlines how projects coalesce to form programmes which in turn merge to form portfolios. They were also used to determine project management models currently in existence which were reviewed in chapter five in order to illustrate the literature gap. Furthermore, secondary data supplemented primary data to ensure the full clarification of the third, fourth and fifth secondary research questions as will be discussed in chapter seven.

6.4 Rationale for Choosing a Qualitative Research Approach

This study is qualitative in nature. Atieno (2009: 16) maintains that qualitative research should be used 'if the purpose is to construct a theory or a theoretical framework that reflects reality rather than the researchers own perspective or prior research results.' According to Maylor and Blackmon (2005), qualitative research allows the study's research questions to emphasise the understanding of a particular issue. Whereas according to the views espoused by Lancaster (2005: 67-68), some of the characteristics and benefits of qualitative research which are relevant to this study are that it is holistic, used for theory generation and that it assumes a dynamic reality of the construct being measured. Therefore, a qualitative research approach was viewed as the most suitable for uncovering insights and gaining a better understanding of the components that should be considered during the development of a project status reporting framework. Moreover, qualitative research lends itself to small sample sizes, as is the case in this research study.

On the subject of business research approach, Blumberg *et al.,* (2005: 124) argue that any choice for either a quantitative or a qualitative study reflects the preferences, capabilities and experiences of the researcher rather than reflecting 'a general idea about which type of research is more useful'. Furthermore, they state that…

> ‘It must be emphasized that one cannot decide whether qualitative or quantitative studies are better or more useful. It is important to note that there are no predeterminates for the appropriateness of either a qualitative or quantitative study. Although quantitative studies seem to be more common in economics and qualitative studies in anthropology. Further, in many social sciences, such as management studies, sociology, psychology, and so on, there is no such clear predominance of qualitative or quantitative studies. Similarly, a new investigation often starts with qualitative studies exploring new phenomena and, later on, quantitative studies follow to test the validity of propositions formulated in previous qualitative studies. Although this approach is often observed in chronologically ordered studies on one phenomena, this should not give the idea that quantitative studies are never explorative, or that it is ridiculous to combine qualitative study and tests of propositions or validity assessment’ (Blumberg *et al.*, 2005: 124).

6.5 Data Trustworthiness

Somekh and Lewin (2005: 349) argue that validity is a ‘term used to claim that research results have precisely addressed research questions.’ Similar to data validity, data trustworthiness is aimed at ensuring that the study accurately gauges the concept it is supposed to, and not some other concept, to strengthen the conclusions, inferences and propositions made (Mohajan, 2017). This study adhered to the six-step process recommended by Creswell (2014) to ensure validity of qualitative research. The first step entailed organisation, preparation and evaluation of secondary data which was done in chapters two to five. Thereafter, the data were assessed to gauge the overall meaning, which led to a rudimentary conceptual framework being proposed in figure 5.1. The third step was to code the primary and secondary data, which was done through the NVivo software discussed in section 6.10. Step four was to then use the codes generated in the prior step to generate themes and descriptions for analysis. During step five, narrative passages are then used to convey the findings for analysis, which was done in chapter seven. The final step is to interpret the meanings and descriptions for themes, done in chapter eight.

There are four main types of validity, namely face, content, criterion-related, and construct (Drost, 2011; Mohajan, 2017). The latter can be further subdivided into convergent validity and discriminant validity. Other types of validity are statistical conclusion, internal, external, translation, ecological, concurrent, and predictive (Drost, 2011; Mohajan, 2017). Of these types of validity this study utilised content, construct and face.

Content validity is aimed at ensuring that the study includes all the right items in developing the framework for project status reporting in South African SOCs, so that data saturation is achieved. This was done by constructing an interview guide which aimed to assist in both the

development and assessment of the conceptual framework for application within these organisations. Prior to collecting primary data, Eskom and Transnet, their key stakeholders and the broader landscape were reviewed in chapter two. Thereafter, project management disciplines were evaluated during literature review in chapter three as encapsulated in figure 3.1. Chapter four reviewed the tenets of project, programme and portfolio management, a management style widely used in the project management environment in which these organisations operate for inclusion in the framework. Subsequent to primary data collection and analysis, the sources of themes pertaining to project management constraints that were included in order to develop a holistic projects status reporting framework are encapsulated in figure 8.2. Moreover, subsection 8.3.2 rationalises and expounds these themes, whereas subsection 8.3.3 rationalises the use of project management offices responsible for project reporting and communication.

Construct validity was used to ensure that the correct construct – a framework for project status reporting in South African SOCs – was formulated. According to Mohajan (2017) construct validity is appropriate for the construction of theories to better comprehend, justify and predict behaviour. It enables the study to generalise about the construct of interest, to ensure that the researcher is truthful in labelling that construct. As alluded to earlier, construct validity has two elements, convergent validity and discriminant validity. In this research study, only convergent validity was used. It was used first in chapter three to review literature pertaining to the *Eskom Integrated Reports* and the *Transnet Integrated Reports* both from 2012 to 2018, as indicated by figures 6.1 and 6.2, to determine disciplines that are of principal importance within reports published by these SOCs. *A Guide to the Project Management Body of Knowledge*, 5th ed. published by the PMI, a leading global project management association, was then used to elucidate various other project management disciplines not included in the *Integrated Reports*. Moreover, peer-reviewed literature was also collected to investigate document control and contract lifecycle management as emerging disciplines. Figure 3.1 encapsulates the aforementioned. Thereafter, convergent validity was used to assess whether or not the themes in primary data agreed with other related material in secondary data regarding the prominent project management themes. Figure 7.19 encapsulates this, following the analysis and discussion of prominent themes in primary data versus those in secondary data.

Face validity is the simplest, least precise and least scientific of all the measurements of validity. However, if it is used to supplement other existing forms of validity discussed above, as was done in this research study, it does add value. Face validity is used to determine whether

or not the measure appears to evaluate the intended construct. In this form of validity, the researcher simply looks at the items in the research instrument and estimates if the items appear to accurately measure what they are trying to measure. Prior to any research study being conducted, as a point of departure, the researcher explores and scrutinises secondary literature in the field of interest. Appropriately secondary literature pertaining to Eskom and Transnet, their key stakeholders and the broader landscape was reviewed in chapter two. In chapter three, holistic project status reporting was undertaken to understand the project management disciplines that affect projects executed by Eskom and Transnet. In chapter four, the project, programme and portfolio management style widely used in the project management environment in which these SOCs operate was evaluated. Considering the aforementioned, chapter five reviewed existing models in the field of project management which would fill the perceived theoretical gap. Bearing in mind the tenets of face validity, this culminated in the proposal of a conceptual framework shown in figure 5.1 to fill this gap.

Reliability is a measure of consistency. It is the ability to measure a construct reliably under similar conditions that consist of the same respondents. (Wagner *et al*., 2012). Consistency or precision in measurements talks to the repeatability of measurements and to whether or not the data collection techniques and analytical procedures would reproduce consistent findings if they were repeated on another occasion or if they were replicated by another researcher (Drost, 2011). This study employed internal reliability. This type of reliability essentially utilises different instruments to measure the same construct. Results are then compared to ascertain whether or not they produce similar results. To ensure reliability of the main themes proposed in the study, primary data were compared with secondary data as encapsulated in figure 7.19 below. It can be seen that some of the themes were exclusively identified during the analysis of primary data, whereas others were solely identified during the review of secondary data. However, considering the principles of triangulation which may be used to ensure the coherent justification for themes (Creswell, 2014; Fink, 2003), the majority were present both in the primary and secondary data.

In their entirety, self-administered, semi-structured interviews, observation research, analysis of secondary data, and methodical collection and analysis of primary data are a set of strategies that were used to enhance the data trustworthiness within the proposed framework. Again, the process of triangulation was used. Fink (2003) maintains that triangulation is the gathering of data from multiple sources to enhance and reinforce the validity and reliability of the propositions made by a study. It is one of the primary strategies used to enhance validity and

reliability within qualitative research (Creswell, 2014). Triangulation is considered by Hesse-Biber and Leavy (2006) as an essential check on validity of research findings. The warning by Riley, Wood, Clark, Wilkie, and Szivas (2000) that there must be theoretical or empirical justification for the choice of external comparison was also heeded by this study. Another primary strategy used to enhance validity and reliability within qualitative research, as recommended by Creswell (2014), which the researcher employed, was spending prolonged time in the field during observation research.

6.6 Research Population

A clearly defined research population guides the reader in apprising sampling credibility, the techniques used and the outcomes of the research study. To curtail sampling biases that characterise many studies, Asiamah *et al.,* (2017) outline three types of population, namely general, target and accessible, which must clearly be communicated by the researcher to the reader as part of the research methodology background. A general population is the full set of items or people under investigation (Lancaster, 2005). These individuals have a common, binding characteristic or trait. In the context of this study the general population are individuals who perform project status reporting at Transnet and Eskom. However, this definition is too broad. Therefore, the research population must be further refined for sampling purposes.

Sampling the general population may result in interviewing individuals that perform project status reporting on an *ad hoc* basis. Hence the formal role of such individuals within Eskom and Transnet is not solely dedicated towards project status reporting. One cause of such events is the bureaucratic project management structure often present within these organisations, which may include, from low-level to high-level, supervisors, project managers, senior project managers, principal project managers, project directors, principal project directors, general managers, and chief executives. These individuals may generally facilitate the sharing of project status information amongst the project team and other stakeholders, but they are not solely dedicated to this role. Consequently, their inclusion in the research sample would violate the goal, assumption and/or context of this study, and as a result may negatively impact on the research outcome. In an attempt to refine the research population, by excluding individuals that do not belong, one moves towards the second concept proposed by Asiamah *et al*., that of target population.

A target population are those ‘individuals or participants with specific attributes of interest and relevance’ and no attributes that ‘controvert a research assumption, context or goal’ (Asiamah *et al.*, 2017:1612). The target population, also known as a theoretical population, refers to an entire group of individuals or objects which meet the research criteria (Hassan, 2018). With this in mind, this study’s target population are individuals with the following characteristics: Their primary role within Transnet and Eskom is to conduct project status reporting; they utilise established processes to collect, collate, validate, and disseminate projects status reports within these organisations; and they ensure reporting to internal and external stakeholders is accurate, and that all the elements that should be reported are accounted for.

With regard to the final concept outlined by Asiamah *et al*., (2017) of accessible population, the following may be said. The accessible population, sometimes referred to as a study population, is essentially a subset of the target population. It is composed of members of the target population who are willing to participate and are available during the data collection period. It is from the accessible population that a research sample will be drawn, and to which the conclusions of the research study must apply. Conversely, one can say that the conclusions of this research study can only be generalised to the target population or to the general population. Figure 6.3 below summarises the above discussion, indicating that the accessible population lies within the target population which in turn lies within the general population.

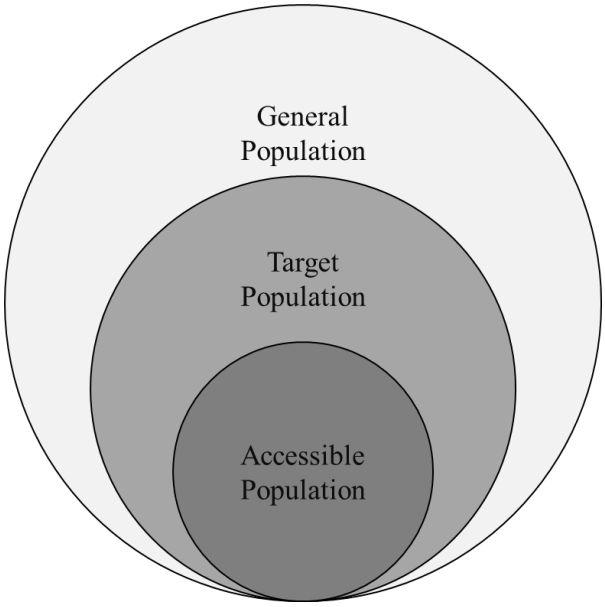


Figure 6.3: A conceptualisation of the relationship between general, target and accessible populations.

Adapted from Asiamah, N., Mensah, H. K. and Oteng-Abayie, E. F. 2017. General, Target, and Accessible Population: Demystifying the Concepts for Effective Sampling. *The Qualitative Report*, 22, 1607-1622.

6.7 Sampling Strategy

To shed light on the central research question, secondary research questions needed to be addressed by means of interviewing a sample of the accessible population. Purposive sampling was used to identify a total of twenty individuals within the SOC wherein primary data were collected. Wagner *et al.,* (2012) consider purposive sampling to be the most useful type of non-probability sampling. Due to the small, manageable size of the accessible population it was decided that a census would be best suited for this study because it is exploratory in nature. A census is a survey that aims to collect data from (each and) every member of the group being studied (Maylor, Blackmon and Huemann, 2016). It is a feasible, reliable and accurate strategy in research studies that involve small populations. One of the key advantages of conducting a census is that it provides no sampling error, since census sampling is a true measure of the entire population. Another advantage is that it increases the amount of detailed information available after data collection. In other words, it enriches the study by increasing the data collection points.

6.8 Contacting Respondents and Administration of Interviews

This study was conducted in a corporate setting. The participating SOC has offices scattered throughout South Africa. However, during the process of data collection, it was found that the respondents were located in Durban and Johannesburg. As a result, self-administered, semi-structured interviews were preferred because they enabled the respondents to complete the interviews at their own leisure and without interfering with their work commitments. Moreover, it was convenient for the researcher because of the distance between the research sites. The respondents were requested to complete the self-administered, semi-structured interviews. Thereafter, these were emailed back to the researcher alongside a signed consent letter (see *Appendix 1*).

Interview guides were emailed together with the University of KwaZulu-Natal's ethical clearance letter, the letter obtained from management granting the researcher permission to collect data within the organisation and the informed consent letter. The latter was to be signed by the respondent confirming clear understanding of the contents of the letter and the nature of the research project before the interview was conducted. Accompanying these documents was a brief overview of the research study, which was aimed at providing a background for the respondent by setting a scene for the questions that were contained in the interview guide.

6.9 Data Collection

The primary aim of data collection is to gather evidence that will later be analysed to formulate credible and adequate answers to the research questions whilst maintaining the integrity of the research (Lancaster, 2005). It is important that the usage of data collection tools be delineated so that they are used appropriately. There has to be a clear and apparent relationship between the data collection methodologies used within any study. This research study was no different. Data collection methods work in tandem, towards a similar goal, in a complementary relationship aimed at addressing the primary and secondary research objectives.

The researcher invested time and effort in observing and listening to the research subjects in their natural settings. Observation involved systematic noting and recording of events and behaviour in order to generate detailed, non-judgemental field notes with concrete descriptions of the events that were observed (Lancaster, 2005). Observation of participants occurred both in Durban and Johannesburg. Although observation research played an important support role, the primary data collection tools were self-administered, semi-structured interviews targeting

the identified research sample. The complementary relationship between data collection methods was evident between data collected by the means of interview guides, as the primary data collection method, and data collected through observation research, as was undertaken by the researcher. There was an apparent link between the two methods in the following areas:

- How the research subjects communicated missed targets or milestones to their team members;
- How the research subjects communicated missed targets or milestones to their superiors;
- The resources used to report project progress within the organisation;
- The manner in which project reporting information is validated;
- The approving parties responsible for published project status reports;
- The most important stakeholders that are involved in project status reporting within the organisation;
- The means used to ensure that similar benchmarks are used within the entire project team when project status updates are communicated;
- The measures used to deal with inaccurate information reported by the project team; and
- The fundamental differences between internal and external reports.

Although data collected using observation research methods can uncover new facts and meaning, it is only useful in complementing other techniques. This is exactly what this data collection method was used for, to corroborate primary data collected through interviews. Notwithstanding its limitations, data collected using observation research helped the researcher develop a more accomplished understanding of the context and phenomena under investigation (Kawulich, 2005). Hence it was within this space that observation methods informed the secondary research questions. To a reasonable degree, the project status reporting processes currently in existence were elucidated. Light was shed on the outcomes pertaining to these project status reporting processes. The researcher was able to understand the key variables of the reporting processes that have been put in place to assure accurate flow of project status information to internal and external stakeholders. Challenges emanating from the existing project status reporting processes were also better comprehended. This was all done in an attempt to propose a suitable and cogent project status reporting framework that is able to overcome the challenges identified.

6.10 Data Analysis and Presentation

6.10.1 Data Analysis

Hair, Babin, Money, and Samouel (2003) state that data becomes knowledge only after analysis has identified a set of descriptions, relationships and differences that are of use in decision-making. To achieve this end, thematic analysis was employed as a method for identifying, analysing and interpreting patterns of meaning ('themes') within qualitative data. NVivo is the software that was utilised to find relationships, differences and interconnectedness between the themes in the primary and secondary data, to enrich the process of thematic analysis. NVivo is a qualitative data analysis computer software program that is able to organise and analyse qualitative data to discover connections and uncover insights (Bazely and Jackson, 2014).

NVivo's versatility means that it may be employed to evaluate and cross-reference primary data with existing literature to add value to any qualitative research study. Utilisation of NVivo during data analysis can assist in the tracking of various records that are part of a qualitative study (Bazely and Jackson, 2014). These may include, but are not limited to, interviews,

> '…published research, images, diagrams, audio, video, web pages, other documentary sources, rough notes, and ideas jotted on memos, information about data sources, and conceptual maps of what is going on in the data' (Bazely and Jackson, 2014: 03).

This array of data sources were not all utilised within this research study, however, value and enrichment was derived through analysis and synthesis of all the data types that were used, light was shed on the secondary research questions and, in the end, guidance was provided towards answering of the primary research question. In the bigger scheme of things, knowledge that contributed towards the project management body of knowledge was uncovered. Analysis of relevant secondary data, a type of descriptive research (Bazely and Jackson, 2014), was chosen because it is ideal for generating data on phenomena that already exist (Fink, 2003) such as project status reporting processes as well as relevant details pertaining thereto.

6.10.2 Data Presentation

After the qualitative data were collected, coded, analysed, and its themes interpreted, a variety of techniques – some of which are available in NVivo – were used to present this data. Of the techniques available in NVivo, hierarchy charts, word clouds, word trees, and extract dialogues were used. Hierarchy charts were used to visualise emerging themes to give the reader a view of the interview questions that were used to address each secondary research question. Word clouds were used to present the frequency of occurring phrases and themes within identified

data. Word trees were used to visualise key themes aimed at addressing relevant secondary research questions to see the context surrounding the utilisation of these emerging themes. Whereas extract dialogues were used to quote directly the responses provided by the respondents which were envisaged to add value to the interview question and/or secondary research question currently under investigation.

Various other data presentation techniques that NVivo does not lend itself to were also used. These include list boxes, relationship diagrams, Gantt charts, pie charts, cycle diagrams, pyramids, and bubble diagrams. These diagrams were created with PowerPoint using data extracted from NVivo. They were specifically chosen because they were envisaged to provide a better visual appeal, which would enrich data presentation, and subsequently this research study.

6.11 Ethical Considerations

With regard to ethical considerations, first and foremost, permission to conduct the study was requested from the SOC in which the primary data were collected. This was done through a memorandum that was addressed to senior organisational management. The memorandum was recommended by the executive manager responsible for the portfolio wherein the research sample resided and also the respective general manager responsible for this portfolio, and it was sent to the human resources general manager for final approval. However, during discussions that ensued, management preferred that the organisation remain anonymous for confidentiality reasons. Despite the fact this was not ideal, to prevent the study from stalling, the request was assented to and the memorandum stipulating this was drafted and signed-off. After the organisational consent was acquired, as is protocol concerning scholarly research conducted through the institution, permission was then sought from the UKZN Humanities and Social Sciences Research Ethics Committee to conduct a study of this nature. The application was considered by the committee and granted full approval. Thereafter the process to collect primary data got well and truly underway.

In addition to the organisational permission and the approval of the UKZN's Humanities and Social Sciences Research Ethics Committee, informed consent was obtained from each and every individual that was interviewed. Informed consent is an indication that, based on the information that is provided, the potential interviewee understands the information and implications thereof with regards to the research study. Since the study collected primary data

utilising self-administered, semi-structured interview guides, the informed consent form was attached as part of the documentation that was emailed to the research group. The individuals that chose to complete the interviews were requested to familiarise themselves with the contents of the informed consent letter before signing the document. This was an indication that they understood the contents of the consent letter and are willing to participate in the study within the bounds set by this letter. Taking the above into account, the research will respect the confidentiality and anonymity of the individuals who participated in this study as well as that of the organisation to which they belong.

6.12 Chapter Summary

This chapter has outlined the overall strategy that was used to collect, collate, measure, and analyse data in a manner that addresses the study's primary and secondary research questions in a logical, coherent and comprehensive manner. First, the research design and research approaches were discussed. Thereafter, the rationale for the chosen qualitative methodology was provided. Data trustworthiness was then considered. The general, target and accessible populations as general concepts were outlined and, more importantly, these concepts were discussed in the context of this study. Discussion of the sampling strategy then followed. The strategy used to contact respondents and administer interviews was then articulated. The data collection, analysis and presentation methodologies then followed. Finally, ethical considerations were outlined considering the obstacles that had to be navigated in this area.

Chapter Seven: Analysis and Discussion: Conceptualising the Project Status Reporting Framework

7.1 Introduction

This chapter will first provide an overview of the respondents. Thereafter, it will articulate the analysis of the primary data, which will be presented according to the study's overarching secondary research objectives stated in section 1.7 above. Although, the first and the second secondary research objectives will be fully addressed by primary data, this will not preclude the study from contrasting, correlating and synthesising the responses provided with reviewed literature. This will demonstrate the relationships, differences and interconnectedness between the themes in the primary and secondary data. The same applies to the remainder of the secondary research objectives, which can only be addressed by a combination of primary and secondary data. Figure 7.1 below shows the nodes compared by the number of items coded for the first, second, third, and fourth secondary research objectives. The applicable interview questions – presented in subgroups – that were used to address each secondary research objective are shown with numbering that corresponds to the interview guide (see *Appendix 2*).

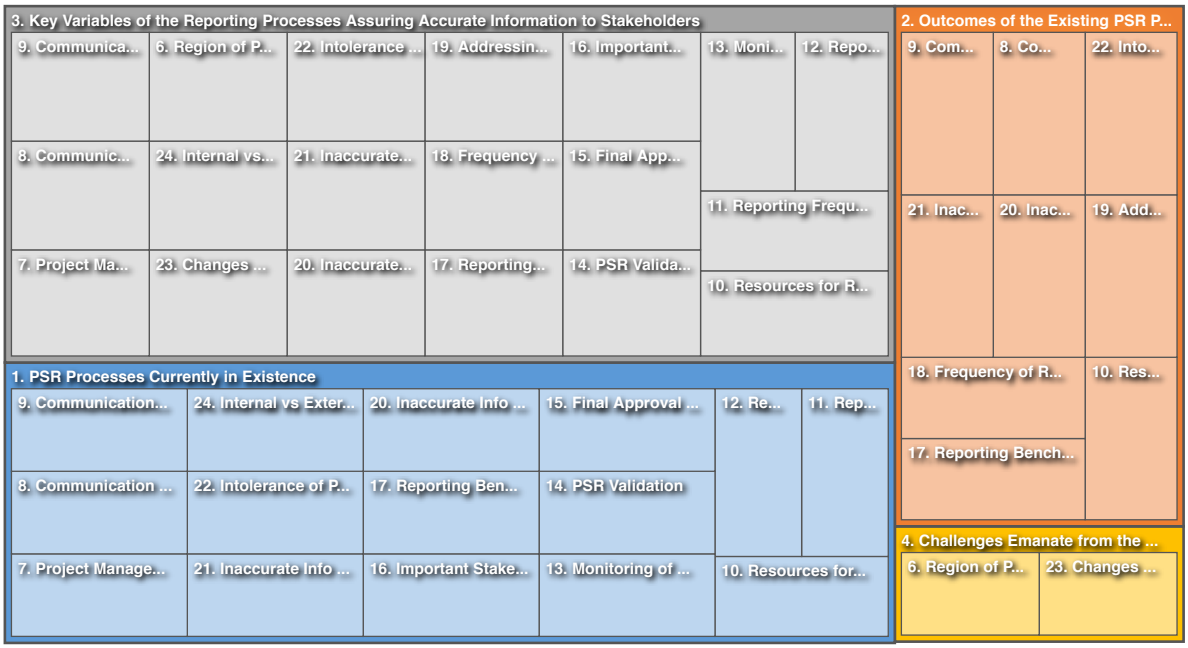


Figure 7.1: Nodes compared by the number of items coded (n=16)

Source: Primary Data, 2018.

7.2 Overview of Respondents

As discussed in section 1.11, South Africa has 131 SOCs which undertake commercial activities on its behalf (SAG, 2017). Of these SOCs, only two can be classified as large, geographically dispersed, tasked with executing infrastructural megaprojects of strategic importance to the country, namely Eskom and Transnet. As articulated in section 6.6, Asiamah *et al.,* (2017) outline three types of population, namely general, target and accessible, which must be communicated by the researcher to the reader as part of the research methodology. A general population is the full set of items or people under investigation (Lancaster, 2005). Asiamah *et al.,* (2017: 1612) argue that a target population are those 'individuals or participants with specific attributes of interest and relevance' and no attributes that 'controvert a research assumption, context or goal'. The accessible population is essentially a subset of the target population. It is composed of members of the target population who are willing to participate and who are available during the data collection period. A clear definition of the three types of population curtails sampling bias that is characteristic of many studies, and it is important because it guides the reader in apprising sampling credibility, the techniques used and the outcomes of the research study (Asiamah *et al*., 2017).

After the study had taken the above factors into account, a total of twenty individuals were identified within the SOC from whom the primary data were collected. They had the following characteristics. Their primary role within the organisation was to conduct project status reporting. They utilised established processes to collect, collate, validate, and disseminate projects status reports. Moreover, they ensured that reporting to internal and external stakeholders was accurate, and that all the elements that should have been reported on were accounted for. It should be noted that the SOC in which the research sample was identified was undergoing restructuring. Hence the new organisational structure accounting for the twenty people was not yet populated by individuals appointed under this structure. During data collection, these individuals were operating under the old structure. This, however, did not hinder the response rate as much as was anticipated.

As a result of the restructuring, it was discovered that there were only nineteen individuals befitting the sampling frame, not the twenty as reflected in the organisational structure. Of the nineteen potential participants engaged to participate in the study, it was discovered that two individuals had been seconded to other departments not responsible for project status reporting. These individuals were duly excluded from the study. Of the seventeen remaining potential participants, all were responsive except for one. This subsection gives an overview of the

sixteen respondents from whom the data were collected, as can be encapsulated by Figure 7.2 below.

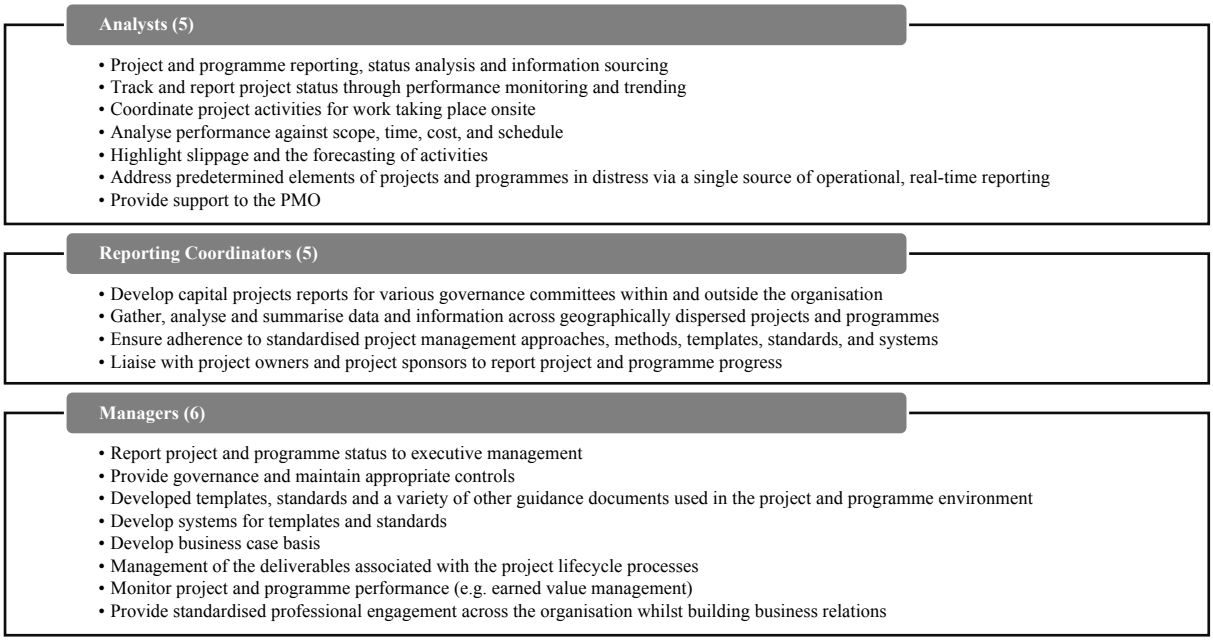


Figure 7.2: Overview of the roles and responsibilities of respondents (n=16)

Source: Primary Data, 2018.

Targeting these individuals allowed the study to investigate the existent processes, evaluate the outcomes thereof, identify key variables of these processes, and thereafter identify challenges emanating therefrom. Achieving these objectives will subsequently provide invaluable input towards the development of a framework aimed at overcoming the challenges of holistic project status reporting in SOCs. Primary data will fully address the first and second secondary research questions and partially address the third, fourth and fifth. Partially addressed secondary research questions will of course be addressed by the three research approaches discussed in section 6.3 above.

7.2.1 Analysts

Five of the respondents were analysts responsible for project and programme reporting, status analysis and information sourcing for the generation of multi-discipline integrated reports. These individuals said that they were responsible for tracking and reporting project status for a variety of megaprojects. This was done through the creation of trackers for daily, weekly and

monthly performance monitoring. This information was then reported to organisational management. They coordinated project activities for work taking place onsite, analysed performance against scope, time, cost, and schedule, and highlighted slippage and the forecasting of activities.

Analysts said that they addressed predetermined elements of projects and programmes in distress by means of analysing and validating performance to create transparency via a single source of operational, real-time reporting. They provided temporary, supportive project management office services with a particular focus on diagnostic, performance monitoring, and proactive tracking and trending. Of the five analysts, three were stationed in Durban and two in Johannesburg, two metropolitans wherein megaprojects of strategic importance to the South African economy are frequently executed. They had experience in the project management environment ranging between three and six years, with combined experience of twenty years.

7.2.2 Reporting Coordinators

Although their titles differed, due to the similarities of their inherent roles and responsibilities, reporting coordinators and reporting specialists, terms which will be used interchangeably within this research study, were considered as a single group. Similar to the analysts, they also account for five of the sixteen respondents. Roles and responsibilities of the reporting coordinators included the development of reports pertaining to capital projects for the consumption of various governance committees within and outside the organisation. They said that they coordinated the preparation of internal and external reports through gathering, analysing and summarising data and information across the organisational projects and programmes distributed throughout the country.

Furthermore, reporting coordinators ensured adherence to standardised project management approaches, methods, templates, standards, and systems. Liaising with project owners and project sponsors to report project and programme progress and providing status updates to internal and external stakeholders also fell within the ambit of reporting coordinators. They prepared *ad hoc* reports for the consumption of various forums including management and senior management. In terms of geographic location, three of the five reporting coordinators were stationed in Durban and the two were stationed in Johannesburg. They had experience in the project management environment ranging between three and thirteen years, with combined experience of forty years.

7.2.3 Managers

The balance of the respondents was a mixture of two project managers, one programme manager, two senior project managers, and one principal project manager. Their roles and responsibilities can be summarised as follows. They said that they were responsible for governance and controls, project and programme reporting to senior management and executive management, and monitoring projects and programmes in distress. They developed templates, standards and a variety of other guidance documents that were used in the project and programme reporting fraternity. They were responsible for developing the systems to which these templates and standards belong, and they developed business case basis as well as management of the deliverables associated with the project lifecycle planning processes.

Furthermore, they said that they monitored project and programme performance. They evaluated earned value management. They also provided standardised professional engagement across the organisation, and built relationships with the business teams to make proactive suggestions on potential improvements and how efficiencies could be achieved. With regard to geographic location, five of the six managers were stationed in Johannesburg, as the economic hub of this country (SSA, 2018). They had experience in the project management environment ranging between three and fifteen years, with combined experience of forty-seven years.

7.3 Realising the Study's Research Objectives

Primary data were collected and analysed with the aim of achieving the research objectives discussed in section 1.7. Sections 7.4 to 7.7 below aim to analyse, discuss and then present these data according to these objectives. First, to determine the project status reporting processes that are currently in existence within large, geographically dispersed SOCs that frequently execute megaprojects of strategic importance to the South African economy [see blue rectangle in Figure 7.1 above]. Thereafter, to ascertain the outcomes of the existing project status reporting processes [see orange rectangle]. Third, to establish the key variables of the reporting processes that have been put in place to assure accurate flow of project status information to internal and external stakeholders [see grey rectangle]. Fourth, to identify the challenges emanating from the existing project status reporting processes [see amber rectangle].

These activities were all aimed at determining the themes that are of principal importance in ensuring holistic project status reporting to internal and external stakeholders. Ultimately, it was aimed at ascertaining the most pertinent model that would allow South African SOCs to minimise the challenges they face when reporting the status of projects to stakeholders. This conceptual framework will be developed in chapter eight after a comprehensive discussion of the findings of the analysed data is provided, if the secondary research questions are framed as objectives using a tabular view. This will indicate the extent to which research questions have been addressed. Development of this framework will serve to achieve the fifth secondary research objective, as a contribution to the existing project management body of knowledge. This will be done by building on the rudimentary conceptual framework proposed in chapter five.

7.4 First Objective: Identifying the Project Status Reporting Processes Currently in Existence

7.4.1 Prominent Project Management Themes in Primary Data

The researcher used NVivo to explore the primary data. This study will now present the analysed primary data. The first secondary research objective, which will be fully addressed by the primary data, aims to identify the series of actions or steps that are currently undertaken during project status reporting within large, geographically dispersed SOCs executing megaprojects of strategic importance to the South African economy. With regard to the first secondary research objective, the first interview question that the respondents were asked was to state, according to their own experiences, the most important project management constraints. As indicated by the word cloud shown in Figure 7.3 below, themes that became apparent were, from the most conspicuous to the least, schedule or time, cost, resources, scope, contracts, risks, and communication. Categorisation of these themes and sub-themes was guided by the literature reviewed in chapter three above.

Figure 7.3: A word cloud for responses to the question 7 of the interview guide: What are the most important project management constraints?

Source: Primary Data, 2018.

The following views became evident whilst unpacking the responses pertaining to each project management constraint. With regard to schedule, the respondents thought that the project schedule was constrained because information pertaining thereto was not shared with the project team in a timely manner. Moreover, the "*project schedule was not resource-loaded*" in order to achieve – in good time – the activities on the critical path, or it "*was not considered realistic*" from the outset. The prominence of the project schedule as a project management constraint that should form the basis of project status reporting in South African SOCs is aligned to the findings discovered during the review of secondary literature under subsection 3.2.1.2 (Mukuka *et al.*, 2015; Newton, 2015b).

As one analyst put it, "*completing the project on planned time within the budgeted cost is always a challenge in [the] project management space*". With this in mind, it came as no surprise when cost was chosen by the respondents as the second most prominent project management constraint. Cost was regarded as a key constraint because, in the case of SOCs, "*external funding*" in the form of taxpayers' money was essential to the existence of these large, geographically dispersed enterprises. This was a view expressed by a reporting coordinator. Cost provides a limitation with regards to the tangible and intangible resources that can be utilised towards the completion of any project. As discussed under subsection 3.2.1.1, the view communicated by the respondents is aligned to a view expressed by Smith (2014; 2016) and supported by the *PMI (2013)* in the reviewed secondary data, which argues for the prominence of cost as a constraint which can hinder project progress.

After cost, resources were uncovered as the next most prominent theme in the primary data. In these particular instances, the term resource specifically refers to human capital. The programme manager, in particular, argued for "*the creation of an environment that adequately motivates resources to perform*" at their peak. Whilst one analyst stated that "*unqualified and inexperienced resources*" were a major constraint, another added that this was especially true in cases where "*resource limitation had a negative impact on the project-related cost*". In secondary data, the constraints provided by resources are discussed in subsection 3.2.2.1.

Scope was the fourth most prominent theme pertaining to project management constraints. Although the respondents did not elaborate why scope was regarded as important, the fact that it was stated amongst the top is aligned to the views expressed in subsection 3.2.1.3 above. Scope management as an iterative process (Khan, 2006; *PMI, 2013*) should become and remain a core component of project status reporting to ensure that all project requirements are accounted for in a logical manner that prevents scope creep and feature creep.

Notwithstanding the absence of quality as a prominent theme in the primary data, the argument is convincing that stipulates that cost, schedule and scope can never be divorced from each other since these project management constraints interact in such a way that one cannot be altered without fundamentally affecting the others (Lock, 2007; Wysocki, 2009). This happens if one considers the most prominent project management constraints as pointed out by the respondents and the manner in which they interact. According to primary data, it can be seen that schedule, cost, resources, and scope are a fundamental part of the project status process which internal and external stakeholders should be apprised of. The rationale behind this is that

these constraints play the most important role in evaluating project success within any organisation.

Albeit less conspicuous, other project management constraints that became evident from the primary data can be summarised in the following manner. One project manager was of the view that "*correct selection of the required contract to meet the project's requirements*" can become a significant constraint if not appropriately managed. Whereas another stated that most project managers lack the sufficient understanding of project-related contracts which "*results in poor management of the Engineering, Procurement and Construction Management (EPCM) contractors according to the clauses stipulated within the respective contracts*". A programme manager argued that experience was vital in the "*anticipation and mitigation of risks which can have a severe impact on programmes*". He added that "*communication and understanding of roles and responsibilities*" is also imperative. Being constrained by poor communication is a view that was reiterated by a project manager who said that "*progress and status reporting does not always reflect the actuals that are happening on the projects, which results in project [progress] not being truly reflected for the executive management to make right or fitting decisions*". As a result, executive management may be hindered from effective and timeous decision-making.

A variety of other constraints that are considered as fundamental to project status reporting processes currently in existence also became apparent from primary data. These are "*quality management*" which was discussed in detail in subsection 3.2.1.4, "*delays in the approval processes*" which essentially has a potential to influence all other project management constraints, managing "*megaprojects without centralised and digitised project management tools and software*", and "*lack of project governance*". The latter three factors were not identified during the literature review, as such they will have to be further unpacked and considered. This is done in subsection 7.7.3 below. Section 7.7 aims to deal with the challenges that emanate from the project status reporting currently in existence. Furthermore, in an attempt to formalise project status reporting by developing a framework that takes into consideration all project management constraints that materialise within SOCs, the study will have to further engage these factors for consideration. This will evaluate their compatibility for their accommodation into the developed framework.

7.4.2 Communicating Targets and Milestones

The next question which was used to ascertain the project status reporting processes currently in existence was aimed at determining the means that are used within South African SOCs to communicate details of missed targets to one's immediate superiors. From the responses that were provided, it became evident that project status reports were used, whose frequency, content, audience, and objective differed. Various reports were issued daily, weekly and monthly. The content within these reports was tailored to suit a particular target audience and was, as one Senior Project Manager put it, "*stipulated in the project communications management plan*". The report-consuming audience included governance structures such as "*Management Committees, Steering Committees and Operating Committees*".

The reports had to indicate what the project targets were, why the targets had not been met if this was the case, and the mitigation actions which were being implemented to ensure that the targets were realised. Depending on the content of the report, a variety of Microsoft Office Suite programs were used that best represented the projects status activities onsite whilst remaining appropriate for the target audience. The reports included a variety of project management constraints as detailed in subsection 7.4.1 above by the respondents, as well as impending or resultant implications in the case of unachieved or unachievable constraints. In the case of meetings that occurred in informal settings or where a paper trail was not required, the respondents said that verbal communication could be used to communicate missed targets to immediate superiors.

After the means used to communicate missed targets to immediate superiors were determined, attention turned to how important targets or milestones were communicated with one's team members. Using an example of how the project schedule was shared with the team to communicate impending items as a means to illustrate his point, a Project Manager said that:

> "*Key milestone dates are referenced into the schedule. These are also used in the basis of project reports which are communicated to all project team members with action lists [and] action owners. This mechanism allows project team members to prepare in advance if any key deliverables are required from them when approaching the milestone date, for example procurement may have to start a process of getting equipment onsite in preparation for the next milestone*."

Meanwhile the Programme Manager, also making a similar reference to the project schedule, said this:

> "*An "executive" milestone schedule which may be different from the actual schedule and may involve the programme director/manager's intervention is a standard reporting requirement*

and each team member should be well briefed and understand the implications and interdependencies of the milestones."

Furthermore, two themes became evident in the sharing of important targets or milestones with team members, formal meetings and regular reports. The respondents said that formal meetings that included all relevant internal and external stakeholders may take place in the form of open engagement forums. A reporting specialist said that,

> "*…we have a weekly session where we share the work that we are doing, so I report all the Shareholder Compact milestone performances in that meeting*".

The frequency of these meetings could be daily, weekly, bi-monthly, monthly, or quarterly. In these sessions, progress reports were circulated for the consumption of the forum, and were thereafter interrogated to ascertain validity. Sometimes these sessions were held for knowledge sharing and information dissemination purposes, to ensure alignment within the project team in terms of project deliverables and areas of concern. These meetings could also take place as and when required, particularly if there were burning issues to be addressed.

A two-week look-ahead, which is essentially a simplified excerpt of the approved project schedule, as well as the issue log could be used to drive decision-making within these meetings. Much like the occurrence of the forum meetings, progress status reports for the consumption of all relevant team members could be issued daily, weekly, bi-monthly, monthly, or quarterly. They were issued using a variety of tools such as the Microsoft Office Suite, Aconex, shared network drives, direct and broadcast emails, Project Management Information Systems (PMIS), and corporate communiques.

Figure 7.4 below illustrates the differences and similarities between the means used to communicate missed targets to one's immediate superiors, team members and both groups, as discussed above.

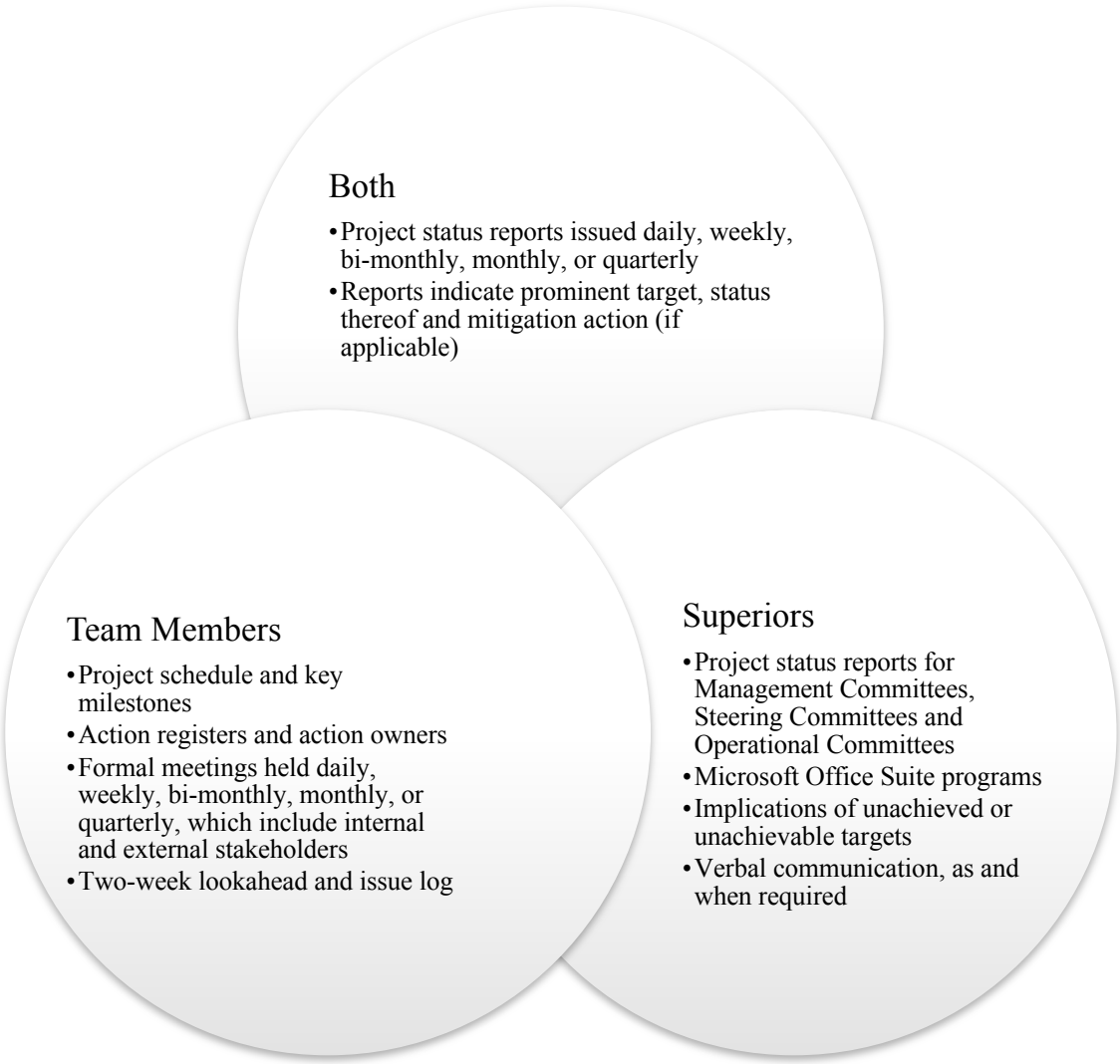


Figure 7.4: A diagram showing the relationship between the means used to communicate missed targets to team members, superiors and both groups

Source: Primary Data, 2018.

To further ascertain the existent project status reporting processes, the respondents were then asked to describe the means and/or resources that were used within the organisation to report project progress. As indicated in subsection 3.2.2.1 and touched on by the respondents in the paragraph above, there is a wide range of resources (*PMI, 2013*; Saputra and Latiffianti, 2015), which may be used for project status reporting within large, geographically dispersed organisations that execute megaprojects, namely tangible resources and intangible resources. The former may include things such as human capital, project status reporting equipment and material, specialised project status reports, information and communications technology

infrastructure, as well as facilities that are dedicated to collecting, collating and validating projects status reports. Whereas the latter may include intellectual property, trademarks, patents, authorisations, permits, and skills, all of which could be used by the project team in an attempt to provide status reporting to internal and external stakeholders.

The Microsoft Office Suite was mentioned by some respondents as the main package that was used to present project status information to various stakeholders and governance committees. A reporting coordinator reiterated that "*project reports are circulated or published to key stakeholders in various formats, but predominantly Excel and PowerPoint*." This respondent also added that information that was contained in the project status reports was obtained from the respective project teams, in particular "*the project or programme managers and discipline leads*". The nature of reports was dependent on information that was contained therein. Routine reports used predetermined templates, which may be revised from time to time. Whereas *ad hoc* reports were governed by the type of information that was contained in the report as well as the target audience. In some cases, project status information may be flashed-out on large display screens in common areas for the consumption of a wide-ranging audience within the organisation.

With regard to the information that was collected by the project teams, schedule tracking software, such as Primavera, was "*updated by the planners*", one of the analysts said. This was done because the planners were more conversant with this type of software as opposed to the reporting team. The same applies to other departments. For instance, cost management software was strictly used by the cost engineers and, to some extent, the project or programme controls managers, not by the reporting team. However, it was indicated by another analyst that the project team is not, and should not be, the only source of information that is emanating from site. She added that the functions of an analyst included going to site to "*monitor, analyse and track progress and slippage so as to contribute towards the production of project status reports*." This verification was done to ensure that the information coming from the project team is cross-referenced by an independent observer not forming part of the project team. With regards to resources used to report project progress within the organisation, one of the reporting coordinators said that "*there are reports compiled and communicated, there are meetings held to discuss project progress and seek support and approval where needed*."

The frequency of the publishing of project status reports was the next question that was posed in an attempt to ascertain the project status reporting processes that are currently in existence

within SOCs. Figure 7.5 below summarises the frequency of different types of project status reports published within the organisation.

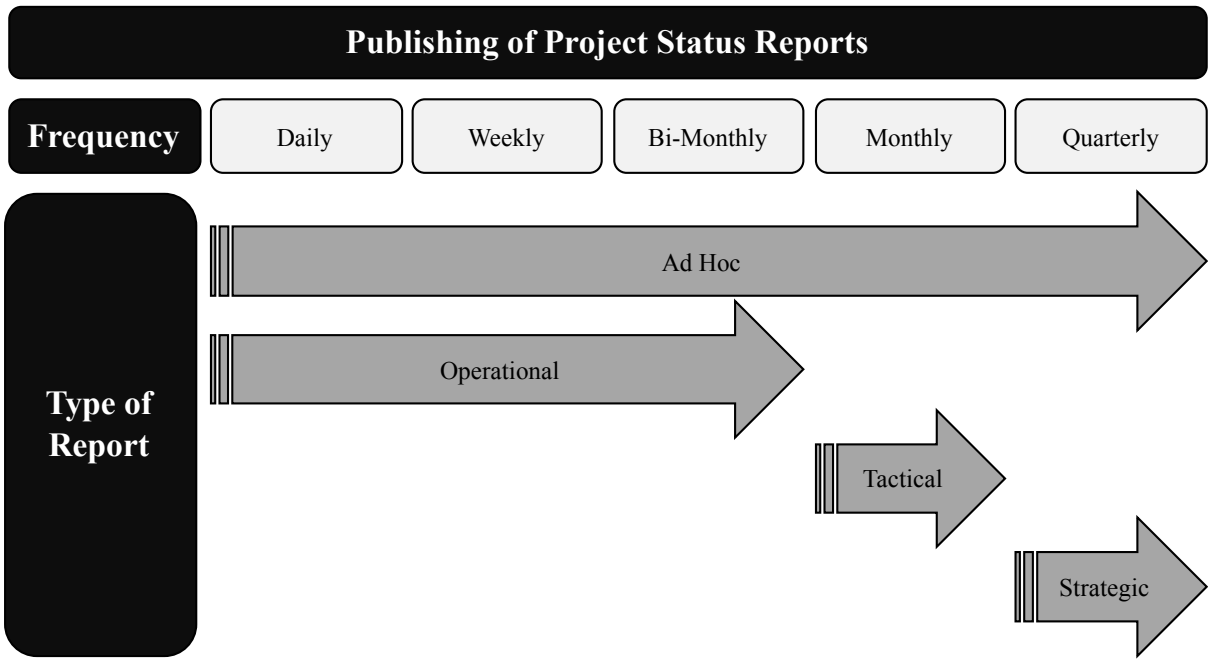


Figure 7.5: The frequency of different types of published project status reports

Source: Primary Data, 2018.

There were five main themes that emerged. The respondents said that the reports were published daily, weekly, bi-monthly, monthly, or quarterly. An analyst explained that in most cases information to populate the project status reports was collected daily, meetings were held weekly and reports were published monthly. Progress towards daily targets may be tracked using an Excel-based two-week look ahead document extracted from the master schedule and subsequently broken-down into a level five schedule. This tracker was updated by analysts using the input provided by the project team at the end of each working day. A level five schedule further breaks-down the level four project working schedule to map out the detailed tasks that need to be executed onsite to support short-term planning, tracking and reporting (*PMI, 2013*). A senior project manager added that "*operational reports were published weekly, tactical reports were published monthly, whereas strategic reports were published quarterly*". This form of reporting is aligned to the reporting done by the Enterprise Project Management Office, the Enterprise Programme Management Office and the Enterprise Portfolio Management Office which function at operational, tactical, and strategic levels respectively, as

outlined in chapter four above. From time to time, *ad hoc* reports may be requested for various committees depending on operational, tactical and strategic needs.

After the reporting frequency had been ascertained, the respondents were asked to describe the types of benchmarks used within the organisation. The purpose was to determine whether the benchmarks used to share information with subordinates differed from those used to share the same information with superiors. Figure 7.6 below shows an overview of the responses received.

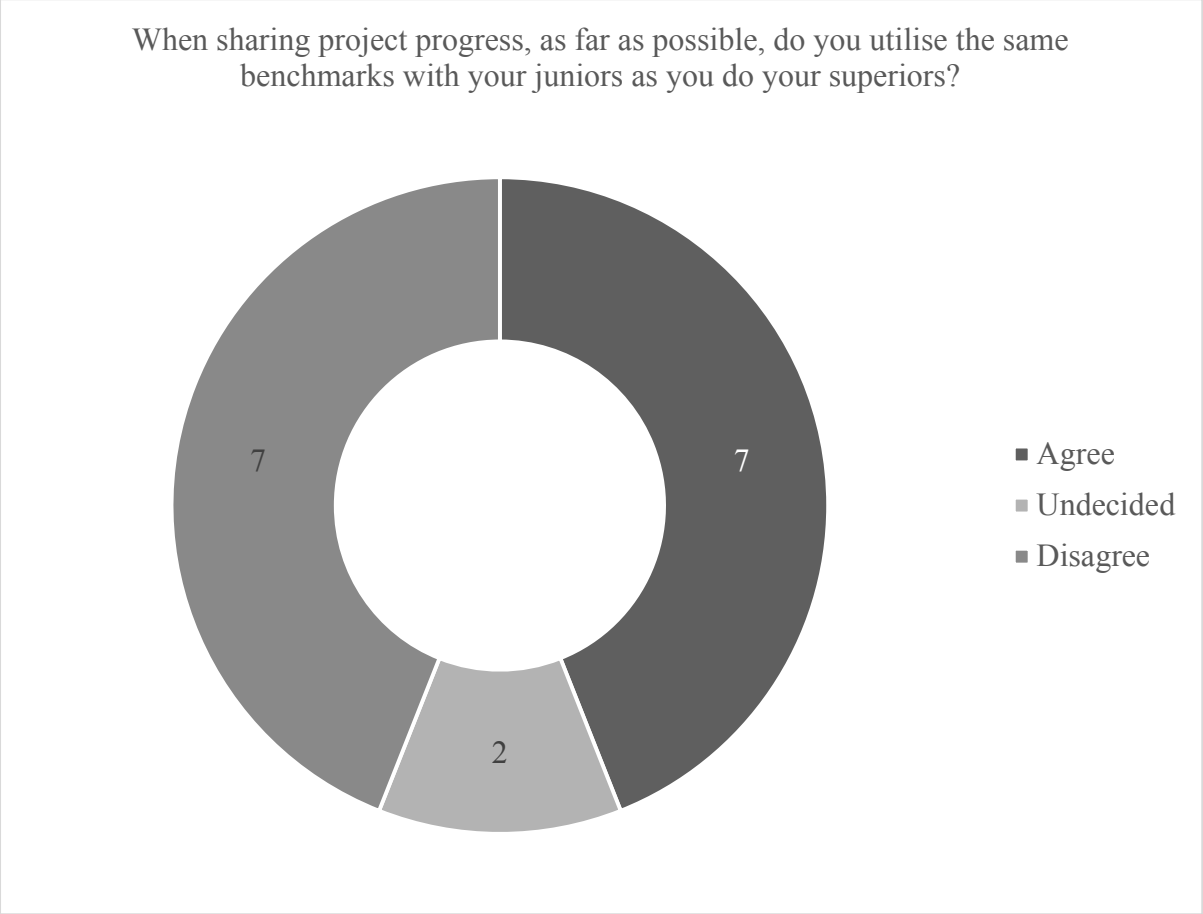


Figure 7.6: An overview of the responses received for question 12 of the interview guide which asked whether similar benchmarks were used to share project progress

Source: Primary Data, 2018.

There was an even split between those who agreed and those who disagreed that the apprising benchmarks differed. The remainder were undecided. One of the main themes that emerged from those that agreed was that similar benchmarks created transparency, uniformity and a

common standard that would be applicable throughout the organisation. A senior project manager added that "*there is a multi-disciplinary forum meant to address the content of all reports published*" to ensure consistency. Whereas one of the main themes that emerged from those that disagreed was that reporting to superiors was high-level whilst reporting to juniors was quite detailed and, as such, the reports were distributed according to the standing of individuals within the organisation. In disagreeing, the programme manager added that "*there is a tiered structure where a programme manager will set targets to the execution team that allow for float compared to management expectations in order to allow for risk mitigation to be conducted within the programme sphere*." It was, however, emphasised that, even though the details shared with the subordinates may differ compared to those used to apprise the superiors, the information that is contained in all the published reports had to be consistent.

Due to the sheer number of components that have a capability to interact with each other within large, geographically dispersed organisations, there is a high probability for discrepancies to occur during the reporting of projects status. With this in mind, and to further interrogate the project status reporting processes currently in existence, the next question that the respondents were asked was to state the frequency of discrepancies that occur between their interpretation of project status and the interpretation of other team members. One analyst said they happened "*weekly, due to a number of interfaces or dependency on one over the other, e.g. material handling and contracts, contracts management and construction*" and so forth. Another analyst added that they happen very often "*because there is no single source of reporting. All members report according to their knowledge and there is no validation [of] information reported*." In contrast, a reporting specialist said that "*Discrepancies are not found often as the project members are qualified professionals in their respective discipline[s] and the entire project team understands the way the project is managed.*" Meanwhile, the programme manager can be quoted as saying that:

> "*Given that a significant portion of reporting revolves around statistics, there are regular instances which are largely influenced by who and how the information is communicated. Having an experienced reporting team that is able to anticipate the possible ambiguity and ensure that the reports are clear from the start is critical to effective representation of information.*"

The overarching theme from the responses provided was that projects status information was interrogated, verified and validated through various checks and balances prior to sign-off by the project/programme controls manager, the project/programme manager and the

project/programme director to minimise the potential for discrepancies. Although the project/programme director was singled-out as the accounting individual for all the reports published within a particular region, the reporting team was regarded as indispensable in providing an independent view of the events taking place onsite. Site walks conducted by discipline leads and construction foremen as well as progress meeting that include key stakeholders within the project team were considered as pivotal to the checks and balances of ensuring consistency. Internal performance audits, periodic external audits, and assessment of processes, procedures and tools also played an important role in interrogating, verifying and validating the information that was coming from the project team to assure fit-for-purpose functioning.

Examination, verification and validation do not occur in a vacuum. These have to be contrasted against some sort of a standard or benchmark. This is why the view expressed by a duo of reporting coordinators resonates. They argued for the importance of obtaining cost and scope baselines at the beginning of the project or programme. These baselines were subsequently used to track deviations throughout the lifecycle of the project. The Project Management Institute concurs with this view. In subsections 3.2.1.1 and 3.2.1.3 this global project management association was used as a cornerstone to argue that, amongst other things, estimating cost and determining budget are activities that are informed by the scope and schedule baselines. Whereas scope management is controlled through the monitoring of the project status, in particular any deviation from the project baseline.

Additionally, baseline monitoring, verification and control are activities that occur from project inception through to project close-out. As can be seen from some iterations of the project management 'iron triangle' and the constraints that inhere within these spin-offs, cost, scope, schedule, and quality cannot be divorced (Lock, 2007). These constraints must maintain their equilibrium for a project to, likewise, remain in an equilibrium (Wysocki, 2009). Regardless of shape, size or location of any project, cost, scope, schedule, and quality interact in such a way that one cannot be altered without fundamentally affecting the others.

Although validation or verification of project status information were themes that emerged in response to the previous question, when drafting the interview guide the researcher could not have pre-empted that these themes would emerge. Hence, one of the questions in the interview guide asked the respondents to explain how they went about verifying or validating project status information. A project manager can be quoted as saying that:

> "*There are various tools in place to verify all the information is reliable. When the project team assembles all the information, [it] must tie up. For instance, the work performed by the contractor must tie up with the payments. If there is an imbalance, reasons for the variation must be elaborated. Same goes for all other disciplines. All the weekly reports must also tie up to the progress of the monthly Project Status Report. The tools in place must crosscheck. The review process is normally over a couple days to ensure that all information gathered by the project team is qualified and quantified.*"

A programme manager stated that:

> "*The multi-stage governance process initiated at site discipline level through to reporting and programme management team is designed to interrogate information through the consolidation process. Having 'accountability gates' whereby a programme manager signs off on the information as accurate incentivises the interrogation and validation process.*"

An analysts said that a level four schedule was requested from the planners and subsequently broken-down into a level five schedule. A two-week look-ahead for physical tracking of individual activities onsite against the plan was extracted from this level five schedule. Using the two-week look-ahead, milestones and key performance indicators were updated, key risks and issues were tracked for mitigation and thereafter weekly reports were generated. Daily site walks were conducted by the reporting team with the purpose of engaging foremen and construction managers. The trending of reports to ascertain consistency from one reporting period to the next as well as the tracking of glaring deviations also emerged as themes for validation or verification of project status information.

The principal project manager concurred with one of the reporting coordinators that, should physical checking of all activities onsite by the reporting team be implausible, evidence for milestones achieved was requested from the contractor or the project team. Meanwhile another reporting coordinator remarked that "*monthly cost and project progress meetings are held with the relevant project manager and project team to validate the project information*". The programme manager added that information may need to be signed-off as accurate prior to sharing with the governance committee or any other stakeholders. A synthesis of steps for verification and validation of project status information emerges as can be seen in Figure 7.7 below.

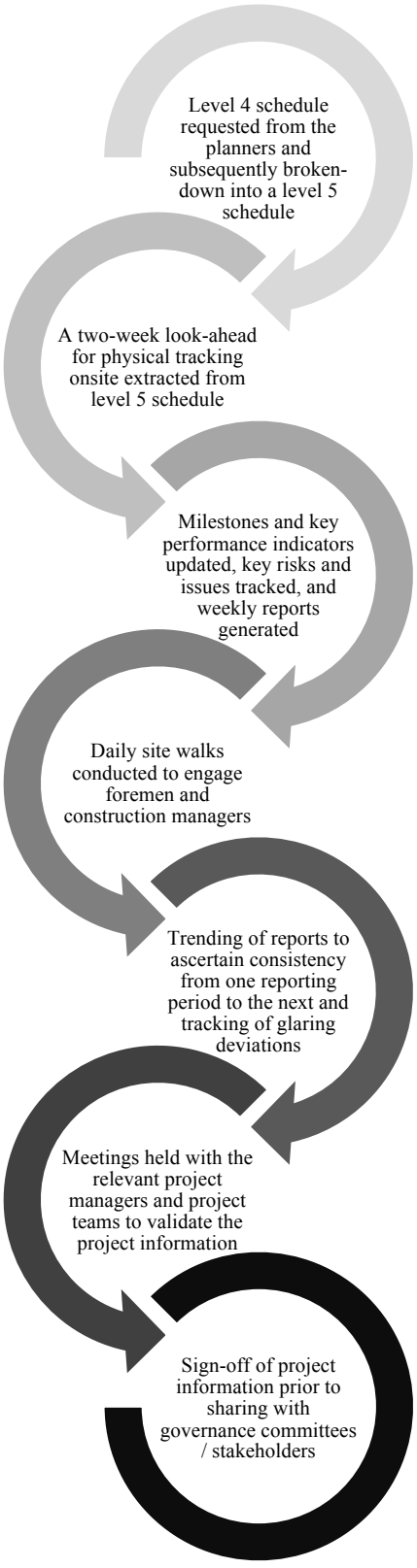


Figure 7.7: A summarised synthesis of events for the verification and validation of project status information

Source: Primary Data, 2018.

As alluded to by the programme manager, project status reports would have to be signed-off prior to sharing with internal and external stakeholders. Reports that were not signed would still need to be approved by the authoritative person prior to publishing. When the respondents were asked: who ensures final approval of reports before they are published? Some of the responses to this particular question were aligned to some of the information already discussed pertaining to the question above.

It emerged that the project/programme controls manager, the project/programme manager and the project/programme director all played a role in approving the reports before they are published or shared with any higher committees. In other instances, it was revealed that the cost engineers, quantity surveyors and planners played a role in signing of internal reports. However, since the cost engineers, quantity surveyors and planners report to the project/programme controls managers in terms of the project/programme structure, they may be required to sign-off prior to their manager signing-off. The majority of the respondents agreed with the above view. However, the balance differed. The remaining respondents stated that some reports were approved by the senior manager, general manager, project sponsor, or chief executive. The programme manager was much more articulate in this regard. He said that:

> "*This depends on the body being approached as the presentation owner is the final authority on the content. That said, a clear and auditable trail of information leads between the various tiers of reporting and should information be amended without the approval of the content owner, an audit finding may result.*"

Taking into consideration the approving authorities that are mentioned above, it is clear that there is a diverse list of stakeholders that play a part in the compilation and approval of projects status reports within large, geographically dispersed SOCs. So, when asked who the most important stakeholders that were involved in the project status reporting process within the organisation, one could expect a lengthy list of stakeholders. The list included all the individuals that have been mentioned above and various others, such as departmental heads of Health and Safety, Quality and Assurance, Engineering, Procurement, Human Resources, Industrial Relations, Risk, Security, Reporting, Environmental, and Document Control. Some individuals were the originators, some were the consolidators, some were the approvers, and others were the consumers of the respective project status information, with layers dependent on the various governance committees and stakeholders within the organisation. Although the question pertained to internal stakeholders, some respondents volunteered that the project

sponsor, sometimes referred to as the owner's team, and the contractor were also regarded as important external stakeholders that were part of the project status reporting process.

7.4.3 Management of Inaccurate Project Status Reporting

After the communication of targets and milestones within the organisation was determined, the management of inaccurate project status information was turned to. In this particular instance, how the project team ensured that similar benchmarks were used to communicate the projects status updates. The study was mindful of the above list of diverse internal and external stakeholders. It was also mindful of the responses provided to an interview question asked earlier of the potential for differing benchmarks between superiors and juniors as well as the subsequent emphasis on consistency in reporting.

Analysing the responses that were shared, it became apparent that standardised templates were used to ensure consistency regarding the benchmarks used. Standardisation is a key concept of integrated reporting (Fried *et al.*, 2014; Hoque, 2017). A project manager articulated this by saying that a standardised template was used, with every discipline lead required to give input into the allocated section using a central point of consolidation. As far as the recurring reports were concerned, all disciplines were required to report according to this template. A reporting coordinator added that new templates had to be approved at the executive level and then rolled-down to the entire organisation to ensure consistency in application. Some responses were mixed, arguing that Standard Operating Procedures were in place, that Terms of Reference were used as a basis to ensure that a similar approach was followed, or regular engagements and consultations were undertaken prior to the publishing of any project status information. One senior project manager was in the negative. He stated that, at any moment in time, similar benchmarks were not being used. As such it became the responsibility of the EPMO to ensure consistency across the various projects and programmes within the organisation.

Even though there may be checks and balances in place to ensure that reports shared with management are a true and accurate reflection of events taking place onsite, there is a potential for the mechanisms that have been put in place to fail. With this in mind, the respondents were asked to identify the best way of dealing with inaccurate information that had been reported to management.

Upon analysis of the responses, it became evident that respondents thought the best way was to acknowledge the mistake or inaccuracy as soon as it was detected, and to retract and revise the report prior to resubmission – if time permits. A process to accurately account for all the deviations should be initiated, the impact assessed and the necessary changes made, with the blessings of management of course. Centralised reporting also became an apparent theme in avoiding contradictory views and ensuring that accurate information is shared with management. The respondents added that, if there are any disagreements pertaining to differing viewpoints, then minutes of the meeting, a Project-Specific Agreement, a Project Change Notice, or any other formally accepted documentation may be used to resolve the dispute. One project manager was more articulate in responding to the interview question. He said:

> "*The approach should be top down. The project director who is accountable will have to face up to executive management and account for why the information is inaccurate, he will have to in turn deal with the project manager and hold him accountable and so forth. The concept is to find the root cause and deal with the person that has provided the inaccurate information. Then set controls in place so that it does not occur again. In some extreme events [a] project manager will lose trust in his project team and will have to micro-manage [the] teams but that is not the best solution because it brings in a negative atmosphere into the project environment. Root cause is the best solution because diagnosing the problem is the start [of] the process of finding a viable solution. Maybe the team is under-resourced or the person providing the inaccurate information is facing some mid-life crisis. All these scenarios need to be dealt with by the project manager and that is why it is critical for the project manager to possess a high degree [of] EQ.*"

Meanwhile the programme manager said:

> "*This depends on the magnitude of the inaccuracy, but usually a revision with a note around the reason for the inaccuracy and impact of the variation suffices. In certain cases, the entire report must be retracted, but this is rare and strict revision control can minimise the impact of an amendment.*"

Synthesising the analysed data, a project team accountability pyramid becomes evident as per Figure 7.8 below.

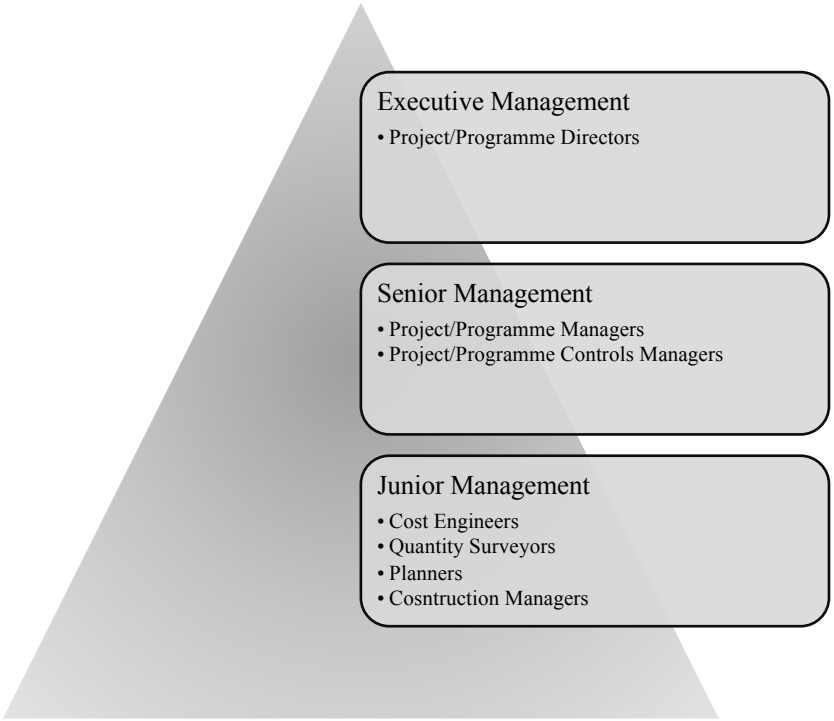


Figure 7.8: Core project team accountability pyramid

Source: Primary Data, 2018.

The core project team accountability pyramid indicates that the project/programme directors are held to account at executive level. The project/programme managers and the project/programme controls managers are held accountable at senior management level and the cost engineers, quantity surveyors, planners, and construction managers are held to account at junior management level. Moreover, the level below is held accountable by the level above. It must be noted that Figure 7.8 only accounts for the core of the project team, not the various departments mentioned above, namely Health and Safety, Quality and Assurance, Engineering, Procurement, Human Resources, Industrial Relations, Risk, Security, Reporting, Environmental, and Document Control. These departments only serve to provide ancillary support and services within the project environment.

After dealing with inaccurate information reported to management, still within the quest of identifying the project status reporting processes that are currently in existence, the next logical step for this research study was to get a sense of how SOCs deal with inaccurate project status information that had been reported by site personnel. The responses received may be summarised and synthesised in the following manner. A site walk to physically verify the *status*

quo may need to be undertaken by the reporting team. In cases where a site walk is implausible because of geographic, financial, temporal, or other constraints, site pictures may serve as evidence that the milestone has been achieved. If insufficient evidence for the completion of the milestone is provided, then the milestone is declared as unachieved until such a time that evidence of its achievement can be provided. A reporting coordinator added that validating the information prior to reporting, to assure that there was evidence to back-up all the milestones that were reflected as being achieved on the project status report, was the best way to deter and prevent site personnel from sharing inaccurate information.

Furthermore, on the basis of the responses provided, it became evident that in some cases inaccurate reporting may take place as a result of the numerous sources of information that may be available to site personnel at any given time. To address this issue, the programme manager argued that inaccurate reporting that occurred unintentionally may be prevented provided there was a "*single source of information*" from where all other downstream reports followed. However, if inaccurate reporting had taken place, measures should then be introduced to prevent reoccurrence should there be room for such improvements to materialise. On the other hand, if inaccurate reporting is done intentionally one-on-one discussions may take place as a form of deterrence, the matter may be escalated to the manager to resolve, and – in serious cases – disciplinary action may ensue. The project/programme manager and the project/programme director were regarded as of paramount importance in ensuring that site personnel shared accurate projects status information and also that personnel who reported the wrong information were dealt with to prevent unwanted repetition.

Regardless of the accuracy of the information reported to management by site personnel, management may perceive project status progress as substandard and, as a result, choose not to tolerate it based on the updates provided by the reporting team. With this in mind, the next question that was posed to the respondents was how they handled intolerance from management regarding this issue. The key theme that became evident was that communication was vital in the handling of intolerance by management regarding perceived substandard project progress. Zulch (2014) also regards communication as the foundation of project management.

Various methods may be used to keep the communication lines between the reporting team and management clear and pertinent. These include procedures, processes or templates that highlight the importance of compliance to these documents and the consequences of non-

compliance. Clearly articulated, written statements were needed so as to maintain an "*auditable paper trail*". Timeous requisition of necessary information is also required, as well as "*generating reports that display accurate and non-biased information*" that has been verified by appropriate stakeholders and presenting such reports at the correct times. The holding of '*war room meetings*' refers to a centralised command centre serving as a point of coordination in which strategy is planned and the current situation monitored.

The argument forwarded by the programme manager, which states that addressing the reporting of project progress does not determine whether project progress improves or not, is a valid one. Instead actual activities onsite should be addressed using the report as grounds for the intervention. Moreover, the report should serve as an enabler that may be used by management "*to identify and address pinch points and assist in returning progress to expectations.*"

Other views that were expressed regarding the handling of intolerance by management towards perceived substandard project progress were as follows: Management should be provided with solutions for improvement and realistic pull-back plans that are determined by the true reflection of project progress. As the accounting party for all project status information that is submitted to executive management, the project/programme director must intervene. Collaboration and problem-solving of the functional manager is considered imperative on matters concerning substandard execution of deliverables. Balanced scorecards, which are performance measurement tools used to monitor and track the employee outputs, were shown to be important tools for management's handling of substandard progress because they were linked to financial year-end bonus payments. As such, employees who underperformed may subsequently be affected come appraisal time.

A project manager emphasised that "*management needs to buy-in to the approach used on the project otherwise the topic is very debatable*". He added that "*the factors that are beyond the project manager's control need to be escalated as quickly as possible to Executives. Governance structures like Management Committee and Steering Committee are a good platform to speak about these issues*". The fact that he considers governance structures as platforms that are well-suited to handling issues pertaining to substandard project progress whether perceived or otherwise, indicates the importance of these structures. Akin to the Enterprise Project Management Office functioning at strategic level, it is important to have executive management buy-in and support for whichever approach is used so that the requisite support is obtained and there is consistency in application (Rathore, 2010).

7.4.4 Internal vs. External Reports

The final question aimed at identifying the project status reporting processes currently in existence asked the respondents to explain the fundamental differences, if any, between internal and external reports. Figure 7.9 shows the key differences between these reports.

Figure 7.9: Differences between internal and external reports

Source: Primary Data, 2018.

The respondents said that internal reports were targeted at the project team and, as such, they contained detailed and sometimes exhaustive information, to give the project team an unparalleled view of the project in question. However, in other instances, the internal report

may be consumed by individuals that were not close to the project. A detailed report helps these individuals appreciate key elements of the project. Internal reports were prepared for the purposes of planning, controlling and regulating the project. Therefore, it is important that they contain all the information that the project team may use to make the appropriate decisions. Furthermore, when presenting an internal report, seldom is the context provided because the project team was expected to be conversant with the project in question owing to their ongoing involvement in the management thereof. More often than not, internal reports contain confidential and sensitive information that is strictly for the consumption of internal stakeholders. Last but certainly not least, internal reports were considered as the primary source for all downstream reports, including all external reports that were produced.

On the other hand, external reports were said to be less detailed. They were said to contain strategic information that was tailored towards client interests. They contained high-level information that external stakeholders, such as government, funders, credit holders, shareholders, interested and affected parties, and sometimes the top-level executive management team may use to make decisions and influence opinions. Moreover, when an external report was presented, broad-based context was provided to give the external stakeholder an articulate view of the economic and social benefits that will be realised upon completion of the project milestones. External reports concentrate on "*contextualising and providing [a] close-loop storyline whereby the reader is not left with [any] unanswered questions*." What is more, they seldom reflect information at project level, rather they reflect a programme or portfolio view, giving the stakeholder a bird's eye view of events taking place within the organisation. External reports seldom contain confidential and sensitive information. Yet at the same time they provide a snapshot that gives external stakeholders the desired decision-making view. These reports may be periodically issued by the organisation out of its own volition or they may be requested by an external stakeholder.

7.5 Second Objective: Outcomes of the Existing Project Status Reporting Processes

Now that the project status reporting processes that currently exist have been identified and articulated, this study now turns to the second secondary research objective, which is aimed at ascertaining and engaging the outcomes of these project status reporting processes. Similar to the first secondary research objective, this will be fully addressed by primary data. The interview guide contained nine questions that were used to answer this secondary research

objective, as indicated in Figure 7.1 above. Primary data for seven of the nine questions has been analysed and presented above in the section dealing with the first secondary research objective. Therefore, on the whole, this data will not be re-analysed and re-presented. Instead, this research study will only summarise the already presented data in the context of the secondary research objective being dealt with in this subsection – viz., to articulate the outcomes of the project status reporting processes that are currently in existence.

Clear expression of the existing project status reporting processes is important. Undoubtedly, it will aid understanding thereof. But more importantly, it will facilitate the articulation of the variables of these processes. This is dealt with in section 7.6 below. Ultimately, clear expression of these processes and variables thereof will aid the development of a framework that is able to overcome the challenges that SOCs face when reporting project status to internal and external stakeholders.

7.5.1 Outcomes of Communicating Targets and Milestones

The first of the already answered interview questions pertains to the communication of missed targets or milestones to immediate superiors. It became evident from the responses that were provided that status reports containing information that is tailored to suit a specific target audience were issued daily, weekly, bi-monthly, monthly, and quarterly. A variety of Microsoft Office Suite programs which could best represent the activities taking place onsite were used to issue these reports. These reports were aimed at communicating missed targets or milestones, not only to one's immediate superior(s) or the project team, but to all individuals within the organisation that are privy to the information being shared. Reports also shared programme and portfolio information, so as to aid problem-solving and decision-making within the organisation. Information aimed at external stakeholders could also be communicated using customised project status reports.

The published reports gave the reader a view of the salient project management constraints, and the implications thereof if the constraints were not managed. They also indicated appropriate project targets and/or milestones, and whether the target had been met or not. If the latter was the case, why this was so, and what mitigation action was undertaken to ensure that the target was met. Depending on the target audience, such as Management Committees, Steering Committees and Operating Committees, and whether or not the report was internal or

external, the status information may be reported at project-, programme- or portfolio-level. However, in some instances, verbal communication may be used.

The next question pertained to the communication of important targets or milestones with team members. Upon the analysis of data, two themes became evident, formal meetings and regularly published reports. The status reports as well as the status meetings were used as a means to communicate important targets or milestones with team members. Formal meetings occurred daily, weekly, bi-monthly, monthly, or quarterly. These meetings included internal and external stakeholders. Status reports were shared within these meetings for alignment purposes and to interrogate the validity of the information contained therein.

Depending on whether the reports contain project, programme or portfolio information or not, they could be used to solve relevant problems as well as to make appropriate decisions within and outside the organisation at operational, tactical or strategic levels. Status meetings were driven by these status reports considering the intended objectives of the meeting. Regular reports which may also be published daily, weekly, bi-monthly, monthly, or quarterly to align with the meetings were distributed using Microsoft Office Suite, Aconex, shared network drives, direct and broadcast emails, PMIS, corporate communiques, and so forth. Reports generally included salient project management constrains such as those discussed under chapter three above.

The outcomes of the existing project status reporting processes were also determined by the means and/or resources that were used to report project progress within the organisation. The analysed data revealed that both tangible and intangible resources were used to report project progress. The Microsoft Office Suite was mentioned as the most popular set of programmes that were used to populate routine and *ad hoc* reporting templates for the production of project status reports. Standardised templates were used to ensure consistency throughout the organisation. However, there were instances where a standardised template could not be used, in which case an *ad hoc* template was developed on-the-fly by the reporting team. Aconex, shared network drives, direct and broadcast emails, PMIS, and corporate communiques were also determined as a means to publish project status reports. Primavera was used for the tracking of activity schedules to further inform the status reports. Human capital was undoubtedly the most important resource used to report project progress within the organisation which enabled the other resources to be functional.

The importance of using similar benchmarks to communicate status updates cannot be overstated within a large, geographically dispersed organisation. With this in mind, the measures that were put in place to ensure that similar benchmarks were used when the project team communicated projects status updates was the next question that was used to determine the outcomes of the existing processes. The respondents indicated that project status reporting templates were, as far as possible, standardised throughout the entire organisation. Templates were approved at the executive level and cascaded down to all employees within the organisation. The Terms of Reference, standardised procedures, or extensive and regular engagements and consultations were undertaken to ensure that similar benchmarks were used by the entire Project Team. The EPMO was regarded as a key enabler in ensuring consistency where similar benchmarks were not being used by, and within, the projects, programmes and portfolios. If these measures function as they should, the outcome is that the project team and the reporting team will be aligned, and these two stakeholders will be aligned with all other stakeholders within the organisation. Moreover, internal stakeholders will be aligned during their engagement with external stakeholders.

Dealing with inaccurate information that is reported by site personnel or inaccurate information that is reported to management were the next two issues that were interrogated to determine the outcomes of the existing processes. With regards to inaccurate information that was reported by site personnel, physical checks were done to verify the true status of the project. In cases where this was implausible for one reason or the other, site pictures served as evidence. Thereafter, measures were introduced to prevent reoccurrence. Having a single source of information from where other downstream reports follow certainly facilitates the reporting process.

With regards to inaccurate information that is reported to management, it became clear that management played a key role in addressing issues pertaining to the publishing of incorrect project status information. Respondents said inaccurate information that had been reported had to be acknowledged by the responsible party as soon as such information was detected and, thereafter, the report had to be recalled and a revision published if the circumstances permit. Management, as one of the most important stakeholder in this regard, would then put in place a process to assess the impact of the inaccuracy before considering and implementing appropriate changes. From other responses provided, it became evident that project-related documents, Terms of Reference, standardised procedures, or extensive and regular

engagements and consultations may be used to settle disputes pertaining to project-related inaccuracies.

The last of the already analysed questions presented above in the section dealing with the first secondary research objective aimed to establish how the reporting team handled the intolerance by management regarding perceived substandard project progress. The key theme that became evident was that communication was vital in handling the intolerance by management regarding perceived substandard project progress. As discussed in detail in subsection 3.2.2.8, project reporting and communication are

> '…the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information' (*PMI, 2013: 287*).

Information that is communicated to management by the reporting team must be able to be verified with, and validated against, other data sources to enhance acceptability, and must preferably be obtained via a single point of consolidation that is credible. It is fundamental to ensure that management understands that intolerance of the reporting does not translate into competency onsite. Instead, the outcome should be that the project status reports enable management to identify and address the areas of concern.

7.5.2 Outcomes Pertaining to Frequency and Resolution of Discrepancies

After summarising the responses that are applicable to the second secondary research objective which were unpacked in the above section, this study will now analyse the primary data pertaining to the two interview questions that were not previously discussed. The first question, which is aimed at reiterating the outcomes of the project status reporting processes, attempts to determine the frequency of project status discrepancies amongst team members. The question that was asked was: how often do you find discrepancies between your project status interpretation and the interpretations of other team members?

Eleven of the sixteen respondents said that discrepancies happen often, regularly, weekly, or monthly. The causes for this frequency were people working in silos, self-preservation, absence of a single source of reporting, people reporting subjectively, poor statistical understanding, lack of experience, different levels of management, and numerous project status interdependencies and interfaces. The remaining five respondents said that the occurrence was rare, infrequent or minimal. The reasoning behind this perspective was that there were regular

project meetings taking place to ensure alignment and the project team members were regarded as highly qualified professionals in their respective disciplines.

The summarised overview of the responses can be seen in Figure 7.10 below. The fact that the majority of the respondents said that discrepancies happen often, regularly, weekly, or monthly makes a case for the proposed project status reporting framework, to minimise, perhaps altogether eliminate, this.

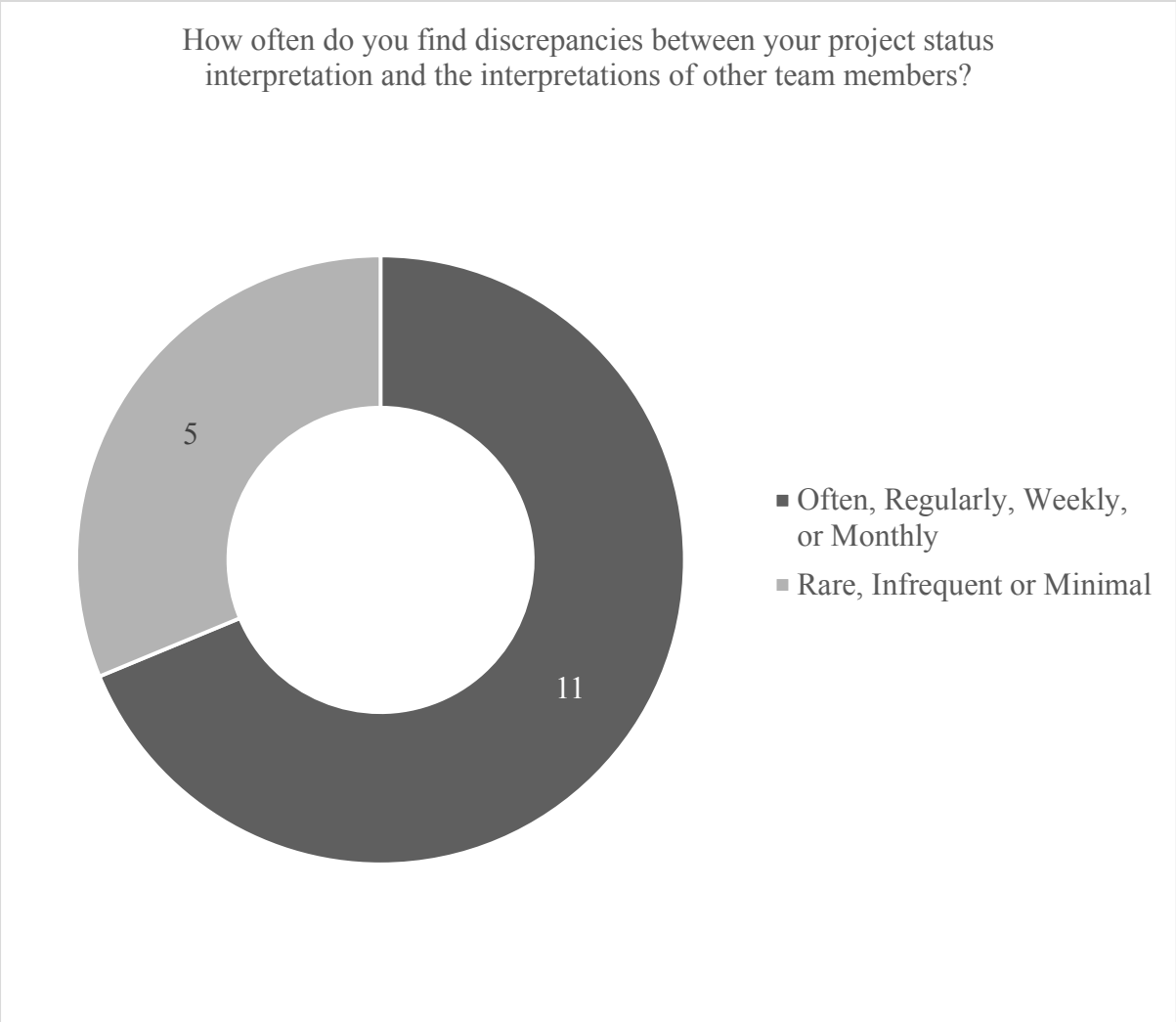


Figure 7.10: An overview of the responses for question 18 of the interview guide, aimed at determining the frequency of the reporting discrepancies

Source: Primary Data, 2018.

Finally, the respondents were asked how they went about addressing the discrepancies that occur as a result of these processes to ensure alignment. Figure 7.11 indicates a frequency word

cloud of the responses provided to this interview question. After further analysis of this data, three themes emerged. These are feedback meetings, verification of relevant project information, and problem-solving sessions.

Figure 7.11: A frequency word cloud pertaining to question 19 of the interview guide: How discrepancies that occur are addressed to ensure alignment?

Source: Primary Data, 2018.

The most prominent theme was that meetings were used. These meetings, whether periodic or *ad hoc*, were said to consist of important project team members and discipline leads. The second most prominent theme was that detailed project progress verification was undertaken. This may take the form of comprehensive desktop investigation exercises, physical site visits, verification of signed project-related documentation, examination of emails, using expert

judgement, and so forth. The third most prominent theme was that problem-solving sessions and war room sessions were employed. The corrected and validated information was then disseminated to all relevant stakeholders.

A senior project manager warned that within the organisation "*the most powerful usually force their way through the issue*" using formal or positional power. As a result, a reporting specialist added, the issue may not be addressed as efficiently as it could be. Meanwhile, the programme manager argued that,

> "*The gradual dissemination to wider audiences through the governance process is designed to give site [personnel], project client and thereafter [the] organisation the opportunity to provide feedback, with the intention being that each layer look towards the nuances of the rest of the chain prior to accepting the information and method of presentation. The presentation is tweaked as it is passed through the governance process in light of the comments made.*"

7.6 Third Objective: The Key Variables of the Reporting Processes Assuring Accurate Project Status Reporting to Stakeholders

The projects status reporting processes currently in existence and the outcomes thereof have been ascertained. This study will now turn to the third secondary research objective, which is aimed at ascertaining the key variables of the reporting processes that have been put in place to assure accurate flow of project status information to stakeholders. This research objective will be addressed partially by primary data. Primary data will be complemented by, and contrasted with, secondary data discussed as part of the reviewed literature. The interview guide contains nineteen questions that were used to answer the third secondary research question, as indicated in Figure 7.1 above. Primary data for seventeen of the nineteen questions has been analysed and presented above under sections 7.4 and 7.5. Considering the purpose of this section, this research study will only articulate the already presented data whilst complementing and contrasting it with secondary data. The aim is to ascertain the key variables of the reporting processes that have been put in place by large, geographically dispersed SOCs to assure accurate flow of project status information to both internal and external stakeholders.

7.6.1 Prominent Project Management Themes: Primary Data vs Secondary Data

Before a comparison of the project management constraints identified using primary data can be contrasted with those ascertained from secondary data, this subsection will first articulate the variables of each constraint identified in primary data. The constraints that were identified

in primary data – which will then be articulated with the assistance of secondary data – can be encapsulated using Figure 7.12 below. This figure shows the prominent project management constraints at the top of this organisational chart. Below each project management constraints are the variables linked to that particular constraint.

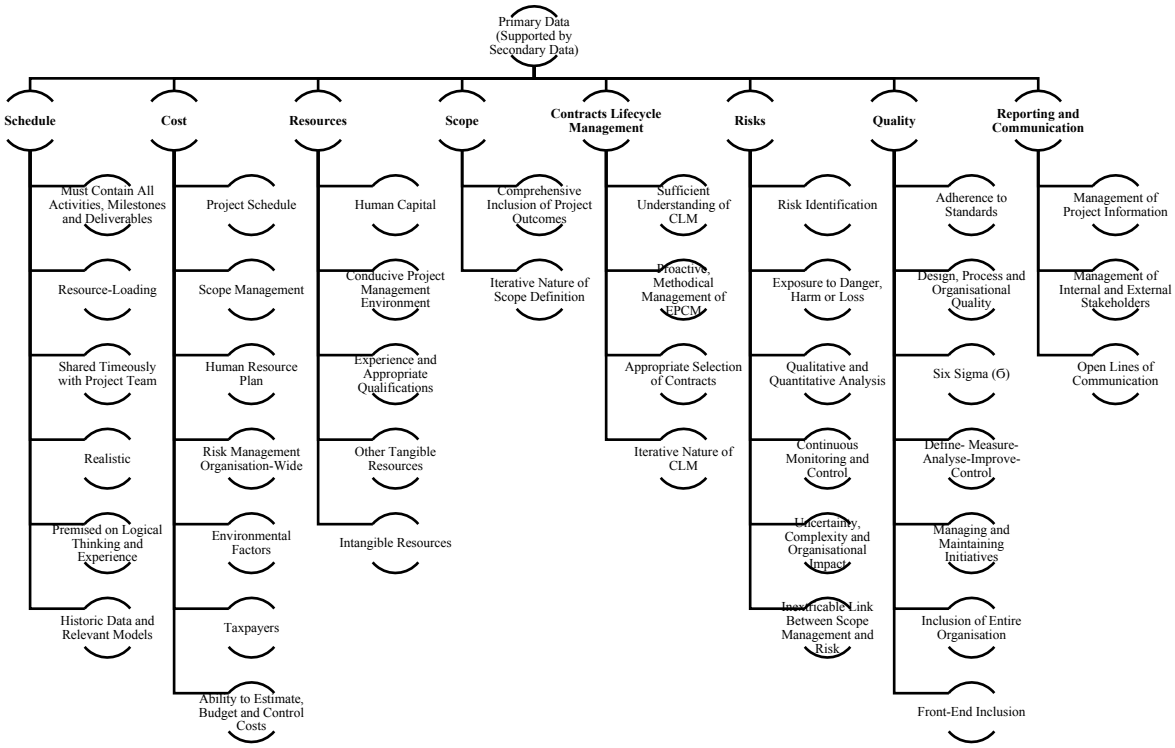


Figure 7.12: Key variables of the constraints that were identified by primary data, articulated with the backing of secondary data.

Source: The Researcher, Compiled from Primary Data Supported by Secondary Data, 2019.

Note: *Delays in approval processes, centralised and digitised project management tools and software, and lack of project governance have not been included in Figure 7.12 above. These are emerging concepts, which will be unpacked in subsection 7.7.3 below to evaluate their potential for inclusion into the developed project status reporting framework.*

The first of the already analysed and presented data pertained to the most important project management constraints in the experiences of the respondents. According to the respondents, these were identified as schedule (also referred to as time), cost, resources, scope, contracts, risk, quality, and communication. Figure 7.1 gives the reader a view of the nodes that were coded with the purpose of ascertaining the key variables of the reporting processes, which is the secondary research objective currently under investigation. Figures 7.13 to 7.18 are word trees that show context of these project management constraints to demonstrate the number of mentions by the respondents. Word trees of 'schedule' and 'time' as mentioned in primary data that was specifically coded to address this secondary research objective can be seen below in Figures 7.13 and 7.14 respectively.

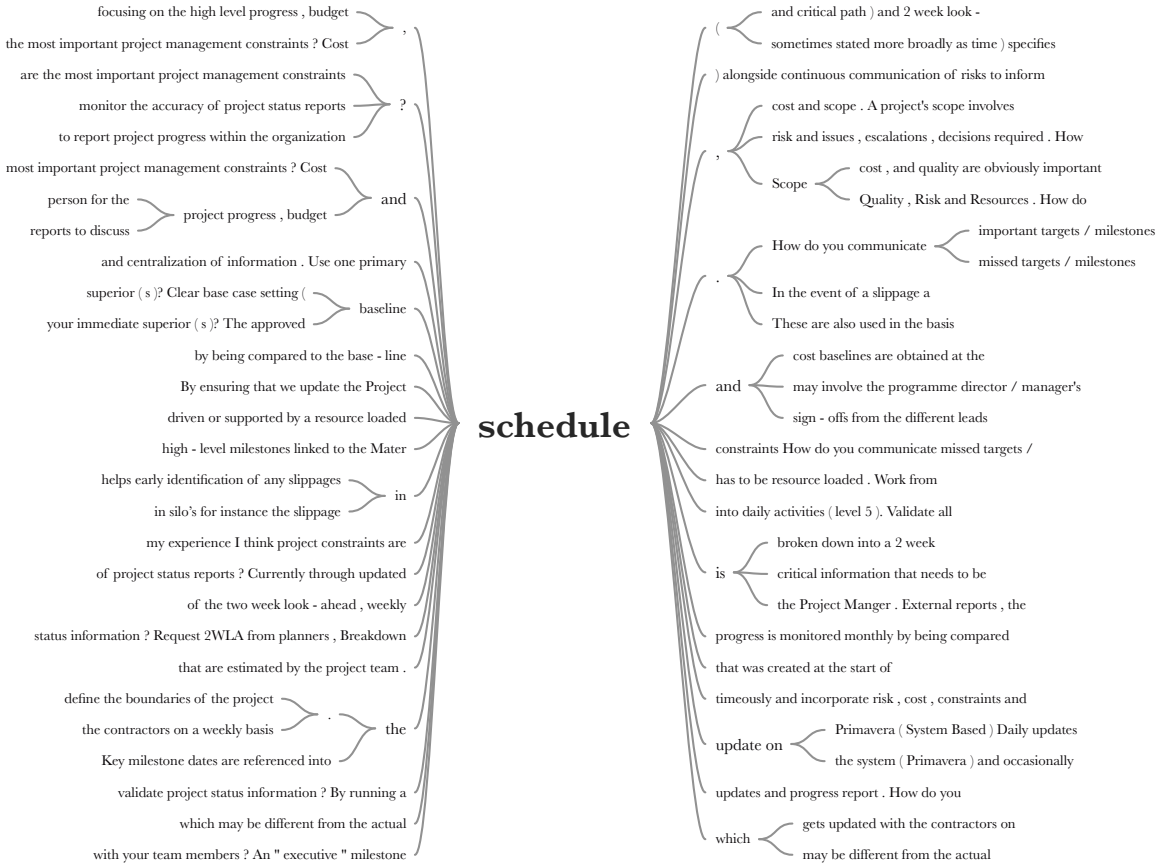


Figure 7.13: Schedule word tree

Source: Primary Data, 2018.

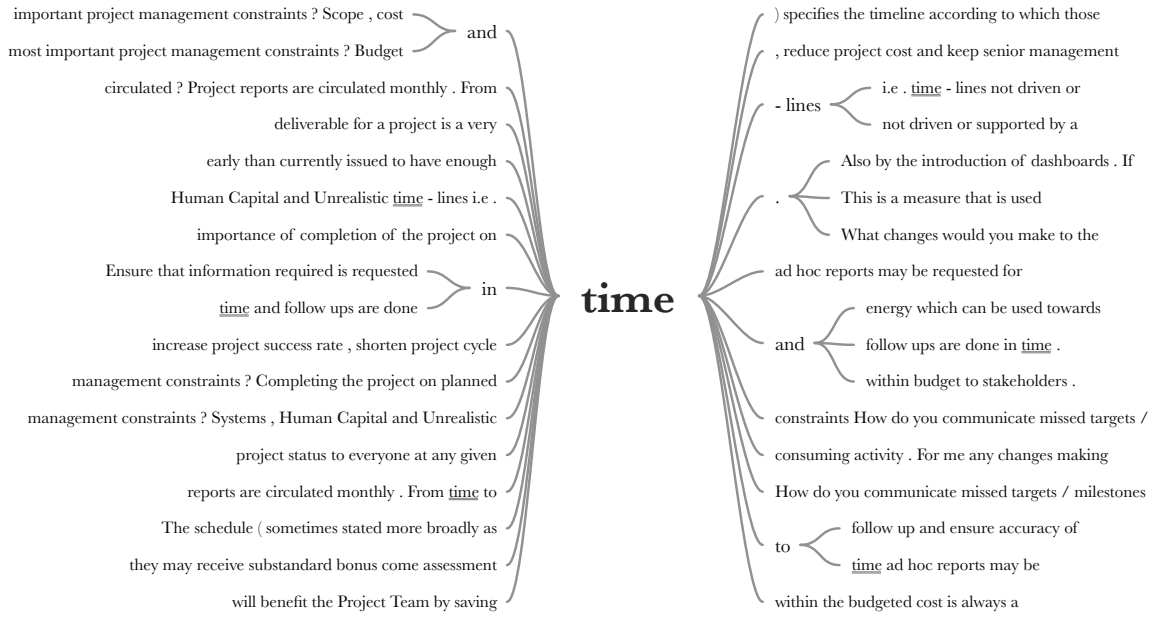


Figure 7.14: Time word tree

Source: Primary Data, 2018.

Schedules were thought to be constrained because they were not resource-loaded, activities pertaining thereto were not shared with the project team on time, or they were unrealistic. In subsection 3.2.1.2 above, a project schedule is described as a timetable containing activities, milestones and deliverables for the entire project, reflecting all the work that is to be completed during the lifecycle of the project – from inception through to close-out. The key variables of project schedule management include defining the project activities, sequencing those activities, estimating requisite resources, approximating respective durations, developing a project schedule, and finally, controlling the produced schedule (Newton, 2015b; *PMI, 2013*).

Although dedicated project management software is used to manage the project schedule, this multi-disciplinary process is still, to a large extent, dependent on logical thinking and experience. The suggestion by Meyer and Visser (2006) that historical data and relevant models simulating the project environment are factors that are capable of informing the project schedule estimates concurs with this view. Inappropriate scheduling has the potential to cause cost overruns, thus there is critical interdependency between project scheduling and costing.

The latter is another project management constraint that was considered important by the respondents

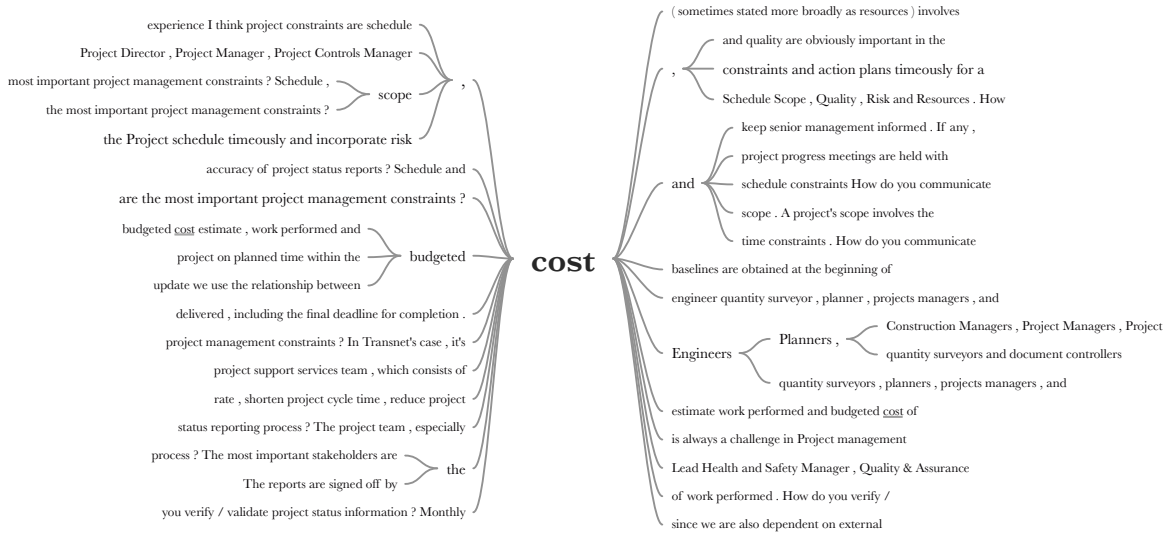


Figure 7.15: Cost word tree

Source: Primary Data, 2018.

The difficulty of completing projects on time and on budget was recognised by the respondents. Amongst other factors such as the project schedule, human resources plan, risk management, organisation-wide environmental factors, and organisational processes, estimating cost is also a factor that is influenced by scope management (*PMI, 2013*). The respondents were of the view that project costs tend to act as a limiting factor to various resources that may be required for project execution. The respondents emphasised cost as a key constraint primarily because SOCs are funded through taxpayers' money. Subsection 3.2.1.1 outlines cost as a set of processes involved in estimating, budgeting and controlling costs in a manner that will allow the project to be completed within the approved budget (*PMI, 2013*). Meanwhile Smith (2014; 2016) argues that project cost management must be acknowledge as a specialised technical field that requires its own specific standards.

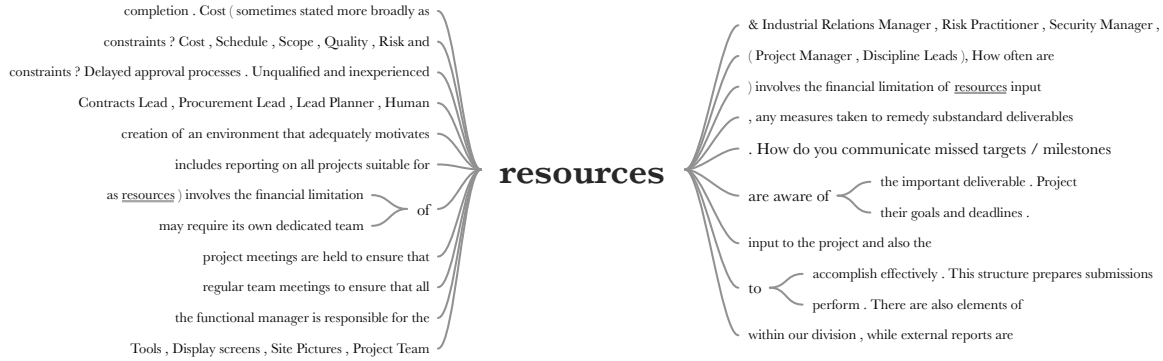


Figure 7.16: Resources word tree

Source: Primary Data, 2018.

Resources were the next project management constraint that the respondents considered as of absolute importance. Strictly speaking, they made a reference only to people. One respondent said that it was difficult to place people in a project management environment that motivated them to perform at their peak. Whereas another viewed certain people within the project environment as lacking experience and appropriate qualifications. However, human capital is only one of the tangible project management resources discussed in subsection 3.2.2.1. The others include things such as tools, machinery, infrastructure, facilities, funding, raw materials, and the like. On the other hand, intangible resources include, amongst others, skills, intellectual property, trademarks, patents, authorisations, and permits. The key variability regarding project management resources is that the respondents failed to expressly communicate most of the resources that have a potential to affect organisational project status reporting processes. The respondents only communicated human capital which, nevertheless, is regarded as the most important resource even though it tends to be neglected after the completed project has been delivered to the customer (Homayounfard and Safakish, 2016).

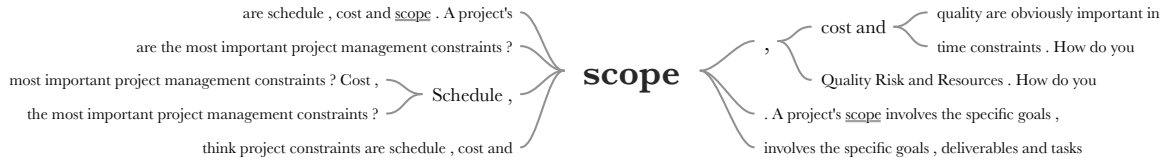


Figure 7.17: Scope word tree

Source: Primary Data, 2018.

Without being explicit, respondents mentioned scope as the fourth most prominent constraint. Further details about this constraint can be found under subsection 3.2.1.3. Project scoping should encompass a comprehensive description of the desired project outcome whilst ensuring that unrequired, additional work is identified and excluded (*PMI, 2013*). The Project Management Institute identifies scoping as a process where each step occurs at least once during the project lifecycle. Khan (2006) adds that the iterative nature of scoping means that information that is generated during project execution feeds back into the system, aiding decision-making. Newton (2015a) argues that the most effective way of completing project deliverables and project goals within the tight confines of time and cost is to develop a clear and comprehensive scope statement. Furthermore, this study – in subsection 3.2.2 – shows that there are numerous other project management constraints – over and above time and cost – which should also be considered during scope development.

Figure 7.18: Contracts lifecycle management word tree

Source: Primary Data, 2018

The fifth most prominent constraint was contract lifecycle management where the respondents said that there was insufficient understanding of contract-related constraints, poor management of the EPCM contractors or inappropriate selection of contracts for execution. In subsection

3.2.2.7, contract management is shown to be a nine-step process which entails the 'proactive, methodical management of a contract from initiation through to award, compliance and renewal' to improve efficiency, save costs and decrease liability, non-compliance and risk (Villanova University, 2018).

Other constraints that were mentioned by the respondents were quality management, risk management and project reporting and communication which led to poor understanding of roles, as discussed in subsections 3.2.1.4, 3.2.2.2 and 3.2.2.8 respectively. According to the *PMI (2013)*, these concepts are regarded as follows: Quality management is a process that regulates quality within the project to ensure the project will satisfy the needs for which it was undertaken; risk management involves the management of adverse effects within the project environment to minimise exposure to danger, harm or loss; and, project reporting and communication is required to ensure timely and appropriate management of project information.

The management of schedule, cost, resources, scope, contract lifecycle, risk, quality, as well as reporting and communication were considered imperative by the respondents. However, to assure that holistic project status information is shared with internal and external stakeholders, chapter three shows that the management of health, safety, environmental, documentation, and procurement must also be considered as part of the equation. These project management themes are variables that are of paramount importance to project status reporting within large, geographically dispersed South African SOCs. Figure 7.19 below diagrammatically illustrates the sources of the project management themes that are key variables of project status reporting in South African SOCs as discussed above. According to the analysed primary and secondary data, reporting on these will assure accurate flow of project status information to internal and external stakeholders. As such all these themes will be reflected in the project status reporting framework that is being developed. This will be considered in subsection 8.3.2 below.

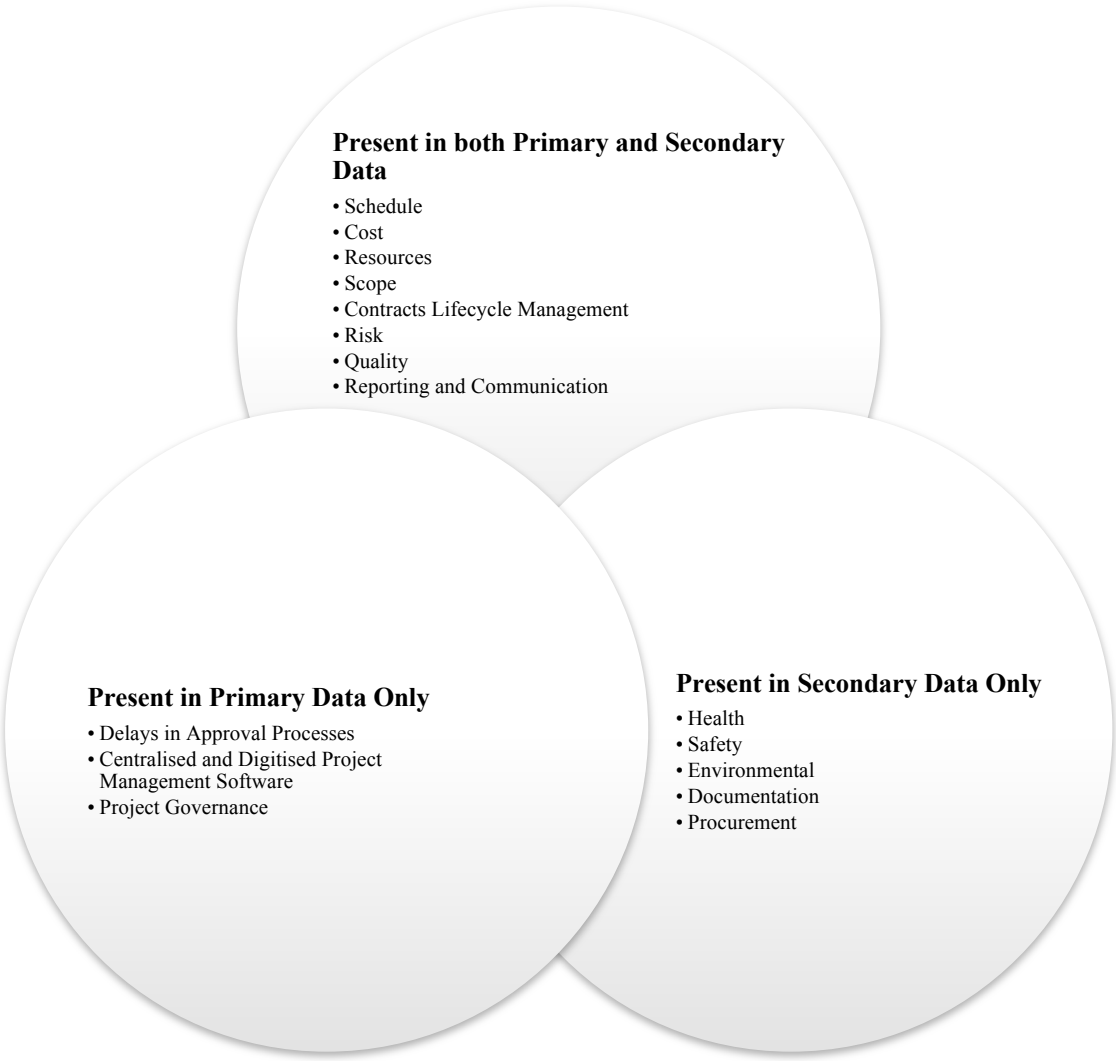


Figure 7.19: Sources of project management themes to be considered during development of a holistic project status reporting framework

Source: The Researcher, Compiled from Coded Transcripts and Reviewed Secondary Data, 2019.

On the other hand, primary data has revealed themes that were not conspicuous during the literature review. Delays in the approval processes, managing megaprojects without centralised and digitised project management tools and software, and lack of project governance are all emerging factors that were not revealed during review of secondary literature. These project management themes will be deliberated on in subsection 7.7.3.

7.6.2 Variances in the Communication of Targets and Milestones

After the most important project management constraints in the experiences of the respondents were determined, the respondents were asked to state the means that are used within the organisation to communicate missed targets or milestones to immediate superiors. The key variables thereof were ascertained from analysis of the responses provided. The respondents stated that a variety of Microsoft Office Suite programs that best represent the projects status activity onsite were used to communicate missed targets, with reports issued daily, weekly, bi-monthly, monthly, and quarterly. Aside from the routine reports, *ad hoc* reports may be issued at the request of the stakeholders and verbal communication may also be used in appropriate settings.

The content of the reports was tailored to suit audiences in various governance structures such as Management Committees, Steering Committees and Operating Committees, and, as one senior project manager put it, is "*stipulated in the project communications management plan*". The overarching aim of the reports was to indicate what the targets were in terms of the project management constraints shown in figure 7.19 above, whether or not the targets had been met as well as the mitigation actions that would be undertaken to ensure that the targets were met, if applicable. In a nut shell, with regard to the communication of missed target to superiors, the key variables are the fact that reporting may be verbal or written, the frequency thereof varies and the content of the reports is tailored to suit the target audience.

The key variables of the reporting processes that have been put in place to assure accurate flow of project status information to superiors should not fundamentally differ from one that is aimed at communicating with juniors or team members. This is not only practical, but it ensures alignment within the organisation. In this regard, the next question that the respondents were asked was to explain how important targets or milestones were communicated with the team members. The responses can be summed up in the following manner. It came out that the schedule, as well as interdependencies with other milestones, was used to communicate key targets. Milestones communicated to the executive were less detailed than those communicated with project team members. Formal meetings that included all relevant internal and external stakeholders and regular progress reports for the consumption of these stakeholders were used to communicate missed targets or milestones with team members. These meetings were driven by action registers. Furthermore, the frequency of formal meetings and the publishing of progress reports occurred daily, weekly, bi-monthly, monthly, or quarterly.

By and large, there were no fundamental differences between the key variables used to apprise team members and those that were used to apprise superiors. The key difference was that the information that was communicated with team members contained a lot more detail than that which was communicated with executives. Figure 7.4 above shows a diagrammatic representation of the relationship between the means used to communicate missed targets to one's immediate superiors, to one's team members and to both groups.

The next question that was interrogated was aimed at ascertaining the means and/or resources used to report project progress within the organisation. From the responses provided it became evident that a range of tangible and intangible resources were used to assure accurate flow of project status information to internal stakeholders. As can be seen in subsection 3.2.2.1, there is a wide range of tangible and intangible resources. The predominant Microsoft Office Suite programmes that were mentioned by the respondents as being used to present project status information were Excel and PowerPoint. The information that was contained in these reports was obtained from the project teams. Routine reports utilised predetermined templates whereas *ad hoc* reports were governed by the information that was contained in the reports in conjunction with the target audience. The flashing of information on large display screens located in common areas could also be used to report project progress.

However, reporting within the organisation is a function that does not solely reside with the reporting team; it belongs to various departments. The reporting team compiles and consolidates the reports whereas the various departments provide their respective input. With regard to the resources used to communicate project progress within the organisation, the following variables became evident. Both tangible and intangible resources were used. The frequency of project status meetings was aligned to the publishing of project status reports within the organisation and various Departments within the organisation contributed towards report compilation.

Although the next question was inadvertently answered by some of the responses emanating from other questions contained in the interview guide, the respondents were asked how frequently the organisation circulates formal project status reports. As presented in Figure 7.5, they said that the reports may be published daily, weekly, bi-monthly, monthly, or quarterly. As one analyst put it, the information to populate the project status reports was collected daily, project status meetings were held weekly and reports were published monthly. Meanwhile a senior project manager said that operational reports were published weekly, tactical reports

were published monthly, and strategic reports were published quarterly. The response by the senior project manager is aligned to the functions of the Enterprise Project Management Office, the Enterprise Programme Management Office and the Enterprise Portfolio Management Office discussed in chapter four above which function at operational, tactical and strategic levels respectively. In certain instances, routine reports may not suffice. Occasionally, *ad hoc* reports that will be used to address a particular query may be requested by the stakeholders depending on the organisation's operational, tactical and strategic needs. The key variables regarding the frequency of the circulation of project status reports is that it differs depending on the stakeholders being apprised. Moreover, the reporting can be routine or *ad hoc*.

The next key variable of the project status reporting processes pertained to the monitoring of the accuracy of reports. In this regard, respondents said cost and schedule baselines at the beginning of the project or programme were used to track the accuracy and to ascertain deviations therefrom, a view that the Project Management Institution concurs with, as can be seen under subsections 3.2.1.1 and 3.2.1.2. In fact, baseline monitoring, verification and control are activities that take place from project inception through to project close-out. Furthermore, the respondents said that the approved schedule was broken-down into a level five, two-week look-ahead for physical tracking of individual activities onsite against the plan. Thereafter milestones and key performance indicators were updated, key risks and issues were tracked for mitigation, and project status reports were generated. To determine site progress, foremen, construction managers and project managers were engaged. The consistency of reporting was ascertained by trending reports from one reporting period to the next.

Project status reports have to be verified and validated to ensure that the aforementioned objective of accuracy monitoring is a success. Accordingly, as part of the reporting processes put in place to assure the accurate flow of project status information to internal and external stakeholders, respondents were asked what system had been put in place to ensure that project status information is verified and validated. The breaking-down of the approved project schedule into a level five, two-week look-ahead for physical tracking of individual activities onsite against the plan, and using this to track project progress onsite, were key to verification and validation of project status reports. Holding monthly cost meetings and project progress meetings with the relevant internal and external stakeholders for the purposes of validating the project information, physically checking all the activities taking place onsite and requesting evidence either from the contractor or from the project team for the milestones that have been achieved, was used to verify and validate project status reports. The key variables can also be

seen in a summarised synthesis of the events for the verification and validation of project status information shown in Figure 7.7.

The final approval of reports before they are published within and outside the organisation was, as a key variable of the reporting process, attributed to the project/programme controls manager, to the project/programme managers and to the project/programme director. These individuals played a vital role in ensuring that reports to internal and external stakeholders were approved as an indication that they contained accurate and up-to-date information. Approval materialises in various forms; it can be written, verbal or electronic. Furthermore, the cost engineers, quantity surveyors and the planners played a pivotal role with regard to verifying and validating internal reports and, on the other hand, the senior manager, project/programme director, general manager, the project sponsor, and/or the chief executive signed-off external reports. The key difference is that the approving parties differ depending on the governance body being approached or the stakeholder being apprised. Nonetheless, there has to be a clear, auditable trail between the various nuances of information thus allowing for consistency of the project status reporting process.

When asked to identify the most important stakeholders that are involved in the project status reporting process within the organisation, a lengthy list was to be expected if one considers the number of individuals who approve the reports before they are published, as mentioned in the paragraph above. In answering this question, the respondents identified all the stakeholders mentioned above as well as Departmental heads of Health and Safety, Quality and Assurance, Engineering, Procurement, Human Resources, Industrial Relations, Risk Management, Security, Reporting, Environment Management, and Document Control. Depending on the information contained in the report, some individuals were the originators, some were the consolidators, some were the approvers, and others were the consumers of the respective project status information reports. Important external stakeholders were identified by the respondents as the project sponsor and the contractor. With the exception of Industrial Relations and Security, all the disciplines that are identified as important in the project management environment by the respondents are also deemed as essential by literature reviewed in chapter three. They have the ability to influence and constrain projects that are executed by large, geographically dispersed organisations.

With such a diverse list of stakeholders, communication was pre-empted as an issue that would have a potential to cause variability within the organisation. With this in mind, respondents

were asked to identify how the project team communicated project status updates in a manner that ensured that similar benchmarks were used by the entire team. Standardised templates became the prominent theme, with all discipline leads required to give input into their assigned sections via a centralised point of consolidation. Templates were approved at executive level and thereafter rolled-down to the remainder of the organisation to ensure consistency. In certain instances, Standard Operating Procedures and Terms of Reference were used to ensure that a similar approach was followed, and regular engagements and consultations were undertaken prior to the publishing of project status information.

7.6.3 Variability Pertaining to the Frequency and Resolution of Discrepancies

Considering the geographical dispersion of the organisations to which this study is applicable as well as the pertinent number of internal and external stakeholders, discrepancies concerning various interpretation of project status reports were inevitable. As a key variable of the project status reporting process, respondents were asked to state the frequency of the discrepancies between their interpretation and the interpretation of other team members. The predominant theme was that discrepancies were frequent as they were said to happen often, regularly, weekly, or monthly (see Figure 7.10) as a result of people working in silos, self-preservation, absence of a single source of reporting, people reporting subjectively, poor statistical understanding, lack of experience, different levels of management, and numerous project status interdependencies and interfaces. Therefore, the silo mentality, self-preservation, numerous reporting resources, subjectivity, poor statistical understanding, lack of experience, differing levels of management, and project interdependencies and interfaces are seen as key variables affecting accurate flow of project status information to internal and external stakeholders.

After addressing key variables of the reporting processes that have been put in place to minimise discrepancies between the interpretations of project status report amongst team members, the researcher wanted to ascertain how the discrepancies that arose were addressed by the team to ensure alignment going forward. The most prominent theme was that periodic and *ad hoc* meetings consisting of key stakeholders such as the project team, discipline leads and senior management were used. The second most prominent theme was the undertaking of thorough project progress verification in the form of desktop exercises, site visits, verification of signed documentation, examination of emails, and utilisation of expert judgement. Problem-solving sessions and war room sessions may also be used to address discrepancies and to ensure

alignment. After discrepancies had been addressed and the correct information had been determined, all relevant internal and external stakeholders were updated via a gradual feedback loop, to give stakeholders an opportunity to provide comment. This feedback loop was designed to give each layer of the organisation an indication of earlier reporting prior to accepting the information and the method of presentation, with the potential for the information to be modified as it passes through the loop.

To further assure accurate flow of project status information to internal and external stakeholders, the next variable that was interrogated was to find out how the organisation deals with inaccurate information that had been reported to management. According to the responses received, the best way was to acknowledge the mistake or inaccuracy as soon as it was detected, and to retract and revise the report prior to resubmission should circumstances permit. The process of elimination was then used by management to find the source of the inaccurate information. A process to accurately account for all the deviations was then initiated, the impacts of the issued erroneous report were assessed and, if management permitted, the necessary changes would then be made. Minutes of the meetings, a Project-Specific Agreement, a Project Change Notice, or any other formally accepted documentation could be used to verify the information that had been reported to management. Nevertheless, having a centralised point of reporting was a theme that would also supposedly reduce the variability of the reporting process and ensure accurate reporting to stakeholders.

After management had been assessed as a variable of the reporting process, the study then turned its attention to assessing the variable that is site personnel in ensuring accurate flow of project status information to internal and external stakeholders. Upon analysis of primary data, it came out that site walks were undertaken to physically verify the information on site and, in cases where physical verification was not plausible or was impossible, evidence in the form of site pictures was considered sufficient. In the case of the latter, enough evidence had to be provided to prove that the milestone had been achieved, otherwise the milestone remained as unachieved. From what had been said, it is clear that having numerous sources of information may have a negative impact on the reporting process. Hence the argument for a single source of reporting forwarded by the programme manager adds a lot of value. If possible, measures may also be put in place to prevent reoccurrence. However, for erroneous reporting that was done maliciously, one-on-one discussions would take place as a form of deterrence, or the issue would be escalated to the line manager, the project/programme manager or the

project/programme director to resolve, or disciplinary action would commence if the issue was deemed of a serious nature.

The last of the already addressed questions pertained to the handling of intolerance by management regarding perceived substandard project progress. With regard to this variable, the key themes that emerged were that communication which is undertaken using a variety of channels was regarded as a vital tool for handling the intolerance by management relating to perceived substandard project progress. Communication may take many forms. These included procedures, processes or templates highlighting the importance of compliance and the consequences of non-compliance, clearly articulated written statements so as to maintain a paper trail, timeous requisition of necessary information, "*generating reports that display accurate and non-biased information*" that had been verified by appropriate stakeholders and presenting such at all times, and/or war room meetings. However, a manager who failed to tolerate substandard project progress was implored to be cognisant of the underlying principle. Displeasure at the reporting of project progress does not determine whether project progress improves or not. Instead actual activities onsite should be addressed using the report as grounds for the intervention. Hence, the reports should enable decision-making aimed at addressing substandard progress onsite.

7.6.4 Potential Changes to the Project Status Reporting Process

As far as the key variables of the reporting processes that have been put in place to assure accurate flow of project status information to internal and external stakeholders, responses pertaining to the following two questions have not previously been analysed. The first relates to the regional location of the projects managed by or associated with the respondents. In this regard, and after careful consideration of the facts at hand and the primary data that has been analysed, the researcher was of the view that no value would be added to this research study by considering variability of the responses according to their regions.

The second question pertains to the changes that the respondents would make to the reporting processes that were in existence. In this regard, various themes emerged as indicated in Figure 7.20 below. Some said that reports should be automated, interactive and centralised because of the following benefits: Human error would be minimised; information would be available instantaneously, at the press of a button; specialised project management software would empower the organisation; and the fact that it was required by the National Treasury

Framework as far as programme reporting was concerned. Moreover, the central repository for storing all the status information should be validated by discipline leads through internal meetings taking place after walk-throughs and site inspections.

Figure 7.20: Changes that the respondents would make to the project status reporting process

Source: Primary Data, 2018.

The varied responses to the changes that respondents would implement should such an opportunity arise, were as follows: A PMO should be established to keep senior management informed and to facilitate successful project delivery; the reporting templates should be issued in good time to give the project team sufficient time to source and compile the information required in order to facilitate the accuracy of the data. the other side of the argument was that the project team should adhere to the reporting deadlines, which could be stringent when it came to *ad hoc* reports; reporting should be undertaken by a third party that has no direct involvement in project execution so as to provide an impartial perspective; focus should move away from activities and instead move towards results, away from micro-management and instead towards macro objectives; there must be a clear Benefits Realisation Map that is defined

and updated regularly and used for reporting against objectives that are clear, standardised and able to be tracked to improve understanding of the governance and decision-making processes; and the Project Management Plan, the Procurement Statement of Work and the Contract Management Plan must clearly articulate the project reporting process, requirements, deliverables, and deadlines.

One Project Manager was more articulate in his response. He said,

> "*Reporting the deliverables for a project is a very time-consuming activity. For me any changes making the report more user friendly, interactive and automated. These will benefit the project team by saving time and energy which can be used towards advancing the Project. Stakeholder lists need to be identified at the very beginning so reports may be distributed and ensure Project alignment. Good strong governance controls would benefit project reporting. For instance, roles and responsibilities for the project report would aid the process. Project reporting is too focused on the past and present events of a project. Indicating proactive trending and planned forecasting is a good area to include on a project report and will aid in the decision-making process when consulting higher management because the past events cannot be undone but changing the events of the future can decide if it is going to be a successful project [or not].*"

7.7 Fourth Objective: The Challenges Emanating from the Existent Project Status Reporting Processes

The fourth secondary research objective, which will be addressed by a combination of primary and secondary data, aims to determine and articulate the challenges that arise as a result of the existing project status reporting processes within large, geographically dispersed South African SOCs. All the pertinent primary data from the responses to the questions contained in the interview guide have been analysed under one or more of the three secondary research objective addressed in the sections above. These data were analysed with the primary purpose of answering the said research objectives. Now that these exercises have been completed, the primary data which has already been explored above will now be scrutinised to determine the challenges emanating from the existing project status reporting process as suggested by the respondents. Thereafter, secondary data will be consulted to better articulate the challenges expressed. This will play a fundamental role in informing the framework which is aimed at overcoming the challenges of holistic project status reporting that will be proposed in section 8.3 below.

7.7.1 Challenges of Project Management Themes Identified in Primary Data

In the interview guide the respondents were asked to identify the most important project management constraints. These are limitations or restrictions that affect the management of any project, regardless of shape, size or location. In terms of conspicuous challenges, discussed in descending order according to the amount of times mentioned (see figure 7.3), the respondents identified schedule, cost, resources, and scope.

Schedule was identified as a constraint because it was not resource-loaded in a manner that ensures that activities on the critical path are achieved timeously, or the scheduling was unrealistic from the outset. As discussed in subsection 3.2.1.2 above, developing a timetable containing activities, milestones and deliverables for the entire project, reflecting all the work that is to be completed during the lifecycle of the project – from inception through to close-out – is a complex endeavour that should take into consideration a variety of project management constraints. Scheduling is a multi-disciplinary process that is largely dependent on experience and logical thinking. It is an activity that has a strong correlation with cost overruns, loss of profit, disputes, and poor workmanship (Mukuka *et al.*, 2015). For instance, Newton (2015b) argues that project schedule management includes estimating and identifying the quantities and the make-up of the resources that are required to execute a project with a clear understanding of their availability, capability and sometimes cost.

There are a variety of project management challenges that emanate from cost as the second most conspicuous project management theme according to the respondents. Project cost management, one of the cornerstones of project management, is a set of processes involved in estimating, budgeting and controlling costs in a manner that will allow the project to be completed within the approved budget (*PMI, 2013*). Primary data identified external funding in the form of taxpayers' money that the SOCs must manage with the utmost care and the resources limitation which can occur as a result of this funding. The DPE is the sole shareholder of both Eskom and Transnet. Its responsibility is to provide investment, regulatory, productivity, and transformation guidance to the SOCs to assure alignment with South Africa's growth strategy in the medium to long term (*DPE, 2017a*), to lower the cost of doing business and to ensure security of supply (*Transnet, 2014*).

Good governance requires that the shareholder representative and all relevant stakeholders be informed of project cost management during the lifecycle of all projects with information that will facilitate decision-making and problem-solving. Failure to apprise stakeholder of

information regarding projects has a potential to negatively influence funding that is channelled towards SOCs. The proposed framework aims to provide this much-needed visibility as far as this challenge is concerned.

After cost, resource management was the next most prominent project management theme. The respondents argued that creating an environment that adequately motivates resources to perform at their peak can become a challenge, and unqualified and inexperienced people were a major constraint, especially in cases where the resource limitation had a negative impact on the project-related cost. Primary data only made a reference to one type of resource, human capital, which has a potential to negatively affect project status reporting processes. Homayounfard and Safakish (2016) have shown that human capital is extremely difficult to manage. That is why project staffing should be a process that takes into consideration the affected departments, communication between technical disciplines, lessons learnt from previous projects, relationships and influences that already exist, and the geographic location of the projects (Towe, 2004).

Nevertheless, as shown in subsection 3.2.2.1 above, there are a variety of tangible resources such as tools, machinery, infrastructure, facilities, funding, raw materials, and the like and intangible resources such as skills, intellectual property, trademarks, patents, authorisations, permits, and so forth. Moreover, resources cannot be dissociated from cost and schedule (Saputra and Latiffianti, 2015). From these premises, it can be seen that challenges that impact on resource management have wide-ranging implications within the project management environment.

Scope was the fourth most prominent constraint that was stated by the respondents as a project management theme with a potential to influence negatively project status reporting in large, geographically dispersed SOCs. As articulated in subsection 3.2.1.3, scope is a process of developing a comprehensive description of the desired outcome of a project to ensure that all the requirements are included and that no additional work is accounted for. It is an iterative five-step process where each step occurs at least once during the lifecycle of the project, moreover these steps tend to overlap and interact in a number of ways (*PMI, 2013*). These definitions are an indication of how challenging it may be to manage scope within the project management environment.

Furthermore, scope may be influenced negatively by scope creep and feature creep. The former, which should not be confused with official and formalised scope change, occurs

gradually and unofficially, without revising the schedule or adjusting the budget. It is the addition of new features and functionality to the project scope without addressing the effects on other project management constraints or without customer approval (*PMI, 2013*), which takes place when change is not properly defined, documented or controlled. Feature creep occurs when the project team indiscriminately adds features or functions in the hope that the customer will want these as part of the deliverables (Wysocki, 2009).

Albeit less conspicuous, other project management themes that became evident from the primary data were contracts, risk, communication, and quality. One of the project managers interviewed said that some project managers lacked sufficient understanding of contracts which could result in poor contractual management of the EPCM. Projects will be negatively affected if the project managers do not have impeccable understanding of the terms of agreements, general conditions, supplementary clauses as well as special clauses, and any other relevant conditions for the delivery of the construction works (Butuza and Hedre, 2010).

The need for knowledge of contracts was reiterated by another project manager who said that appropriate selection of the required contracts allowing the organisation to realise project requirements could constrain project execution if not managed. Some of the factors that need to be considered during contract lifecycle management include the project timelines, the type, size and location of the project, the allocation and mitigation of risk, the best possible way to separate the roles and responsibilities of relevant parties, prevailing market conditions, and project cost constraints (Chua and Loh, 2006).

Experience is vital in the anticipation and mitigation of risks which, if not managed appropriately, can have a severe impact on a programme. This was a view expressed by a programme manager. This view is also pertinent to the projects which make-up the programme. As discussed in subsection 3.2.2.2, exposure to danger, harm or loss that has a potential to affect objectives adversely is intrinsic to all projects, as a result of their uniqueness, complexity, change, assumptions, constraints, dependencies, and people within and outside the project (Hillson, 2004). Despite this fact, risks do not affect all projects in the same manner (Thamhain, 2013), thus making risks extremely difficult to manage.

What also makes risks extremely difficult to manage is that they vary throughout the lifecycle of the project (Toth and Sebestyen, 2015). Programmes are no different; they are exposed to as much risk as projects, if not more, and likewise in an inconsistent manner throughout their lifecycles. The factors which make risks difficult to manage also makes risks difficult to report

on. That being said, it is imperative that risk reporting be done in a manner that gives stakeholders information which will aid decision-making. Furthermore, risks cannot be divorced from other project management constraints. For instance, Le *et al*., (2009) argue that there is an inextricable link between scope definition and risk management.

In addition to the importance of the anticipation and mitigation of risks, the programme manager also stated that communication aimed at helping people understand their roles and responsibilities is important. Whereas one of the project managers interviewed said that project status reporting, whether verbal or written, was not always reflective of the activities taking place onsite which in turn meant that stakeholders could not always take appropriate decisions. As articulated in subsection 3.2.2.8 project reporting and communication are

> '…the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information.' (*PMI, 2013: 287*).

These processes bring with them challenges in the project management environment.

In contrast to ordinary project reporting and communication, Integrated Reporting encourages cohesive and efficient project status reporting that breaks down the silo mentality, reduces information duplication, and improves the quality of the information available to stakeholders. Integrated Reporting gives stakeholders sight of how the organisation strategically creates value over time. In this case the term stakeholder is not only reserved for individuals, groups, or organisations affected by the decision, activity, or outcome of a project as suggested by the *PMI (2013)* but it also includes shareholders, employees, customers, suppliers, partners, the physical environment, knowledge institutions, and society (Fried *et al.*, 2014).

Quality is the last of the project management theme that was mentioned by the respondents as being a challenge in the project management environment. Quality cannot be divorced from cost, schedule, scope or specification, and resources. These project management constraints interact in such a way that one cannot be altered without fundamentally affecting the others (Lock, 2007; *PMWL, 2017*; Wysocki, 2009). As elaborated in subsection 3.2.1.4, project quality management is a three-dimensional philosophy of adherence to standards – encompassing deliverables conforming to the customer needs – processes that exist within the organisation to ensure delivery of a quality product, and management of quality-related skills, communication, training, suppliers, partnerships, and stakeholders (Basu, 2012). Project quality management is a three-stage process that comprises activities regulating quality policies, objectives, roles, and responsibilities during project execution, to ensure that the

project will satisfy the needs for which it was undertaken (*PMI, 2013*). These are all challenges that a project team must manage.

7.7.2 Challenges of Project Management Themes Identified in Secondary Data

As mentioned earlier, the challenges emanating from the existing project status reporting processes will be addressed by a combination of primary and secondary data. Furthermore, it was said that secondary data will be consulted to better articulate the challenges expressed by the respondents. Utilisation of the two data sources will play a vitally important role in developing a holistic framework for project status reporting in South African SOCs, which is proposed in section 8.3 below.

It should be noted that the above challenges stated as the most prominent project management constraints by the respondents do not holistically account for all the challenges that have a potential to impact positively or negatively on projects executed by Transnet and Eskom. To demonstrate this, figures 3.1 and 7.19 above indicate the sources of these themes. Primary data asserts the importance of schedule, cost, resources, scope, contract lifecycle management, risk, quality, and communication. Content analysis referred to cost, social capital, health, safety, environmental, risk, and documentation (*Eskom, 2020*; *Transnet, 2020*). The Project Management Institute (2013) mentioned cost, schedule, scope, quality, resources, risk, procurement, and communication as of paramount importance in a project environment. In chapter three, an array of peer-reviewed articles and other secondary data were then used to supplement the view expressed by the Project Management Institute. Whereas document control (Al-Qady and Kandil, 2013; Groenewald, 2004; Inglesis, 2013; Kain and Koshy, 2013; Leikums, 2012) and contract lifecycle management (Butuza and Hedre, 2010; Chua and Loh, 2006; Exari, 2018; Trinkūnienė and Trinkūnas, 2014) were also included. As such it is important for this study to consider all these constraints when developing the framework.

Furthermore, it is important to articulate the constraints that were not evident during the review of secondary literature, which instead emerged during the analysis of primary data, to assess whether they will add any value to the framework or not. These constraints are, delays in the approval processes, managing megaprojects without centralised and digitised project management tools and software, and lack of project governance. Before this study turns to the discussion of the constraints that were stated by the respondents as important which were however not evident during the review of secondary literature, this study will first, briefly

summarise the challenges that emanate from the constraints articulated in chapter three which were not mentioned by the respondents. Namely health, safety, environmental factors, documentation, and procurement.

Health and safety will be discussed simultaneously because, as shown in subsection 3.2.2.3, the two disciplines are intertwined, not only in the construction sector but industry-wide. Health and safety in the workplace is governed by the *OHSA*, whose primary objective is to ensure that work-related injuries and illnesses are prevented across-the-board in industries operating within the South African borders, from ordinary office environments to more hazardous working environments *(RSA, 1993*). Nonetheless, the construction industry is a sector that experiences a high number of work-place accidents and illnesses mainly because the work environment remains largely labour-intensive and in a constant state of evolution as construction progresses. Ineffective enterprise occupational health and safety management, business continuity planning and overall risk management are challenges that an organisation, its employees, and management encounter (Hindley, 2010), more so within SOCs executing megaprojects of strategic importance.

Southern Africa faces a number of environmental stresses, such as low adaptability, climate change and dwindling water supplies. These can have an adverse impact on the flora and fauna within the region. Furthermore, it can be quite difficult for an organisation to localise environmental incidents, accidents and disasters. Therefore, it becomes imperative to apprise stakeholders accordingly of the environmental activities of business conducted by Eskom and Transnet to encourage compliance pertaining to legislation, standards and common codes of practice. Depending on the nature of the project being executed, the type, size and location thereof, the environment may be impacted in a number of ways. A comprehensive overview of these environmental impacts can be found in subsection 3.2.2.4. Due to their wide-ranging implications on internal and external stakeholders, environmental impacts may have detrimental effects if there is poor visibility and management thereof. The most prominent legislation that governs environmental activities within South Africa, to which these organisations must comply, includes the *NEMA*, which is supported by five (5) subsidiary acts.

Due to their size and geographic dispersion, document management in SOCs can become a daunting task if one considers the sheer number of documents that need to be created, reviewed, modified, stored, issued, distributed, accessed, and destroyed, some of these activities will be permanent whilst others are temporary. To ensure that the principles of this discipline are

realised, a functional document management system must have seven characteristics (Inglesis, 2013), which can be summarised as follows: The system must be easily accessible to all stakeholders; changes pertaining to the document management systems must be shared with the team timeously; there should be clear document revision tracking measures; Every document should contain a unique identifier number; superseded documents should be removed from the system to prevent unintended use; document status should be easily identifiable; and, there has to be a single and unique document distribution system.

Even though the manual document management system has not been replaced by the electronic system in its entirety, top construction firms generally utilise computer software and electronic methods of document management (Al-Qady and Kandil, 2013). However, the major drawbacks of this system include the amount of time it takes to scan the existing hardcopy documents as well as erroneous categorisation during the capturing process (Kain and Koshy, 2013). Eskom and Transnet use semi-automated document management systems, which may be hindered if comprehensive, organisation-wide support as suggested by Groenewald (2004) is lacking. Or if human resourcing is not considered, especially in the public sector as Leikums (2012) suggests.

Procurement is the acquiring of goods, services and/or works from an external source considering the cost, schedule, risk, quality, quantity, and geographic location. Inappropriate management of this discipline may stall project progress and result in schedule and cost overruns. Lack of innovation (Valence, 2010) and rampant corruption (Osei-Afoakwa, 2012) are challenges that are closely associated with procurement. The former as a result of the characteristics of the discipline that do not incentivise research, development and knowledge acquisition, and the latter as a result of the bureaucratic nature of large, geographically dispersed SOCs. As can be seen from the above discussions, there are numerous challenges that emanate from additional project management constraints that were identified during the review of secondary literature.

7.7.3 Challenges of Emerging Project Management Themes

This study has briefly summarised the challenges emanating from the existent project status reporting processes not mentioned by the respondents which were, however, articulated in chapter three. It is now time to turn to those challenges that were not evident during the review of secondary literature which instead emerged during the analysis of primary data. These are,

delays in the approval processes, managing megaprojects without centralised and digitised project management tools and software, and lack of project governance. It is important that all project management constraints be considered. This will ensure that the framework that is proposed in section 8.3 below is holistic. This framework aims to utilise both primary and secondary data to account for the constraints that have a potential to affect large, geographically dispersed SOCs that execute megaprojects of strategic importance to the South African economy – in particular – and the construction industry – in general.

If one uses the phrase 'project management software' as a search criteria in any search engine, one is bombarded with hundreds of hits. The results indicate that project management software can assist in project planning, schedule management, and milestone tracking. It covers, the management of scope, cost, budget, as well as resource estimation and allocation. File sharing, project reporting and communication, and collaboration, also fall within its ambit. In evaluating what makes good project management software tools, Aston (2017) identifies the five key functionality aspects as the ability to manage task lists, schedules, file sharing, communication, and reporting. However, he concedes that this list is focussed on task execution and not planning, billing, integration, and other functionalities.

The benefits of project management software are listed by Hurst (2017) as ease of collaboration, schedule management, project tracking, better communication, and task delegation. Meanwhile Khan (2006) listed reduced project risk, better decisions, improved collaboration and communication, saving time and money, and well-documented operating assets. Whilst Windsor (2018) lists standardised project management approaches, efficient management of projects, optimised resource allocation, centralised project reporting, improved task management and visibility, and effective team collaboration. If one assesses the benefits of centralised and digitised project management software, first, one can see many benefits that may be reaped by an organisation which utilises this software. Second, not having the requisite software can become a substantial hindrance. A senior project manager indicated that projects were being managed "*without centralised and digitised project management tools and software*". This is one of the reasons why project management software should form part of the framework that is being developed.

Project governance is the definition of structures, processes and mechanisms influencing roles, accountabilities and responsibilities that affect decision-making with the aim of achieving organisational objectives (Allassani, 2013). It outlines the relationship between internal and

external stakeholders that form part of the project, the flow of information within the project, ensures appropriate management of project-related issues, and guarantees that the appropriate guidance is received at each relevant project stage (Deenen, 2007). Effective governance is a precursor to the project being completed within its constraints, sufficient information flow within the team, and executive support and commitment (Allassani, 2013).

In an investigation into the characteristics of the evolution of megaprojects, Lu, Li, Pang, and Zhang (2015: 19) argue that lack of effective organisational governance during construction is caused by a variety of reasons such as

> '…diversification and interaction among project participants, complication of organisational, relationships and personal behaviour dynamics, and uncertainty in the long construction period.'

These result in poor project performance, epitomised by cost and schedule overruns. Lu *et al*., (2015) conclude that there are better chances for government invested projects to collaborate with others because of the closeness of their organisational networks which, however, require stabilised governance policies in order to function properly. An evaluation of project governance shows that it is not a constraint that affects a project *per se*. Rather it is a constraint that, for instance, affects the ability of the EPMO to manage the project, programme or portfolio. As such it will be included as part of the Enterprise Management Office Framework, on the right side of the framework that is being developed.

The final constraint that was not evident during the review of secondary literature which instead emerged during the analysis of primary data is the delays in the approval process. Lack of appropriate project governance and lack of timeous visibility caused by the management of megaprojects without centralised and digitised project management tools and software – as discussed above – are examples of factors which can cause delays in the approval processes. Furthermore, delays in the approval processes have the potential to influence all other project management constraints discussed herein. If these processes within an organisation do not function like clockwork they have the potential to amplify all the challenges that have been articulated in this section. They have to be fluent and seamless so as to reduce unnecessary setbacks and increase the chances of timeous project completion (Mulder, 2018). Delays in the approval process is indeed a project management constraint that will have to be added to the proposed conceptual framework.

7.7.4 Other Challenges Identified during Data Analysis

As can be seen from the three subsections above, there are many challenges that emanate from the existing project status reporting processes as a result of the project management constraints. Further to this, a number of challenges became evident as the primary data were analysed. This study will now provide an overview of these challenges.

Project status reporting and communication may take many forms. It may form part of the procedures, processes or templates that highlight the importance of compliance and the consequences of non-compliance. They may also involve: Clearly articulated written statements so as to maintain a paper trail; an eloquent verbal statement; timeous requisition of necessary information; the ability to generate reports that display accurate and non-biased information that has been verified by appropriate stakeholders; and/or war room meetings. However, as numerous as these are, they may not always be reflective of the actual events taking place onsite. If staff, management, executives, shareholders, and interested and affected parties are starved of the necessary information they may be hindered from effective and timeous decision-making.

Respondents who were of the opinion that benchmarks that are used to apprise superiors were similar to those which are used to apprise juniors were evenly split with those who said that benchmarks used for the two groups differed. Notwithstanding the need to compartmentalise information to protect organisational intellectual property and to safeguard sensitive information, using different benchmarks to apprise different stakeholders has a potential to cause many problems. In particular, it can be a challenge for the project status reporting processes to reconcile the difference that exist within an organisation.

In fact, in response to the question how often discrepancies between project status interpretation of team members are found, eleven of the sixteen respondents said that discrepancies happen often, regularly, weekly, or monthly. Silo mentality, self-preservation, absence of a single source of reporting, people reporting subjectively, poor statistical understanding, lack of experience, different levels of management, and numerous interdependencies and interfaces were all cited as sources of inaccurate reporting due to diverse benchmarks. The importance of using similar benchmarks to communicate status updates cannot be overstated within a large, geographically dispersed organisation.

As part of the reporting duties, the Project Team may be required to communicate achieved or missed targets or milestones with internal and external stakeholders using a variety of resources

within the organisation. This may be done sporadically or routinely depending on the requirements of the stakeholders. During this undertaking, the project team must, as far as reasonably possible, utilise the same benchmarks to encourage transparency and consistency. The project status reports must be monitored, verified and validated to assure this. And before reports are published for the consumption of internal and external stakeholders they may need to be approved by the appropriate authority.

Taking into consideration the number of variables that are involved in holistic project status reporting within a large, geographically dispersed organisation, discrepancies within the various interpretations of team members will have to be dealt with in one manner or the other to ensure alignment of the project goals and deliverables. Regardless of whether the information reported is accurate or otherwise, the receiving stakeholders may perceive it as substandard. However, it is imperative that stakeholder appraisal be undertaken in a pertinent, holistic and transparent manner to aid decision-making and problem-solving. The challenges in this subsection have prompted this study to develop a project status reporting framework aimed at addressing them. After presenting the findings in a tabular form, chapter eight advances this framework.

7.8 Chapter Summary

This chapter has given an overview of the respondents. Thereafter, it articulated the details of the analysis of the primary data collected to achieve the aims and objectives of this study. To demonstrate the relationships, differences and interconnectedness between the themes, primary data were contrasted, correlated and synthesised with secondary data. Primary data were presented according to the overarching secondary research objectives stated in section 1.7 above. It was collected via self-administered, semi-structured interview guides and analysed – at times presented – using the NVivo software. In a nutshell, primary data were collected, analysed and discussed to first, determine the project status reporting processes that are currently in existence. Second, to establish the outcomes of these processes. Third, to ascertain the key variables thereof. Fourth, to elucidate the challenges emanating from these processes. A framework informed by this data will now be advanced in the following chapter.

Chapter Eight: Research Findings: A Framework for Project Status Reporting in South African SOCs

8.1 Introduction

This chapter aims to provide a comprehensive discussion of the findings pertaining to the data analysed in chapter seven. It will do this by discussing what was uncovered during analysis of secondary research questions one-to-four if the secondary research questions are framed as objectives, using a tabular view to provide the extent to which they have been addressed. This chapter will then advance a conceptual framework that is able to overcome the challenges that were identified. This framework should make a unique and meaningful contribution to the project management body of knowledge. The left side of the conceptual framework is founded on the project management triangle, which describes constraints that have the potential to affect all infrastructural projects during their lifecycles. Additional constraints which also affect these projects were identified during the literature review, whilst others were identified during analysis of primary data. The right side of the conceptual framework is founded on the enterprise management offices which, amongst other things, formally report on these project management constraints. A summary will then conclude the chapter.

8.2 Framing Secondary Research Questions as Objectives

The central research question of this study is to determine the appropriate framework for project status reporting in South African SOCs. To better address this central research question, five secondary research questions were generated. Before a project status reporting framework is proposed, Table 8.1 below provides a tabular view of the extent to which secondary research questions one-to-four have been addressed, summarising the results to which they satisfy the secondary research questions if these are framed as objectives.

To recap, the secondary research questions are as follows:

i. What project status reporting processes are currently in existence?
ii. What are the outcomes of the existing project status reporting processes?
iii. What are the key variables of the reporting processes that have been put in place to assure accurate flow of project status information to internal and external stakeholders?
iv. What challenges emanate from the existing project status reporting processes?

v. Is the proposed project status reporting framework suitable and cogent, and is it able to overcome the challenges that have been identified?

Table 8.1: Secondary research questions framed as objectives

Source: The Researcher, Compiled from Primary Data Supported by Secondary Data, 2019.

Research Objective One: Project Status Reporting Processes Currently in Existence
Prominent Project Management Constraints
1. Cost: a. External funding of SOCs through taxpayers' money b. Resources limitation which can occur as a result of constrained funding 2. Schedule / Time: a. May become constrained if the information pertaining thereto is not shared with the team in a timely manner b. Not resource-loaded to achieve activities on the critical path c. Unrealistic schedules 3. Resources: a. Respondents specified only human capital and no other tangible or intangible resources: i. Working environment not conducive to high levels of excellence ii. Unqualified or inexperienced individuals iii. Resources limitation negatively impacting project-related costs 4. Scope 5. Contracts: a. Appropriate selection of required contracts b. Lack of understanding pertaining to project-related contracts c. Poor management of EPCM 6. Risks: a. Poor anticipation and mitigation of risks 7. Project reporting and communication a. Communication and understanding of roles and responsibilities b. Project status reports not reflective of activities taking place onsite, thus hindering problem-solving and decision-making 8. Quality 9. Delays in the approval process 10. Managing projects without centralised and digitised project management tools and software 11. Project governance
Communicating Targets and Milestones
How missed targets are communicated to superiors: 1. Project status reports issued daily, weekly and/or monthly
How missed targets are communicated to team members: 1. Key milestone dates 2. Action lists 3. Formal meetings 4. Regular reports

How project status is reported within the organisation:

1. Microsoft Office suite
2. Predetermined templates and reports
3. *Ad hoc* templates and reports
4. Formal meetings
5. Large display screens
6. Aconex
7. Project Management Information Systems
8. Shared network drives
9. Direct and broadcast emails
10. Corporate communiques

The frequency of publishing project status reports:

1. Daily
2. Weekly
3. Bi-monthly
4. Monthly
5. Quarterly

Benchmarks used to apprise superiors vs. juniors:

1. 7 respondents said they differed
2. 7 respondents said they were similar
3. 2 respondents were undecided

To ensure that there were minimal discrepancies between interpretation of project status reports:

1. Information was interrogated, verified and validated
2. Project status reports were signed-off by the project/programme controls manager, the project/programme manager and the project/programme director

How project status information was verified and validated:

1. Approved schedule broken-down into a level-five, two-week look-ahead for physical tracking of individual activities onsite against the plan
2. Cost meetings
3. Schedule progress meetings
4. Requesting evidence from the contractor and/or project team for milestones claimed to be achieved

Project status reports were approved by the following individuals prior to publishing:

1. Project/Programme Controls Manager
2. Project/Programme Manager
3. Project/Programme Director

Most important stakeholders within the organisation:

1. Project/Programme Controls Manager
2. Project/Programme Manager
3. Project/Programme Director
4. Health and Safety Manager
5. Quality and Assurance Manager
6. Engineering Manager
7. Procurement Manager
8. Human Resource Manager
9. Industrial Relations Manager
10. Risk Manager

11. Security Manager
12. Reporting Manager
13. Environmental Manager
14. Document Control Manager

Management of Inaccurate Project Status Reporting

Utilisation of similar benchmarks within the organisation was assured through:

1. Utilisation of standardised templates
2. Approval of templates at executive level
3. Utilisation of Standard Operating Procedures
4. Utilisation of Terms of Reference
5. Regular engagements and consultations

Inaccurate reporting to management was resolved through:

1. Retraction and revision of reports
2. Deviation identification process and implementation of resultant changes
3. Centralised point of reporting
4. Minutes of the meeting
5. Project-Specific Agreement
6. Project Change Notice

Inaccurate reporting by site personnel was resolved through:

1. Site walks to physically verify the *status quo*
2. Site pictures
3. Physical validation of information prior to reporting
4. Utilisation of a single source of reporting
5. Disciplinary action

Management intolerance regarding *status quo* reflected in reports was resolved through:

1. Effective communication
2. Using approved procedures, processes and templates
3. Clearly articulated, written statements
4. Generating reports that display accurate and non-biased information verified by stakeholders
5. War room meetings
6. Collaboration and problem-solving of functional managers
7. Balanced scorecards
8. Management buy-in to the approach being used
9. Governance structures e.g. Management Committees, Steering Committees, Operating Committees, etc.

Internal vs. External Reports

Internal reports which:	External reports which:
1. Contain detailed information 2. Are consumed by people conversant with the project 3. Are prepared for project planning, control and regulation 4. Seldom provide context 5. Contain confidential and sensitive information 6. Are the primary source of all downstream reports, i.e. external reports	1. Contain high-level information 2. Are consumed by stakeholders, such as government, funders, credit holders, shareholders, interested and affected parties, etc. 3. Provide a broad context for a closed-loop storyline 4. Reflect information at programme or portfolio level 5. Contain no confidential information

Research Objective Two: Outcomes of Existing Project Status Reporting Processes
Outcomes of Communicating Targets and Milestones
Communication of missed targets/milestones to superiors resulted in: 1. Direct reporting of missed targets to relevant internal and external stakeholders 2. Reports that give the reader a view of the salient project management constraints 3. Reports that aid problem-solving and decision-making 4. Reports that indicate the status of targets and milestones as well as mitigation action if targets and milestones have not been met 5. Reports tailored to suit a particular target audience 6. Reports reflecting project-, programme- or portfolio-level information, depending on the stakeholder
Missed targets were communicated to team members with the intention of: 1. Ensuring alignment amongst team members 2. Interrogating validity of information contained in the reports 3. Aiding problem-solving and decision-making
Means or resources used to report project progress within the organisation were: 1. Standardised templates to ensure consistency throughout the organisation 2. *Ad hoc* templates developed on-the-fly by the reporting team 3. Primavera was used for tracking schedule-related activities
Similar benchmarks were ensured through: 1. Standardised templates to encourage consistency throughout the organisation 2. Templates approved at executive level and cascaded downwards 3. The EPMO as a key enabler in ensuring consistency 4. Alignment amongst internal stakeholders as well as alignment between internal and external stakeholders
Inaccurate information reported to management or inaccurate information reported by site personnel was dealt with through: 1. Physical checks done to verify true project status onsite 2. Utilisation of site pictures 3. Introduction of preventative measures 4. Recall and revision of project status reports
Management intolerance regarding *status quo* reflected in reports was managed through: 1. Effective communication 2. Utilisation of approved procedures, processes and templates 3. Clearly articulated, written statements 4. Reports that display accurate and non-biased information verified by stakeholders 5. War room meetings 6. Collaboration and problem-solving of functional managers 7. Functional managers looking for management buy-in to the approach being used 8. Governance structures e.g. Management Committees, Steering Committees, Operating Committees, etc.
Outcomes Pertaining to the Frequency and Resolution of Disputes
Frequency of discrepancies between project status interpretation amongst team members happen: 1. Often / Regularly, weekly or monthly

2. Because of people working in silos, self-preservation, absence of a single source of reporting, people reporting subjectively, poor statistical understanding, lack of experience, different levels of management, and numerous project status interdependencies and interfaces

Discrepancies that occurred were addressed through:

1. Alignment meetings involving of important project team members and discipline leaders
2. Desktop investigation exercises
3. Physical site visits
4. Verification of signed project-related documentation
5. Examination of emails
6. Using expert judgement
7. Dissemination of correct information

Research Objective Three: Key Variables of the Reporting Process

Prominent Project Management Constraints: Primary Data vs Secondary Data

Primary and Secondary Data:

1. Cost
2. Schedule / Time
3. Resources
4. Scope
5. Contracts Lifecycle Management
6. Risks
7. Quality
8. Project Reporting and Communication

Primary Data Only:

9. Delays in the approval process
10. Managing project without centralised and digitised project management tools and software

Secondary Data Only:

11. Health
12. Safety
13. Environment
14. Document Management
15. Procurement

Variances in the Communication of Targets and Milestones

Communication of missed targets to superiors undertaken through:

1. Project status reports issued daily, weekly and/or monthly
2. *Ad hoc* reports issued as and when required
3. Verbal communication in appropriate settings
4. Content tailored to suit various governance structures, e.g. Management Committees, Steering Committees, Operating Committees, etc.

Communication of missed targets to team members undertaken through:

1. Key milestone dates within project schedule
2. Action lists
3. Regular reports

Means and/or resources used to report project progress within the organisation:

1. Microsoft Office suite
2. Predetermined templates and reports

3. *Ad hoc* templates and reports
4. Formal meetings
5. Large display screens

Frequency of publishing project status reports:

1. Daily
2. Weekly
3. Bi-monthly
4. Monthly
5. Quarterly

Monitoring the accuracy of reports undertaken through:

1. Baseline monitoring, e.g. cost, schedule, scope, quality, etc.
2. Breaking-down of approved schedule into a level five, two-week look-ahead for physical tracking of individual activities onsite against the plan
3. Updating milestones and key performance indicators
4. Tracking issues and risks
5. Trending of reports from one reporting period to the next

Verification and validation of project status information undertaken through:

1. Breaking-down of approved schedule into a level five, two-week look-ahead for physical tracking of individual activities onsite against the plan
2. Cost meetings
3. Schedule progress meetings
4. Requesting evidence from the contractor or project team for achieved milestones

Final reports are approved by the following individuals before they are published:

1. Project/Programme Controls Manager
2. Project/Programme Manager
3. Project/Programme Director

The most important stakeholders are:

1. Project/Programme Controls Manager
2. Project/Programme Manager
3. Project/Programme Director
4. Health and Safety Manager
5. Quality and Assurance Manager
6. Engineering Manager
7. Procurement Manager
8. Human Resource Manager
9. Industrial Relations Manager
10. Risk Manager
11. Security Manager
12. Reporting Manager
13. Environmental Manager
14. Document Control Manager

Similar benchmarks were assured through:

1. Utilisation of standardised templates
2. Approval of templates at executive level
3. Utilisation Standard Operating Procedures

4. Utilisation of Terms of Reference
5. Regular engagements and consultations

Variability Pertaining to the Frequency and Resolution of Disputes

Frequency of discrepancies between project status interpretation amongst team members happen:

1. Often / Regularly, weekly or monthly
2. Because of people working in silos, self-preservation, absence of a single source of reporting, people reporting subjectively, poor statistical understanding, lack of experience, different levels of management, and numerous project status interdependencies and interfaces

Discrepancies that occurred were addressed through:

1. Alignment meetings consisting of important project team members and discipline leaders
2. Desktop investigation exercises
3. Physical site visits
4. Verification of signed project-related documentation
5. Examination of emails
6. Using expert judgement
7. Dissemination of correct information

Inaccurate reporting to management was resolved through:

1. Retraction and revision of reports
2. Deviation identification process and implementation of resultant changes
3. Centralised point of reporting
4. Minutes of the meeting
5. Project-Specific Agreement
6. Project Change Notice

Inaccurate reporting by site personnel was resolved through:

1. Site walks to physically verify the *status quo*
2. Site pictures
3. Physical validation of information prior to reporting
4. Utilisation of a single source of reporting
5. Disciplinary action

Management intolerance regarding *status quo* reflected in status reports was resolved through:

1. Effective communication
2. Using approved procedures, processes and templates
3. Clearly articulated, written statements
4. Generating reports that display accurate and non-biased information verified by stakeholders
5. War room meetings
6. Collaboration and problem-solving of functional managers
7. Balanced scorecards
8. Management buy-in to the approach being used
9. Governance structures e.g. Management Committees, Steering Committees, Operating Committees, etc.

Potential Changes to the Project Status Reporting Process

1. Reports should be automated, interactive and centralised
2. Establish a PMO to keep senior management informed and facilitate project delivery
3. Issue reporting templates timeously
4. Project documentation must be clearly defined and regularly updated
5. Reporting should be undertaken by a third party that has no direct involvement in project execution
6. Focus on results and macro objectives

7. The reporting should adhere to the reporting deadlines

Research Objective Four: Challenges Emanating from Existent Processes

Challenges Pertaining to Project Management Constraints

Primary and Secondary Data:

1. Cost:
    a. External funding of SOCs through taxpayers' money
    b. Resources limitation which can occur as a result of constrained funding
    c. Estimating, budgeting and controlling costs in a manner that will allow the project to be completed within the approved budget (*PMI, 2013*)
    d. A key constraint in the view of the shareholder representative (*DPE, 2017a*)
2. Schedule / Time:
    a. Not resource-loaded to achieve activities on the critical path
    b. Unrealistic schedules
    c. May become constrained if the information pertaining thereto is not shared with the team in a timely manner
    d. Must contain activities, milestones and deliverables for the entire project, reflecting all the work that is to be completed during the lifecycle of the project – from inception through to close-out
    e. Must consider all project management disciplines
    f. Dependent on experience and logical thinking
    g. Strong correlation with cost overruns, loss of profit, disputes, and poor workmanship (Mukuka *et al.*, 2015)
    h. Must have clear understanding of resource availability, capability and sometimes cost (Newton, 2015b)
3. Resources:
    a. Working environment not conducive to high levels of excellence
    b. Unqualified or inexperienced individuals
    c. Difficulty of managing human resources in a project environment (Homayounfard and Safakish, 2016)
    d. May negatively impact project-related costs
    e. Project staffing should consider affected departments, communication between technical disciplines, lessons learnt from previous projects, relationships and influences that already exist, and the geographic location of the project (Towe, 2004)
    f. Cannot be dissociated from cost and schedule (Saputra and Latiffianti, 2015)
4. Scope:
    a. Developing a comprehensive description of the desired outcome of a project to ensure that all the requirements are included and that no additional work is accounted for (*PMI, 2013*)
    b. Scope creep and feature creep (*PMI, 2013*; Wysocki, 2009)
5. Contracts:
    a. Appropriate selection of required contracts
    b. Lack of understanding pertaining to project-related contracts
    c. Poor management of EPCM
    d. Understanding of the terms of agreement, general conditions, supplementary clauses as well as special clauses, and any other relevant conditions for the delivery of the construction works (Butuza and Hedre, 2010)
    e. Consideration of project timelines, the type, size and location of the project, the allocation and mitigation of risk, the best possible way to separate the roles and responsibilities of relevant parties, prevailing market conditions, and project costs constraints (Chua and Loh, 2006)

6. Risks:
    a. Anticipation and mitigation of risks as a result of project uniqueness, complexity, change, assumptions, constraints, dependencies, and stakeholders (Hillson, 2004)
    b. Exposure to danger, harm or loss
    c. Variation throughout the lifecycle of the project (Toth and Sebestyen, 2015)
    d. Difficulty of risk reporting
    e. Inextricable link between scope definition and risk management
7. Project Reporting and Communication:
    a. Communication and understanding of roles and responsibilities
    b. Project status reports not reflective of activities taking place onsite, thus hindering decision-making and problem-solving
    c. 'Timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information' (*PMI, 2013: 287*)
    d. Cohesive and efficient project status reporting using the IR template
8. Quality:
    a. Inextricable link between cost, schedule, scope, and resources (Lock, 2007; *PMWL, 2017*; Wysocki, 2009)
    b. Adherence to standards and processes (Basu, 2012)
    c. Ensuring that the project satisfies the needs for which it was undertaken (*PMI, 2013)*

Secondary Data Only:

9. Health and Safety:
    a. Inextricable link between health and safety in a project environment
    b. Preventing work-related injuries and illnesses
    c. High number of work-place accidents and illnesses as a result of labour-intensive working environment and a constant state of evolution as construction progresses
    d. Business continuity planning
10. Environmental:
    a. Adverse impact on the flora and fauna
    b. Difficulty for organisations to localise environmental incidents, accidents and disasters
    c. Environmental stresses, such as low adaptability, climate change and a dwindling water supply
11. Document Management:
    a. Large quantities of documents that need to be created, reviewed, modified, stored, issued, distributed, accessed, and destroyed
    b. Challenges identified by Inglesis (2013)
        i. Accessibility to all stakeholders
        ii. Timeous sharing of document management system changes with the team
        iii. Clear document revision tracking measures
        iv. Appropriate identification of documents
        v. Removal of superseded documents
        vi. Ease of identification of document status
        vii. Single and unique document distribution system
    c. Scanning hardcopy documents into an EDMS
    d. Comprehensive, organisation-wide support of EDMS
    e. Human resource training
12. Procurement
    a. Rampant corruption
    b. Lack of innovation

Primary Data Only:

13. Lack of project management software, inhibiting the following:

a. Ability to manage task lists, schedules, file sharing, communication, and reporting (Aston, 2017) b. Collaboration, schedule management, project tracking, better communication, and task delegation (Hurst, 2017) c. Resource allocation, centralised project reporting, task management, and team collaboration (Windsor, 2018) 14. Delays in the approval process a. Affects all other project management constraints
Other challenges: 15. Benchmarks used to apprise superiors differing from those used to apprise team members: a. Inability to reconcile the difference that exist within the organisation 16. Inaccurate reporting due to diverse benchmarks caused by: a. Silo mentality and self-preservation b. Absence of a single source of reporting c. Subjective reporting d. Poor statistical understanding e. Lack of experience f. Numerous interdependencies and interfaces 17. Intolerance by management regarding perceived substandard project progress

8.3 The Project Status Reporting Framework (Contribution to the Body of Knowledge)

8.3.1 Overview of the Framework

An adequately constructed project status reporting framework has the ability to impact positively on infrastructural development on a variety of levels. It can 'ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information' (*PMI, 2013: 287*). It can aid the realisation of project deliverables by keeping the lines of communication clear and pertinent (Zulch, 2014). It can breakdown the silo mentality, reduce information duplication, and improve the quality of information available to stakeholders. It is able to apprise internal and external stakeholders on how projects are progressing with high quality, trustworthy and holistic project status information. It is able to apprise a large number of stakeholders such as shareholders, employees, customers, suppliers, partners, knowledge institutions, and society (Fried *et al.*, 2014), using a single, standalone report or a series of distinguishable, identifiable portions forming part of a larger report *(IIRC, 2013*). An adequately constructed project status reporting framework can also make provision for how an organisation's mission, strategy, governance, and business model combine to create value over time (Fried *et al.*, 2014).

To eliminate the effects of selective reporting in the form of optimistic bias, pessimistic bias and erroneous reporting, project status reporting is an endeavour that should take into consideration all project management constraints which have the potential to affect

infrastructural projects during their lifecycle. Project status information is prone to transformation and error as it is passed through the reporting process, considering the number of individuals, from supervisors on the job-site to executives in the boardroom, who are privy to this information as it is shared from one level to the next. If one takes into consideration a multi-tiered structure often present in the project management environment, the effects of improper reporting can quickly reverberate and amplify throughout the entire organisational structure and beyond, with devastating consequences. Moreover, accurate, holistic and pertinent reporting can be a daunting undertaking if one considers the size and number of projects that need to be reported by a large, geographically dispersed SOC that executes megaprojects of strategic importance to the South African economy.

Literature will reveal very little in the way of formalised project status reporting pertaining to SOCs. The construction industry, to which the said organisations are a part, is no different; it suffers from similar neglect. A framework formalising project status reporting pertaining to these organisations is desirable for the above-mentioned benefits. Without this formalisation, project status reporting as it stands is at a disadvantage. Formalisation can further be complicated by the geographic dispersion of these organisations. Moreover, organisations have yet to realise fully the benefits of utilising enterprise management offices as a means to improve accurate stakeholder feedback at project, programme and/or portfolio levels. In fact, present literature suggests that there are numerous benefits to be had if this is done (Hyväri, 2014; Khalema *et al.*, 2015; Malatji and Marnewick, 2016; Marnewick and Labuschagne, 2010; Smith and Sonnenblick, 2013). The developed framework advocates for the utilisation of enterprise management offices as a means to improve accurate stakeholder feedback. Reporting may not be greatly hindered if the organisation is devoid of the enterprise management offices, at project, programme, or portfolio levels. However, utilisation is highly recommended considering the benefits that these management offices offer.

Considering the aforementioned dynamics, this research study primarily argues that the challenges of holistic project status reporting may be addressed by the utilisation of the framework shown below.

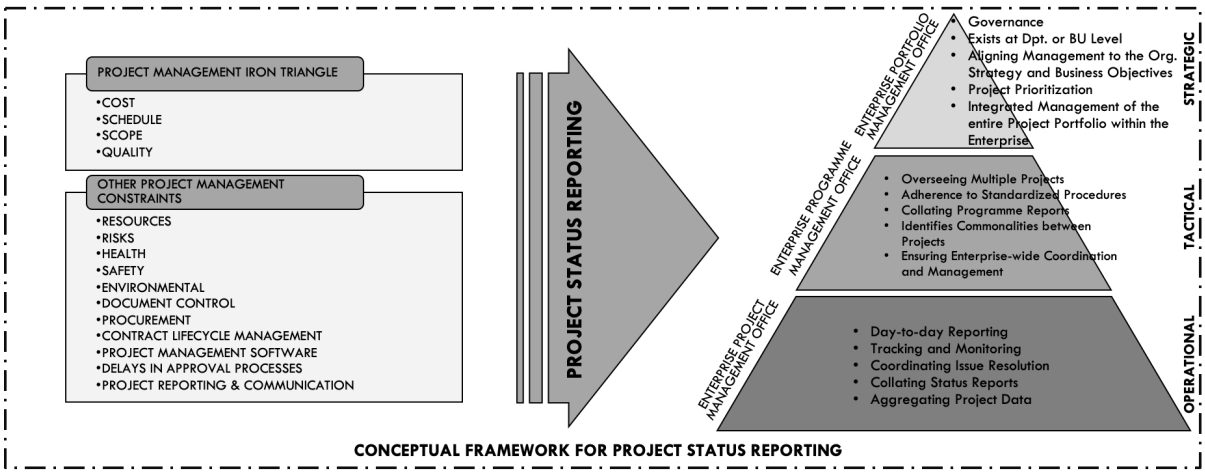


Figure 8.1: A diagrammatic representation of the conceptual framework that enables holistic project status reporting

Source: The Researcher, 2019.

8.3.2 Rationalising the Left Side of the Framework

The left side of the conceptual framework is founded on the project management triangle which describes constraints that all projects must face. Granted, there are many derivatives of the project management triangles. Likewise, there are various constraints that inhere within these triangles, which must maintain their balance for a project to, similarly, remain in a state of balance. The common thread that runs through all project management triangles is that they attempt to describe constraints that all projects must face regardless of shape, size or location. Likewise, in projects executed by Eskom and Transnet, a decision by management to prioritise one or two of these project management constraints must sometimes be made at the expense of the remaining constraints.

According to a model developed by Dr Martin Barnes, project management constraints are regarded as cost, time, and quality/performance (Lock, 2007; *PMI, 2013*). Barnes' original version of the project management triangle refers to the quality component. In the improved version, Barnes refers to performance, because 'quality implied little more than compliance with the specification, whereas performance is intended to mean that the project, upon completion, does what it is supposed to do' (Lock, 2007:22). Building on the foundation established by Barnes, Lock (2007) argues that the cost objective, the performance (or quality objective) and the time objective are the key factors that result in project success or failure.

Whereas, Wysocki (2009) uses the term 'scope triangle' to describe a model which is constrained by scope, quality, cost, time and resources.

In this study, the project management 'iron triangle' on which the conceptual framework is founded, is that of cost, schedule and scope which interact to inform the resulting quality of the project. As alluded to earlier, these constraints can never be divorced from each other since they interact in such a way that one cannot be changed without fundamentally altering the others. As such, shortening a project schedule and increasing the quality demands shall, without fail, increase the cost, shortening a schedule and decreasing the cost will religiously lower the overall quality, whereas increasing the quality requirements and decreasing the budgeted cost will certainly increase the time needed to execute the project. However, reporting cost, schedule, scope and quality cannot be considered holistically by any stretch of the imagination when large, geographically dispersed organisations are under investigation.

Due to their strategic nature, projects executed by large, geographically dispersed SOCs are exposed to numerous project management constraints over and above cost, schedule, scope, and quality. These additional project management constraints complicate the terrain in which these organisations operate. Literature concerning these constraints has been reviewed to demonstrate this view. This was done in order to demonstrate the need for a holistic project status reporting framework. Furthermore, it was done to minimise the effects that selective reporting has on effective communication.

It is a fundamental attribute of the project management team, at all levels of the organisation, to possess the ability to communicate these project management constraints effectively to stakeholders. Zulch (2014) shows the importance of stakeholder communication as the foundation on which all other key elements of project management are based. Effective communication is an essential skill in project management. The project management team must be able to acquire all the relevant information pertaining to the project and, subsequently, simplify this information for ease of understanding by the project management team and other stakeholders such as the DPE, National Treasury, DoE, NERSA, and the NNR.

Reporting in this fashion ensures that, in instances where the information is available, it is shared with internal and external stakeholders in an accurate and comprehensive manner, to aid decision-making and problem-solving in matters affecting the organisation. In instances where the information is not applicable, this should be clarified to the stakeholders. In instances where the information is pending at the time of reporting, this should also be clarified to the

stakeholders, explaining that the information will be made available in due course. These alternatives enrich project status reporting at all levels within the organisation. Anything less is tantamount to 'selective reporting', another impediment that project managers must deal with.

Selective reporting refers to an act by the project team member of conveying inaccurate or incomplete project status to his/her seniors (Iacovou *et al.*, 2009) with the aim of suppressing information that will allow management to ascertain the true status of a project (Smith *et al.*, 2001). This phenomenon occurs primarily as a result of management's inability to tolerate negative project information, or anticipation by the project team of negative repercussions should project status reports reflect performance that is regarded as subpar (Iacovou *et al.*, 2009). Iacovou *et al*., (2009) further divide selective reporting into two dyadic components, 'optimistic biasing' and 'pessimistic biasing'. Optimistic biasing occurs when the project management team reports that a project is in better stead than the team honestly perceives it to be in. The reverse is true for pessimistic bias. It occurs when the project management team reports that a project is in a state inferior to that which the team truthfully believes it to be in.

Whichever way one looks at it, selective reporting in the form of optimistic biasing or pessimistic biasing can be detrimental in a project management environment. The implications tend to be amplified in a strategically important megaproject executed by large, geographically dispersed organisations such as Transnet and Eskom. Selective reporting has the ability to influence negatively the entire project management structure in a costly, time-consuming and generally destructive manner. Depending on the complexity, size and strategic importance of the project under execution, reporting structures at Transnet and Eskom, may include, from low-level to high-level, supervisors, project managers, senior project managers, principal project managers, project directors, principal project directors, general managers, and chief executives. Considering this bureaucratic structure, the effects of selective reporting can quickly reverberate and amplify throughout the entire organisation and beyond, with devastating and wide-ranging consequences.

Selective reporting prevents decision-making stakeholders, in particular the project sponsor, from detecting projects in distress at an early stage and effectively altering their course. More often than not, this translates into spiralling costs, runaway schedules, ever-changing scopes, and substandard quality. The construction of Medupi and Kusile power stations as well as the construction of Transnet's New Multi-Product Pipeline, a 555km pipeline designed to transport

petroleum fuel from Durban to Heidelberg and the neighbouring regions, epitomise these unfortunate results. Expenses have escalated by billions of Rand from the initial projected cost-to-completion of R69.1 billion and R80.6 billion respectively communicated by Eskom in April 2007 to R195 billion and R225 billion as at September 2016 on Medupi and Kusile respectively (Yelland, 2016). Likewise, numerous delays and massive cost overruns, from R12.7 billion in 2008 to R30.4 billion in 2017, have been experienced on Transnet's New Multi-Product Pipeline (Groenewald, 2017). These flagship projects are just a tip of the iceberg in a lengthy line of costly projects executed by these organisations. Judging from the revelations of the Zondo commission of inquiry into state capture, the need to share accurate project status information cannot be overstated.

During development of a project status reporting framework aimed at overcoming challenges of holistic project status reporting in SOCs, this study took the above factors into consideration. With this in mind, the project management constraints that the study finally settled on, which underpin the project status reporting conceptual framework, can be summarised using the figure below. Some of the constraints were exclusively identified during the analysis of primary data. Some were solely identified during the review of secondary data. Considering the principles of triangulation, appropriately, the majority were present both in the primary and secondary data. The view espoused by this study is that holistic project status reporting can only take place if all these constraints are considered and accounted for.

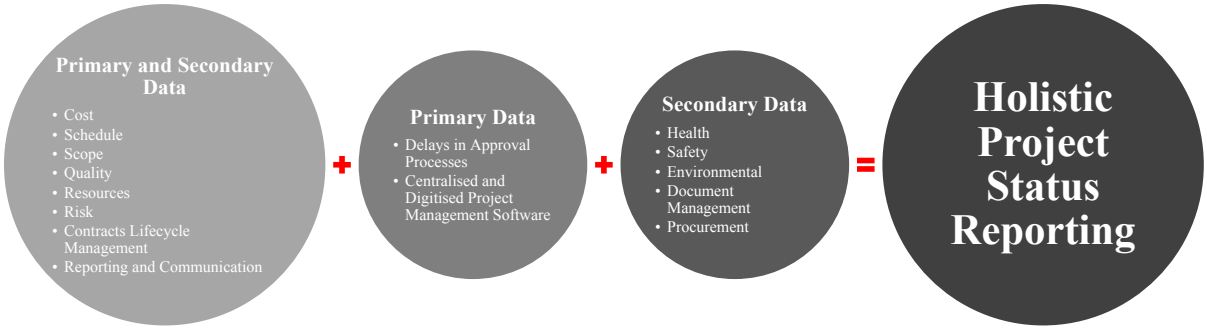


Figure 8.2: Sources of themes pertaining to project management constraints

Source: The Researcher, Compiled from Coded Transcripts and Reviewed Secondary Data, 2019.

Therefore, additional constraints which should supplement those of the project management triangle include: tangible and intangible resources, a wide range of natural, physical, financial, political, and environmental risks falling within or outside the jobsite; various health and safety legislations and regulations that govern all employees at work and on the jobsite; the natural, physical, ecological, and biological environments in which they operate which are also regulated by a multitude of legislation; the creation, review, modification, distribution, and management of project-related documents; procurement of pertinent goods and services; methodical management of project-related contracts throughout their lifecycle; project management software as well as delays in the approval process which influence all the above-mentioned constraints; and finally, reporting and communication of project status to stakeholders.

Such a multitude of factors is difficult to manage on even the smallest of projects; the difficulty increases exponentially on megaprojects. Therefore, after setting the foundation using the project management 'iron triangle', guided by a combination of primary and secondary literature, this portion of the conceptual framework accounts for these additional constraints.

Before moving to the right side of the conceptual framework, this study will first, briefly unpack the left side. It will deal with all the project management constraints identified by the combination of primary and secondary data. It will outline why these project management constrains should form part of the reporting framework which should be utilised by a large, geographically dispersed SOC executing megaprojects of strategic importance to the South African economy. Moreover, what should be reported as far as each constraint is concerned to address the challenges emanating from the existing project status reporting processes discussed in the table above. Nevertheless, it is important to note that the details of each constraint contained in the project status report will ultimately depend on the stakeholder being apprised, the problem being solved and/or the required decisions being made. This study merely provides guidance as to the pertinent components identified, using the project management 'iron triangle' as a foundation.

8.3.2.1 Cost

There are no regularised global professional standards pertaining to the specialist technical field of project cost management (Smith, 2014; 2016). Smith (2016) therefore argues that professionals in this field as well as the organisation to which these professionals belong must play a fundamental role in the development of a universally accepted standard with the

assistance of the International Construction Measurement Standard. The *PMI (2013)* shows that project cost management is a set of processes involved in planning, estimating, budgeting determination and costs control. The project team must execute these processes in a manner that will allow the project to be completed within the approved budget. It should be noted that cost planning, cost estimation, budget determination and cost control may be applicable in an iterative manner throughout the lifecycle of the project in an environment where costs escalate regularly or drastically.

Due to the lack of regularised global professional standards, it is the prerogative of the organisation to determine what elements of project cost management are reported, during cost planning, cost estimation, budget determination, and cost controls. Factors that will influence how the planning of cost management is handled, how costs are estimated, how the budget is determined and how costs are controlled include the following *(PMI, 2013*): Scope baseline; a resource-loaded project schedule; human resource calendars; a risk register; enterprise environmental factors, and organisational process assets. Moreover, the basis of estimates, contracts, project management plans, funding requirements, and work performance information. Therefore, these are all factors which should be considered during project cost reporting. To provide a user-friendly breakdown, cost reporting should, at the very least, include the budgeted costs, actualised costs and forecasted costs for the month, year-to-date, quarterly, quarter-to-date, annually, and for the lifetime of the project.

8.3.2.2 Schedule

A project schedule is essentially a timetable containing activities, milestones and deliverables for the entire project, reflecting all the work that is to be completed during the lifecycle of the project – from inception through to close-out. Due to sheer complexity and the number of possible scenarios pertaining to project scheduling, the project management teams must use dedicated software to manage, update, revise, and track the project schedule. The project team must pay special attention to the activities on the critical path. The critical path is based on the interrelated project activities that will take the lengthiest time to complete. Hence for a project to be completed on the due date, the sequenced critical path activities must be completed on time.

It is important for the project manager to work with an experienced project team when developing a project schedule. Field experts also play a key role in estimating the amount of time it will take to execute project activities and the sequencing order. It is also imperative that

the team that is going to carry-out the work be involved in the scheduling if circumstances allow. They may provide the scheduling team with an invaluable perspective during the schedule development phase. Involvement of the project team will ensure that the durations are realistic and, more importantly, that the team takes ownership of the resultant project schedule. Such an involved team is more likely to take ownership of the scheduling process they are part of, compared to one that is seemingly imposed.

Meyer and Visser (2006) suggest that utilisation of historical data as well as enlisting of relevant models that aimed to simulate the project environment may improve project scheduling estimates. Historical data allows experience to play a role in informing the project schedule whereas relevant models are likely to obtain more informed estimates. Since any output is only as good as the input, utilising high quality data, resources and processes is imperative in ensuring that historic data modelling is a successful endeavour. It is important that the historical data being employed is of the highest order and that the models are utilised by personnel with the appropriate experience. Moreover, models have to be up to the job they are being enlisted for.

Depending on the size and requirements of the project, a report aimed at sharing schedule-related information should detail all the activities that comprise the project, key project deliverables and major milestones with respective start and end dates. It should consider the dependencies and permutations between the activities, such as start-to-start, start-to-finish, finish-to-start, and so forth. There should be a clear link that considers the logical sequencing order and the interdependencies between high-level requirements, major milestones, key deliverables, low-level tasks, and the Work Breakdown Structure. The schedule should be resource-loaded as a means to identify and account for the resources that are going to execute the work, their quantities and a clear understanding of resource availability, capability and cost. Project schedule reporting should consider the critical path as the activities onsite progress. Furthermore, project status reporting should be realistic and these reports must be shared with the project team timeously.

8.3.2.3 Scope

To complete the project deliverables and project goals within the tight confines of scope, time and cost, a clear and comprehensive scope statement should be developed (Newton, 2015a). A scope statement is a comprehensive description of the desired outcomes, milestones, deliverables, goals, features, functions, and tasks of a project that ensures that all the

requirements are included, and that no additional work is accounted for *(PMI, 2013*). To initiate the process, project requirements and objectives should be collected through a detailed process of interacting with stakeholders. Secondly, a detailed impression of the project is produced. Thereafter, a WBS is created by breaking-down the high-level requirements into low-level tasks, activities, deliverables, or practical components. Fourthly, project tasks, activities, deliverables, and components are verified to assure that all the requirements of the project have been included and that no additional work has been considered. Finally, the scope is controlled through the monitoring of the project status, including any deviations from the project baseline.

Scope definition is a concept that is ever-present no matter the size, shape or location of the project. To ensure that the scope statement is absolutely comprehensive it should consider all the project-related constraints. Since projects vary in shapes and sizes, accordingly, respective constraints – as detailed in this section – should be considered during scope development. After taking all the constraints into account, the resultant scope should then be managed appropriately by the project team. Scope management is an activity that occurs from project inception through to project close-out. In large projects, a multi-discipline approach needs to be adopted since tasks, activities, deliverables, and components interact with each other in numerous ways. Furthermore, it is important to note that a change in project stakeholder, functionality, or business requirement can trigger a change in scope. Poor scope management may result in the project failing to provide the requisite value for the project owner, it may result in a runaway project leading to either cancellation or discontinuation, or it may cause scope creep and/or feature creep (Woolridge *et al.*, 2009). These are anomalies that occur at the expense of schedule, cost, and resources.

Khan (2006) argues that scope definition should be performed only if the following tasks have been completed. Scoping should only take place after the project manager has been assigned, the project management team has been formed, feasibility studies have been completed, a summary of the WBS has been outlined, the project budget, schedule, and key outputs and parameters have been delineated, the design basis memorandum has been completed, bids have been invited, and the basic engineering package contracts have been awarded. In fact, the latter marks the beginning of the scope definition phase (Khan, 2006).

As alluded to earlier, scope creep happens gradually and unofficially, without schedule revision or budget adjustment. It is the unwarranted addition of new features and functions to the project scope without addressing the effects on time, costs and resources *(PMI, 2013)*. Feature creep

is the indiscriminate addition of features or functions by the project team in the hope that the customer would want to have these as part of the final deliverable (Wysocki, 2009). The occurrence of scope and feature creep are examples of the importance of project scope reporting. The effects of scope creep and feature creep will be minimised if the scope planning and scope definition have been executed properly. Project scope reporting will enable the project team to monitor and manage the scope, assure the executive management that requisite value is being added, as well as give stakeholders a view of the end result of the project.

8.3.2.4 Quality

It is imperative for an organisation executing megaprojects of strategic importance to implement a project quality management process. Project quality is a three-dimensional philosophy of adherence to standards, encompassing design quality, process quality, and organisation quality (Basu, 2012). The quality of design is concerned with the project deliverables conforming to the customer requirements and ultimately the customer needs. The quality of process considers how the project-specific processes performed in terms of various project management constraints. The quality of the organisation considers how, during the lifecycle of the project, stakeholders were managed, skills and training were disseminated, long-standing and fruitful partnerships were built with suppliers, teamwork was encouraged, and effective and efficient communication was nurtured.

According to the *PMI (2013)*, project quality management is a three-stage process that comprises activities regulating quality policies, objectives, roles, and responsibilities during project execution to ensure that the project will satisfy the needs for which it was undertaken. The first stage is to identify and document the project quality requirements and standards. These requirements and standards will serve as evidence of how a project demonstrates compliance during its lifecycle. The second stage is to audit the quality requirements and standards to verify the level of compliance. And the final stage is to perform quality control via monitoring and recording of results of the previous stage to gauge the level of conformance and recommend necessary changes for improvements should performance be regarded as subpar.

The principles of the project quality management process as outlined by the PMI are aligned to those of a simple, iterative performance improvement model known as Define-Measure-Analyse-Improve-Control, or DMAIC. DMAIC can be unpacked as follows. One must first define the project goals and customer needs of the activity that require improvement.

Thereafter, the current system, process, activity, or standard must be measured to gauge the as-is condition. During the analyse phase, an analysis is undertaken to eliminate the gap between the current system, process, activity, or standard and the desired goals or customer requirements that were defined during the first step. Step four is then to implement the outcomes of the analysis so as to improve the current systems to move it towards the desired state. Controls are then put in place to regulate the new system. Continuous improvement is an ongoing effort to incrementally improve the system, process, activity, or standard yielded by the final step as input in the first step; this is what makes DMAIC iterative in nature.

If quality is of paramount importance then specialist techniques of Six Sigma, The Motorola Business Management approach devised in 1986, should be utilised to assure quality of the highest order. Although they are fundamental to project quality management, the project management philosophy espoused by Basu and the project quality management process advocated by the PMI fall short of Six Sigma. Six Sigma is also based on DMAIC (Pyzdek and Keller, 2010). It is an essential concept in the field of high-end project quality management (Knowles, 2011). It is a rigorous, focused, and highly effective implementation of proven quality principles and techniques (Pyzdek and Keller, 2010). Sigma is a metric value that denotes how well quality management processes, principles and techniques are performing, measured against their respective capabilities to perform defect-free work (Pyzdek and Keller, 2010). As the sigma value increases so does quality, value and subsequent customer satisfaction. If utilised appropriately, Six Sigma can assure quality of the highest order.

Quality management occurs continually, throughout the lifecycle of the project, and as a philosophy, quality can only really add value if and when it includes the entire organisation and its comprehensive systems, processes, activities and/or standards (Anand *et al.*, 2009; Kwak and Anbarib, 2006). Likewise, organisations must understand that concepts need to be embedded in the design phase instead of being implemented at the tail end of the system, process, activity and/or standard. Furthermore, quality should not be dissociated from cost, schedule, scope, and resources (Lock, 2007; *PMWL, 2017*; Wysocki, 2009). Impeccable quality management improves the organisation's processes, reduces the cost of defects, eliminates product recall costs, and encourages the documentation and subsequent utilisation of lessons learnt (Streun, 2004). For quality to be managed appropriately all these factors have to be visible to all relevant stakeholders. Therefore, it is important that project quality reporting forms part of the framework.

8.3.2.5 Resources

Likewise, for project resources to be managed accordingly, and for stakeholders to have the desired influence over them, it is important that resources form part of routine project status reporting. People are by far the most important resource and, according to the respondents, are not motivated to perform at their peak and are sometimes inadequately qualified or inexperienced. Not only is human capital the most important, it is extremely difficult to manage and certainly one of the most neglected after the completed project has been delivered to the customer (Homayounfard and Safakish, 2016). Other tangible resources – such as tools, machinery, infrastructure, facilities, funding, and raw materials – and intangible resources – such as skills, intellectual property, trademarks, patents, authorisations, and permits – also play a vital role in the project management environment. As such they need to be managed accordingly by the stakeholders, which can only happen if pertinent information is available.

Project staffing must account for the departments that will be involved and affected by the project, communication between technical disciplines, lessons learn from previous projects, relationships and influences that already exist, and the physical and geographic location of the project (Towe, 2004). To facilitate project staffing, Homayounfard and Safakish (2016) developed a human resource toolkit for megaprojects to allow project managers to circumvent project-based resource impediments whilst encouraging a productive environment. This human resource toolkit also encourages teamwork. Teamwork enhances success, promotes creativity, builds synergy, motivates problem-solving, facilitates decision-making, encourages a fun environment, and it is well-equipped to respond to challenges and change (Towe, 2004).

Gardner (2014) argues that organisations should attempt to understand the interaction between dynamic capabilities, learning processes and knowledge management so that resources can be managed appropriately. There is a growing realisation that resource management is a key part of project management which contributes to project success, business results, benefits management, networking and alliances, strategy implementation, and the consequences of national culture (Gardiner, 2014). Meanwhile, in a study exploring a resource allocation strategy, Klingebiel and Rammer (2014) found that innovation-based performance within an organisation benefits immensely from a broad allocation of resources at an early-stage. This strategy covers a large spectrum of resources, it increases exposure, cross-functional learning and the probability of project success. Appropriate resource management is vital to a well-formulated organisational strategy.

In a multi-project environment pertaining to large, geographically dispersed organisations, and in an effort to minimise wastage, it is to be expected that there will, at some point, be resource scarcity. Resource scarcity will have time and cost implications. In cases where resources are constrained, or resource variability is present, Maheswa *et al.,* (2015) have shown how the Relationship Diagramming Method can be used to ascertain alternative sequencing which will serve to achieve the objectives of a project whilst preserving the logic of construction. This method can check which activities can be executed in sequence or which can be executed in parallel depending on the resources that are available at a particular point in time. It will, therefore, minimise schedule and cost overruns. Meanwhile, Saputra and Latiffianti (2015) have demonstrated how a Monte Carlo simulation can be used to measure project reliability in terms of cost and schedule by considering resource availability under conditions of uncertainty.

According to Saputra and Latiffianti (2015) resource estimation is closely linked to the estimation of cost and schedule. At the very least, resource availability determines the cost and the duration of a project. During a resource estimation exercise, all activities as well as corresponding resources must be identified. The sequencing of project activities in the schedule will determine how many resources will be needed during the project lifecycle. The inverse may also occur wherein the project activities determine which resources, and how many, will be needed during the lifecycle of the project. In the case of human capital, skill-level, experience and geographic location also play a critical role in cost and schedule estimations. Whether resources are readily available or scarce, the importance of deploying resources in a manner that adds value to the organisation cannot be overemphasised. This can only take place when organisational management understands the dynamics affecting resources.

8.3.2.6 Risk

In order for stakeholders to develop an effective risk mitigation plan, they must have a view of all the risks that have the potential to have an impact either positively or negatively on a project. By definition, risk is a situation involving exposure to danger, harm or loss that has a potential to affect the project adversely. Risks are present in all projects, emanating from uniqueness, complexity, change, assumptions, constraints, dependencies, and people, within and outside the project (Hillson, 2004). Risks are also present in all projects as a result of their uniqueness pertaining to the numerous project management constraints. Despite the fact that risk is present in all projects, risks do not affect all projects in the same way (Thamhain, 2013). In a paper assessing scope and managing risk in highway development projects, Le *et al.,* (2009) argue that the potential level of risk to which a project is exposed can be determined by a

comprehensive scope definition and the assessment of elements thereof. After exhaustive scoping has occurred, a risk mitigation plan can then be developed to deal with the management of high-risk elements (Le *et al.*, 2009).

Risk is present at every stage of the project throughout its lifecycle (Kumar and Harison, 2016). However, it will vary as the project progresses through its lifecycle (Toth and Sebestyen, 2015). Therefore, risk management should be a six-step process that includes planning, identification, qualitative analysis, quantitative analysis, response planning, and monitoring and control (*PMI, 2013*). Risk management processes are defined during the planning phase. During the risk identification phase, risks that have a potential to affect the project are then identified and their characteristics documented. Thereafter, by prioritising risks based on their likelihood or probability of occurrence and resulting impact, a qualitative risk analysis is performed. This is followed by a quantitative risk analysis, which is underpinned by numerical ranking and analysis of the effects of the identified risks. Depending on the outcome, alternative options and mitigation actions are then developed as part of a risk response plan. Finally, a risk response plan is put into place, risks are tracked and identified, residual risks are monitored, and effectiveness of the risk management processes throughout the project lifecycle is evaluated.

By virtue of their strategic importance, megaprojects include many risk factors – such as design, legal, political, contractual, construction, operational, labour, client, society, and financial – that have a potential to derail the project, with devastating consequences to the organisation and its stakeholders (Irimia-Diéguez *et al.*, 2014). Effective risk management at every stage of the project lifecycle will minimise costs and at the same time maximise profits (Kumar and Harison, 2016). It must also be noted that risk will vary as the project progresses through its lifecycle (Toth and Sebestyen, 2015). The risk management team must be cognisant of risk variability during development of action plans, implementation of continuous risk monitoring systems and resource deployment in attempts to mitigate risks. An acceptable risk mitigation plan can only be developed if the project management team has a view of all the risks that have a potential to impact the project one way or another.

A variety of methods may be used to assist the project management team to reap the benefits of effective risk management. Whichever method is chosen, the project management team should ensure that it is guided by practicality, readability and ease of results interpretation (Dziadosz and Rejment, 2015). The approach used must be complementary, interdisciplinary and flexible, and it should be able to capture the fluid nature of risk factors whilst

simultaneously enabling organisation-wide involvement and interdisciplinary participation (Dziadosz and Rejment, 2015). The risk management team should encourage open lines of communication to facilitate early risk detection and management (Thamhain, 2013). The risk management team should also understand the dynamic forces at play within the organisation that impact on project risk performance (Thamhain, 2013).

8.3.2.7 Health, Safety and Environment

The importance of health, safety and environment (HSE) cannot be overstated in a project environment, more so within large, geographically dispersed organisations executing these projects. Although health and safety may be highly regulated industry-wide, the construction industry is a sector that continues to experience a high number of work-place accidents and illnesses. Notwithstanding mechanisation taking place in other industries, the construction industry has remained largely labour-intensive. The construction site is a work environment that is frequently changing as construction progresses. Whereas, environmental incidents, accidents and disasters, are difficult to localise. It is therefore important for stakeholders largely affected by the environmental activities of business conducted by Eskom and Transnet to have a view of the measure of compliance within these organisation in terms of legislation, standards and common codes of practice pertaining to HSE.

There are numerous legislations that govern HSE in the construction industry to minimise the number of work-place incidents, accidents and illnesses. On the one hand, the *OHSA* and its set of 21 subordinate legislations aims to prevent work-related injuries and illnesses across-the-board in industries operating within South African borders (*RSA, 1993*). The *OHSA* aims to provide for the health and safety of persons at work and for health and safety of persons in connection with the use of plant and machinery. It provides for the protection of persons other than persons at work against hazards and also makes provisions for health and safety arising out of, or in connection with, activities at work. Education, training and dissemination of information on occupational health and safety also falls within the ambit of the *OHSA*. On the other hand, the *NEMA* and its 5 subsidiary acts – which are in turn supported by numerous regulations – aims to provide for co-operative governance on matters affecting the environment (*RSA, 1998*). The *NEMA* also establishes institutions that will co-ordinate environmental functions exercised by organs of state. It further aims to provide for certain aspects of the administration and enforcement of other environmental management laws.

Ineffective enterprise occupational health and safety management, business continuity planning and overall risk management can become a disaster with devastating consequences for the organisation, employees, management and the community at large (Hindley, 2010). An organisation needs to employ imaginative methods of dealing with HSE matters. An organisation also needs creative strategies for promoting and socialising legislative compliance pertaining to these disciplines. To improve the outcomes, Biggs and Biggs (2013) identified training categorised as critical to the success of culture improvement strategies within an organisation. Hindley (2010) posits that good corporate governance, underpinned by principles of effective strategy and policy development contributes positively towards risk reduction and disaster management. Therefore, it is essential that HSE become part and parcel of organisational strategy and policy planning.

To prevent ineffective HSE management from becoming a disaster with devastating consequences for an organisation, employees, management and the community at large, it is important that occupational HSE training initiatives be given the spotlight and visibility they deserve to prevent incidents and accidents before they occur. It can sometimes prove difficult to localise HSE incidents, accidents and disasters. Consequently, it is essential that occupational HSE become part and parcel of the organisational strategy and policy planning. This can only be done if stakeholders have an overview of HSE matters. Moreover, to aid accountability and holistic strategy and policy formulation, external stakeholders largely affected by the activities of business conducted by Eskom and Transnet must have a view of the measure of compliance within these organisations.

8.3.2.8 Document Management

Document management is the creation, review, modification, storage, issuance, distribution, accessibility, and destruction of project-related documents. Due to the sheer number of documents that may need to be managed in a project environment within which large, geographically dispersed organisations operate, document management can become a daunting task. In a project management environment, documents are produced for a variety of reasons. They may be used to assist the project team during project construction, to assist the asset owner during operation of the asset, or for gathering institutional knowledge. For the organisation to achieve these goals, stakeholders must have an unparalleled view of the document management system for all the projects.

Although Al-Qandy and Kandil (2013) found that top construction firms generally utilise computer software and electronic methods for the creation, storage and management of project-related documents, EDMS has not replaced manual document control and management. The main reason for this is that EDMS essentially mimics traditional methods of document organisation and retrieval. However, EDMS is a major positive step forward in records management (Koshy, 2013). Its foremost benefits are speed, multi-user access and hierarchical access. The major drawbacks pertain to the amount of time it takes to scan existing documents onto the system as well as erroneous categorisation of documents during the capturing process. However, this becomes redundant when applied to a project that commences with EDMS already in place, because there would be no existing project documents that would need to be scanned.

EDMS is an intervention that requires comprehensive, organisation-wide support and implementation. Groenewald (2004) warns that the introduction of EDMS may backfire in an event where the necessary groundwork has not been done or in cases where organisation-wide support and implementation is lacking. Human resource policies must be reviewed to create a conducive environment for appraisals, performance-related compensation, recruitment and selection, education, employee relations, empowerment, teamwork, and training and development, amongst others. The management of human factors, insofar as they affect project document management system, is especially important in the public sector (Leikums, 2012).

Whether electronic or manual, seven characteristics must be exhibited by a document-management system in a construction environment to realise the tenets of this discipline (Inglesis, 2013). Requisite documents should easily be accessible by all relevant project members, whether in the form of hardcopies, electronic format or from a shared network drive. To prevent people from working with superseded or outdated documents, changes on any document should be shared with the project team timeously. Third, there should be clear and visible ways of identifying document changes and updates. Fourth, to differentiate all documents from others and to differentiate them from previous revisions, every document should contain a unique identifier number, to determine how the document fits in with the whole document management system. Fifth, previous versions of superseded or revised documents should be removed from circulation to avoid unintended use. Sixth, the status of the document – i.e. whether the document is a draft or an approved copy – should be easily identifiable by all users. Finally, there has to be a single and unique document distribution

system, such that it is made clear that any documentation received through any other means is not valid and should not be used on the jobsite or for construction purposes.

8.3.2.9 Procurement

Procurement involves activities and processes of acquiring goods, services and/or works from a source that is external to the organisation at the best possible price, whilst accounting for quality, quantity, turnaround time, and location. It is aimed at minimising risk, reducing delays and, at the same time, promoting fair and open competition. The procurement of project-related goods and services may stall progress onsite, resulting in schedule and cost overruns. Therefore, it is imperative that the procurement of goods and services be strategically planned and executed. This can only materialise if management has a view of the key procurement issues obstructing the project team. Whether it be design-build or design-bid-build, choosing the appropriate project delivery procurement method can determine the success or failure of a project.

Design-bid-build is a system where the contractor is not responsible for the design or the documentation of the project. There is a clear division between design and construction in the design-bid-build procurement system. It has continued to exist because the separation of design and construction eliminates opportunistic business behaviour, it allows flexibility during the construction phase, it takes advantage of the free-market economics during the contractor selection phase, and it takes advantage of the best talents from design and construction to produce the most desirable results with greater certainty (Kong and Gray, 2006). Alternatively, a design-build procurement delivery system may be employed. In this type of procurement, the project owner, or client, enters into a single contract with an entity that is responsible for both the design of the project and the construction thereof. It is, therefore, crucial that the contractor selection process is comprehensive to ensure successful execution when the design-build procurement delivery system is used. The design-builder is not prohibited from subcontracting portions of the project. However, the contractor is wholly responsible and answerable to the project owner for all the activities on site.

Lack of innovation and rampant corruption were some of the vices that were identified by secondary literature that broadly affect the discipline of procurement within an organisation. Procurement has certain characteristics that appear to retard progress in building and construction projects. Furthermore, those characteristics make innovation difficult to achieve. The financial incentive to undertake research and development in procurement delivery

systems pertaining to the construction is minimal, leading to lack of innovation and deficiency in knowledge acquisition within the discipline (Valence, 2010). Whereas corruption is a result of the bureaucratic nature of project procurement which, from any philosophical view considering the good and evil actions of men, is wrong. Corruption is illegal, immoral, unconventional and against the public good (Osei-Afoakwa, 2012). Lack of innovation and rampant corruption are project management vices that influence project procurement and these cannot be managed if stakeholders have no insight into how these vices manifest themselves.

The *State of Capture Report* published by the former Public Protector, Advocate Thulisile Madonsela in 2016 showed wide evidence of improprieties at state level, between the Gupta family and the then President, Zuma, implicating numerous high-ranking government officials. The allegations that the Gupta family influenced the removal and appointment of ministers and directors responsible for SOCs, resulting in improper conduct, including the award of state contracts and benefits, are under investigation by the Zondo Commission. The construction of Medupi and Kusile power stations as well as the Transnet's New Multi-Product Pipeline characterise projects whose costs have ballooned since project inception. Large quantities of taxpayers' money have been squandered during the lifecycle of these projects. Although these projects have not been directly implicated in the *Commission of Inquiry into State Capture*, they epitomise the amount of money which can be misused in the project environment in which Eskom and Transnet operate. Hence the need for internal and external stakeholders to have a view of project procurement.

8.3.2.10 Contract Lifecycle Management

At any given time, a large, geographically dispersed SOC may have tens – if not hundreds – of contracts to manage on each megaproject. Selection of a type of contract to be used for the delivery of the construction project must consider the characteristics of the project as well as the prominent needs of the organisation. A contract is a legally binding document between the contractor and the client detailing the terms of agreement, general conditions, supplementary clauses as well as special clauses, including any other relevant conditions for the delivery of the construction works (Butuza and Hedre, 2010). A contracting strategy should consider the project timelines, the type, size and location of the project, the allocation and mitigation of risk, the segregation of roles and responsibilities of relevant parties, prevailing market conditions, as well as project costs constraints (Chua and Loh, 2006).

A contracting strategy is not an event, rather it is a process that takes place throughout the lifecycle of a project. It enables appropriate management of the key factors of the project such as the client's requirements, the contractors' competences, desired objectives, and the client's competitive advantage. It maximises the possibility of the overall project success. Management of these factors is especially important considering that all projects are prone to change throughout the lifecycle in terms of various project management constraints discussed herein. A well-defined contracting strategy sets a firm foundation for the management of the key dynamics of the contract as part of Contract Lifecycle Management, or CLM. CLM is a 'proactive, methodical management of a contract from initiation through to award, compliance and renewal' to improve efficiency, save costs and to decrease liability, non-compliance and risk (Villanova University, 2018). There is no doubt that stakeholder should have a view of these factors considering that billions of Rand of taxpayers' money is at stake.

The CLM process must include the following (Exari, 2018; Trinkūnienė and Trinkūnas, 2014): To initiate the lifecycle, a request describing the project needs must be made; thereafter a contracting strategy based on the approved templates and clauses must be created; the next step is to get the contract approved by the appropriate parties which must then be shared with interested and affected parties; fourth, the terms of the deal must be negotiated to balance risks against value, considering all legal obligations; afterwards, the contract must be signed as a binding agreement between the parties; step six, the contract must be captured into a central system to facilitate ease of management; thereafter, contract compliance is managed regarding various contract obligations and commitments, and to avoid contract breaches and subsequent risks; step eight is for the contract management staff and contract administrators to manage the contractual rights, renewals, amendments, and relationships; finally, the portfolio may be optimised for better value and lower risk outcomes, thus creating a continuous feedback loop between the contract portfolio and business management.

8.3.2.11 Project Management Software

There are many benefits of utilising centralised and digitised project management software. Depending on the package being employed, this software has a potential to manage cost, schedule, scope, quality, resources, risks, safety, health, environment, documents, procurement, contracts, file sharing, and so forth. Project management software enables ease of collaboration, schedule management, project tracking, better communication, and task delegation (Hurst, 2017). Meanwhile Khan (2006) argues that it reduces project risk, enables better decision-making, improves collaboration and communication, saves time and money,

and facilitates proper documentation of operating assets. Moreover, Windsor (2018) maintains that it standardises the project management approach, encourages efficient management of projects, optimises resource allocation, centralises project reporting, improves task management and visibility, and it facilitates effective team collaboration.

Moreover, centralised and digitised project management software can facilitate the approval processes within the organisation. A well-adapted project management software package can facilitate the approval processes, which encourages appropriate management of all project management constraints under consideration. If approval processes are sluggish, other project management constraints are exacerbated in a generally disruptive manner. Therefore, approval processes within an organisation have to function seamlessly, to reduce unnecessary setbacks and increase the chances of timeous project completion (Mulder, 2018). Furthermore, centralised and digitised management software provides much needed visibility within the project environment at all levels of the organisation. Undoubtedly, lack of project management software can constrain an organisation that manages billions of Rand worth of projects that are geographically dispersed.

8.3.2.12 Delays in the Approval Processes

Delays in the approval processes have the potential to influence all other project management constraints discussed herein. If processes within an organisation do not function like clockwork they have the potential to amplify challenges that have been articulated in this subsection pertaining to the various constraints. Delays in the approval processes will have a particularly adverse effect on the procurement of goods and services, with resulting cost and schedule implications. As such, approval processes have to be fluent and seamless so as to reduce unnecessary setbacks and increase the chances of timeous project completion (Mulder, 2018). Hence the need for their inclusion in the conceptual framework that was being developed.

8.3.2.13 Project Reporting and Communication

Project reporting and communication will use the project status reporting framework to encapsulate the above project management constraints. Also known as project status reporting, it includes

> '…the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information' (*PMI, 2013: 287*).

A project status report may be published as a single, standalone report or as part of a series of distinguishable, identifiable portions forming part of a larger report (IIRC, 2013). During

project status reporting, this study recommends that the principles of Integrated Reporting (IR) be adopted. IR can capture the project status in a concise, all-encompassing manner that considers key issues, both negative and positive.

IR produces cohesive and proficient status reports, it eliminates the silo mentality, reduces information duplication, and improves quality (*IIRC, 2013*). As far as complexity of implementation of the integrated reporting framework is concerned, Cheng *et al*., (2014) argue that experiences in South Africa have shown that the adoption and implementation of the integrated reporting framework is not as complex as some would have us believe. IR gives stakeholders insight into how the organisation's mission, strategy, governance, and business model combine to create value over time (Fried *et al.*, 2014), with regards to all the elements of the project, programme or portfolio under consideration.

The IR takes a more holistic view of the concept, stakeholder. It asserts that stakeholders should include shareholders, employees, customers, suppliers, partners, the physical environment, knowledge institutions, and society (Fried *et al.*, 2014). In the spirit of IR, internal and external stakeholders must be identified and their interests, involvements and impact documented; a reporting and communication approach must be devised; relevant information must be made available; stakeholder expectations must be managed; finally, the relevant information must be disseminated. Notwithstanding routine reports, an organisation may choose to share project status information with stakeholders to increase transparency and to encourage further investment. This articulation of how project reporting and communication should be undertaken concludes the left side of the framework.

8.3.3 Rationalising the Right Side of the Framework

The right side of the conceptual framework is founded on the enterprise management offices which will, amongst other things, be responsible for project reporting and communication, discussed in subsection 8.3.2.13 above. The management style where projects coalesce to form programmes which in turn merge to form portfolios, is widely used in the project management environment, and within the large, geographically dispersed SOCs that are a subject of this study.[2] Hence the utilisation thereof.

[2] Refer to Table 4.1 showing a Comparative Overview of Project, Programme and Portfolio Management

Hope and Moehler (2014) suggest that organisations have an opportunity to integrate visionary and strategic sustainability with operational sustainability as part of project, programme and portfolio management. This is in response to global environmental issues such as climate change, energy security, issues of social justice, and concerns over resource depletion. Todorov (2014) postulates that well-designed project and programme tools and methods have a positive impact on economic and social development of communities and countries that successfully implement them. These tools and methods provide centralised financial planning, holistic risk management, modelling of project and programme interdependencies, sharing of resources, and appropriate selection and prioritisation of projects to ensure sustainability and regularity.

As discussed in chapter four above, enterprise management offices can be referred to using a variety of names, are depicted using a variety of models, and are purported to fulfil a variety of roles. Even though they may not have the desired influence within the organisation (Malatji and Marnewick, 2016), management offices aim to assist in various ways with varying degrees of involvement. They have distinct strengths, weaknesses and characteristics (Mariusz, 2014). They have a 'degree of authority, acceptance, adoption, and autonomy, for defining, distributing, and supporting project management practices' within the organisation (Monteiro *et al.*, 2016: 1093). According to the *PMI (2013: 11)*, management offices can be categorised as either supportive, controlling or directive. A supportive management office supplies 'templates, best practices, training, access to information, and lessons learned'. A controlling management office provides support and compliance, which 'may involve adopting project management frameworks or methodologies, using specific templates, forms and tools, or conformance to governance'. Whereas a directive management office may directly manage the projects with a high degree of control.

In this study enterprise management offices are categorised into three, namely the Enterprise Project Management Office, the Enterprise Programme Management Office and the Enterprise Portfolio Management Office. In terms of organisational hierarchy, these function at operational, tactical and strategic levels respectively. The Enterprise Project Management Office implements and manages projects throughout their lifecycle – from initiation through to project close-out. It conducts day-to-day tracking and monitoring, collating project status reporting, coordinating issue resolution, managing project risks, and aggregating financial data.

The Enterprise Programme Management Office manages multiple projects running within programmes. It ensures adherence to standardised procedures, collating programme status reports and assembling these for senior management and programme sponsors. It identifies commonalities amongst projects running within the programme to ensure enterprise-wide coordination and resource management. Furthermore, it ensures that governance processes are followed, programme benefits are realised, key internal and external stakeholders are consulted, uncertainties are minimised, and a holistic view of the programme is apparent to all stakeholders.

The Enterprise Portfolio Management Office is premised on the previous two enterprise management offices. In fact, in this study the acronym EPMO only applies to this management office. The EPMO is most beneficial when it is implemented by a large organisation, managing multiple projects and programmes in geographically dispersed locations using shared and dedicated resources to deliver these within scope, cost and schedule. It does this whilst ensuring organisational efficiency, business innovation, systematic decision-making, and benefits realisation. The EPMO is tasked with:

- Safeguarding the alignment of project and programme management with the organisational objectives and business strategy and, ultimately, with the vision, mission and values. There should be a willingness to change project and programme management should these change;
- Maintaining an integrated project and programme management plan with goals, objectives and milestones;
- Maintaining an extensive governance and decision-making system for handling people requirements, processes, technologies, organisational structure, and strategy for integration into the organisation's philosophy;
- Identifying the most strategic projects to execute, providing grounds for prioritising these projects and determining resource deployment and human capital development in order to facilitate acquisition and upgrading of essential skills;
- Earmarking projects and programmes that can be utilised to pilot new technologies, thus ensuring the company is technologically savvy;
- Ensuring that senior executives and key internal and external stakeholders have bought into the concept of enterprise management offices. This will ensure that the EPMO is strategically positioned as an agent of change by attaining organisation-wide support;

- Attracting and retaining the best resources in the industry and facilitating the deployment of these resources to the highest priority projects and programmes in order to promote success;
- Maintaining an organogram, with respective roles and responsibilities to ensure that all project and programme staff are aware of, and capable of executing, their functions, and that critical functions are occupied by the best performing individuals within the organisation;
- Identifying, prioritising, planning, authorising, executing, closing-out, reviewing and thereafter documenting and inculcating the utilisation of lessons learnt within the entire organisation, to encourage learning and growth whilst ensuring consistency in application;
- Integrating management of the entire project portfolio within the enterprise, to safeguard project and programme management excellence;
- Integrating and aggregating project and programme information at executive level;
- Providing a centralised entity to which the geographically dispersed enterprise management offices will report;
- Accounting for all projects within the entire portfolio to facilitate standardised cross-organisation measurement, thus ensuring meaningful articulation, comparison and evaluation of information;
- Facilitating the standardisation of processes, practices, techniques, and tools to ensure cross-organisational articulation, comparison, visibility, accountability and consistency in reporting and evaluation; and
- Providing consultancy and advisory services including business case development and review, cost-benefit analysis, risk management, post-implementation reviews, mentoring and evaluation, and multi-project scheduling and planning.

8.4 Objectives of the Framework

This study has developed a framework for project status reporting in South African State-Owned Companies. This framework should:

- Formalise project, programme and portfolio status reporting, particularly within large, geographically dispersed SOCs that execute megaprojects of strategic importance to the South African economy;

- Communicate cost, schedule, scope, quality, resources, risks, safety, health, environment, document management, procurement, contracts lifecycle management, and delays in the approval processes to stakeholders during the lifecycle of the project, programme or portfolio;
- Utilise enterprise management offices as a means to improve accurate and holistic stakeholder feedback at project level, programme level and portfolio level;
- Eliminate the effects of bureaucratic project management structures often present within the project management environment;
- Minimise transformation and error as information is iterated by the reporting process from one level to the next; and
- Mitigate the effects of selective reporting throughout the organisation, thus minimising negative impact on all stakeholders – internal and external.

According to this research study, this conceptual framework is the most appropriate framework for overcoming the challenges faced by Transnet and Eskom during project status reporting. With minor adjustments and care in application, this framework may be applicable to the construction industry of which these organisations are a part. This framework eradicates the challenges of holistic project status reporting, as identified in sections 1.3 and 7.7 above. This framework contributes to the project management body of knowledge that aims to formalise project status reporting. It advocates for the utilisation of enterprise management offices to improve accurate stakeholder feedback. It provides a holistic view of all the project management constraints that have a potential to impact positively or negatively on projects undertaken by these organisations, and it eliminates the devastating effects of selective reporting often present in large, geographically dispersed organisations.

8.5 Chapter Summary

This chapter has provided a comprehensive discussion of the research findings pertaining to the data analysed in chapter seven. This was done by providing a tabular view of what was uncovered during analysis of secondary research questions one-to-four if these are framed as objectives. This view is appropriate for providing the extent to which the study's secondary research questions have been addressed. Thereafter, a conceptual framework that is able to overcome the challenges identified in sections 1.3 and 7.7. was developed. The left side of the conceptual framework is founded on the project management triangle, and thereafter accounts

for all constraints that have the potential to affect infrastructural projects during their lifecycle. Whereas, the right side is founded on the enterprise management offices which will, amongst other things, be responsible for project reporting and communication. The objectives of the framework were then provided to bring the chapter to a close.

Chapter Nine: Conclusions and Recommendations

9.1 Introduction

Present literature will reveal very little in the way of formalised project status reporting pertaining to large, geographically dispersed SOCs tasked with executing megaprojects of strategic importance to the South African economy. The construction industry, to which these SOCs are a part, suffers from similar neglect. Instead, formalised project status reporting literature tends to point towards information and communications technology as well as software development (Barry and Uys, 2011; Iacovou *et al.*, 2009; Smith *et al.*, 2001; Smith and Keil, 2003; Snow *et al.*, 2007; Wearne, 2014). The need to formalise project status reporting pertaining to these organisations was the primary motivation for this research study.

The central research question was aimed at determining the appropriate framework for project status reporting in South African SOCs. The broad nature of this central research question prompted the formulation of five secondary research questions. As these secondary research questions were addressed, information pertinent to the central research question became clear. Hence, five secondary research questions were formulated. The first was to establish the project status reporting processes currently in existence. The second was to determine the outcome of these processes. The third was to uncover the key variables of the reporting processes that have been put in place to assure accurate flow of project status information to internal and external stakeholders. The fourth was to deliberate on challenges emanating from the existing project status reporting processes. The fifth was aimed at gauging the cogency of the developed project status reporting framework, and its abilities to overcome the challenges identified.

9.2 Research Findings

9.2.1 First Secondary Research Question

As the first secondary research question was engaged, the project status reporting processes currently in existence became evident. These processes pertained to the following: The most important project management constraints; the communication of missed targets/milestones with immediate superiors; and the communication of important targets/milestones with team members. They related to resources used to report project progress, the frequency of reporting and the benchmarks used. Furthermore, they included the monitoring of reporting accuracy, means used to verify project status information, the approving authority prior to report

publishing, and the most important stakeholders involved in project status reporting. Finally, they dealt with how inaccurate information from site personnel was controlled; how inaccurate reporting to management was handled; how management intolerance regarding perceived substandard project progress was addressed; and the fundamental differences between internal and external reports.

9.2.2 Second Secondary Research Question

As the second secondary research question was engaged, the outcomes of the existing project status reporting processes became clear. It was found that status reports containing information tailored to suit a specific target audience were issued daily, weekly, bi-monthly, monthly, and quarterly using a variety of Microsoft Office Suite programs which could best represent the activities taking place onsite. Aconex, shared network drives, direct and broadcast emails, PMIS, and corporate communiques were used to share the progress reports. These reports indicated appropriate project targets and/or milestones, whether the target had been met or not, and the mitigation actions undertaken to ensure that the target was met if it had not been met. The reports also gave the reader a view of the salient project management constraints, and the implications thereof if the constraints were not managed. It also became evident that formal meetings aligned to the publishing of the reports were held wherein the reports were tabled for discussion.

Furthermore, the Terms of Reference, standardised procedures, or extensive and regular engagements and consultations were utilised to ensure that similar benchmarks were used. In cases where inaccurate information had been reported, physical checks were done to verify the true status of the project and, where this was impracticable, site pictures served as evidence. This was especially important considering discrepancies were said to happen often, regularly, weekly, or monthly. Discrepancies that occur as a result of inaccurate reporting or misalignment were addressed by team meetings, verification of information onsite, or the use of problem-solving sessions and war room sessions to ensure alignment. If inaccurate information had been shared with management, this had to be acknowledged at the earliest instance and, thereafter, the report had to be recalled and a revision published if possible. However, in cases where management was intolerant of the reporting, citing perceived substandard project progress, it emerged that intolerance of the reporting does not translate into

competency onsite. Instead, the reporting should enable management to identify and address the areas of concern.

9.2.3 Third Secondary Research Question

As the third secondary research question was engaged, the key variables of the reporting processes that have been put in place to assure accurate flow of project status information to stakeholders came to the fore. The most important constraints in the experiences of the respondents were stated as schedule, cost, resources, scope, contracts, risk, communication, quality, project management software, and delays in the processes of approval. In contrast, secondary literature showed that the management of health, safety, environmental, documentation, and procurement should not be understated in a project environment. As far as the means that are used within the organisation to communicate missed targets or milestones to immediate superiors is concerned, Microsoft Office Suite was the suite of programs most evident in the creation of reports published daily, weekly, bi-monthly, monthly, and quarterly. The content of these reports was tailored to suit the target audience within the respective governance structures. Moreover, reports could be routine or *ad hoc*.

Regarding the communication of important targets or milestones within team members, the variables were similar to those used for immediate superiors, with the key variable being that information communicated with team members was much more detailed. With regard to the means and/or resources used to report project progress, it transpired that a wide range of tangible and intangible resources were used. Baselines were used to monitor the accuracy of the reporting against a tangible reference point and to ascertain deviations therefrom. To verify and validate the project status information, individual activities onsite were physically tracked against the plan and, thereafter, regular meetings were held. The key change that respondents said they would make to the reporting process was to automate and centralise it.

Project status information was interrogated, verified and validated by key stakeholders using various checks and balances prior to sign-off. Discrepancies that arose were addressed via desktop exercises, site visits, verification of signed documentation, examination of emails, utilisation of expert judgement, problem-solving sessions, war room sessions, or using routine or *ad hoc* meetings consisting of key stakeholders. However, if inaccurate information slipped through the cracks, the mistake or inaccuracy was acknowledged as soon as it was detected and the report was retracted and revise prior to resubmission if time permitted. Having numerous

sources of information was noted as negatively affecting reporting. In cases where the information was accurate but was still not accepted by management because it reflected substandard progress onsite, open lines of communication were regarded as pivotal. Moreover, management was implored to use the reports to enable decision-making aimed at addressing substandard progress onsite.

The most important stakeholders involved in the project status reporting process, were listed as project/programme controls managers, the project/programme managers and the project/programme directors who approved the final reports before they were published, with approval being verbal, written or electronic. The approving parties differ depending on the governance body being approached or the stakeholder being apprised. Furthermore, the cost engineers, quantity surveyors, planners, and the construction managers played a pivotal role with regard to verifying and validating internal reports, whereas the senior managers, project/programme directors, general managers, the project sponsors, and/or the chief executive signed-off external reports. Moreover, the departmental heads of Health and Safety, Quality and Assurance, Engineering, Procurement, Human Resources, Industrial Relations, Risk, Security, Reporting, Environmental, and Document Control, were said to contribute towards the reports. Depending on the information contained in the report, some individuals were the originators, some were the consolidators, some were the approvers, and others were the consumers. Important external stakeholders were identified as the project sponsor and the contractor.

9.2.4 Fourth Secondary Research Question

As the fourth secondary research question was engaged, the challenges emanating from the existent project status reporting processes became clear. As far as the prominent project management constraints pertaining to primary data – namely schedule, cost, resources, and scope – the following became evident. Schedule was identified as a constraint because it was not resource-loaded in a manner that ensured that activities on the critical path were achieved timeously and, in some cases, the scheduling was unrealistic from the outset. It was challenging to manage project costs with the utmost care considering that SOCs were funded by taxpayers' money, and notwithstanding the resources limitation occurring as a result of funding. Creating an environment that adequately motivates resources to perform at their peak as well as unqualified and inexperienced individuals were key challenges, especially in cases where the

resource limitation had a negative impact on the project-related cost. With regard to scope, it was found that it could be negatively influenced by scope creep and feature creep; the former occurring gradually and unofficially due to undocumented or uncontrolled changes, and the latter as a result of indiscriminate addition of features and functions.

As far as the less prominent constraints pertaining to primary data were concerned – namely contracts, risks, communication, and quality – the view was that project managers had insufficient understanding of contracts for the delivery of the construction works, and as a result there was poor contractual management of the EPCM. Moreover, there was inappropriate selection of the required contracts thus constraining project execution. Risks were not always anticipated and mitigated appropriately, thus severely impacting programmes, and reporting thereof was not done in a manner that aided decision-making. Communication aimed at helping people understand their roles and responsibilities was sometimes lacking, and project status reporting was not always reflective of the activities taking place onsite, thus hindering decision-making and problem-solving. Moreover, that quality management was not at an acceptable level considering the strategic importance of the projects being executed.

With regard to other challenges identified, the construction industry was said to experience a high number of work-place accidents and illnesses because it remains largely labour-intensive and in a constant state of evolution as construction onsite progresses. Ineffective enterprise occupational health and safety management, business continuity planning and overall risk management were challenges that an organisation, its employees, and management encountered. Moreover, it was difficult for an organisation to localise environmental incidents, accidents and disasters. These could have a detrimental impact emanating from poor visibility and subsequent management thereof. Document management could become a daunting task in large, geographically dispersed organisations. There was lack of innovation and rampant corruption in procurement. In addition, delays in the approval processes could have the potential to influence negatively all other project management constraints discussed herein.

9.2.5 Developing the Project Status Reporting Framework

After findings pertaining to the four secondary research question articulated above became evident, to contribute to the project management body of knowledge, a conceptual framework was developed to close the literature gap. The developed project status reporting framework is considered suitable and cogent for the following reasons. It ensures ‘timely and appropriate

planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information' (*PMI, 2013: 287*). It aids the realisation of project deliverables by keeping the lines of communication clear and pertinent (Zulch, 2014). It shatters the silo mentality, reduces information duplication, and improves the quality of information available to stakeholders. It constantly apprises internal and external stakeholders of how projects are progressing with high quality, trustworthy and holistic project status information.

The developed conceptual framework eliminates the effects of selective reporting – namely, optimistic bias, pessimistic bias and erroneous reporting – using the principles of Integrated Reporting. This is done by apprising a large number of stakeholders such as shareholders, employees, customers, suppliers, partners, knowledge institutions, and society (Fried *et al.*, 2014), using a single, standalone report or a series of distinguishable, identifiable portions forming part of a larger report (IIRC, 2013). It takes into consideration all project management constraints which have the potential to affect infrastructural projects during their lifecycle. It also makes provision for how an organisation's mission, strategy, governance, and business model combine to create value over time (Fried *et al.*, 2014).

Furthermore, the conceptual framework minimises transformation error as the project status report is passed through the reporting processes, considering the number of individuals, from supervisors on the job-site to executives in the boardroom, who are privy to this information as it is shared from one level to the next. In a multi-tiered structure often present in the project management environment, it minimises the effects of improper reporting which can quickly reverberate and amplify throughout the entire organisational structure and beyond, with devastating consequences. And finally, it aids accurate, holistic and pertinent reporting, which can be daunting if one considers the size and number of projects that need to be reported on by large, geographically dispersed SOCs that execute megaprojects of strategic importance to the South African economy.

9.3 Limitations of the Study

Like many research studies, this study experienced limiting factors which, if not acknowledged and subsequently managed, would undermine the validity and reliability thereof. Limitations are potential weaknesses of a study that are beyond the researcher's control (Simon, 2011). Section 1.11 discusses the scope within which this study is valid and reliable. With regard to

the limitations associated with this discussion, the following may be said. Of the 131 SOCs, only two can be classified as large, geographically dispersed organisations, tasked with executing infrastructural megaprojects of strategic importance to the country, namely Eskom and Transnet. Therefore, it must be accepted that the conclusions reached by this study should be limited to Transnet and Eskom. Even though from a certain perspective these SOCs are part of the construction industry – insofar as the execution of megaprojects, the conclusion of this study can only be generalised to the latter. Furthermore, generalisation of conclusions to other organisations – such as private enterprises that execute megaprojects of strategic importance to the South African economy, SOCs or private organisations outside the borders of South Africa, or other similar organisations within and outside the country – should be done with the utmost care, considering the variables at play.

With only two SOCs falling within the scope of the study, it must be accepted that the general research population would dramatically shrink. The identification of only twenty individuals using the sampling strategy outlined in section 6.7 stems from the few SOCs that fall within the scope of the study. Furthermore, it was mentioned that the organisation wherein the data were collected was undergoing organisational restructuring during this period. The resulting implications was that the new organisational structure, accounting for the twenty reporting individuals, was not yet populated by personnel who were appointed under this new structure. These individuals performed this role under the previous, dated organisational structure. The metamorphic nature of this organisation is another factor that this research took into consideration.

As data were collected, it was discovered that this limitation did not significantly hinder the response rate. Since sixteen respondents out of a potential twenty participated in the study, this was a relatively healthy response rate. Although working under the dated structure, these individuals had common, binding characteristics, which would not change under the new structure. Their primary role within the organisation was to conduct project status reporting. They utilised established processes to collect, collate, validate, and disseminate projects status reports within the organisation. Moreover, they ensured reporting to internal and external stakeholders was accurate, and that all the elements that should be reported on were accounted for.

The principles of triangulation were applied to minimise the effects of the above-mentioned limitations. The study endeavoured to gather data from multiple sources using the four research

approaches articulated in section 6.3, to enhance and reinforce the validity and reliability of the propositions made (Fink, 2003). Triangulation was used, wherever possible, to evaluate and cross-reference primary data with existing literature. The triangulation process shed some light and provided guidance during the development of a framework aimed at overcoming the challenges of holistic project status reporting in SOCs.

9.4 Recommendations

This study has developed a framework for large, geographically dispersed SOCs that execute megaprojects of strategic importance to the South African economy. This framework is recommended for overcoming the identified challenges faced by these organisation during project status reporting. Since the framework is holistic, it formalises project status reporting, nurtures effective communication to both internal and external stakeholders, and eliminates the bureaucratic project management structures as a factor that is capable of undermining reporting. It considers all pertinent, applicable and available information at the time of reporting, clarifies instances where the project status information is not applicable, as well as cases where the information is not available at the time of reporting. The framework minimises the effects of selective reporting, and as a result minimises spiralling costs, runaway schedules, ever-changing scopes, and substandard quality that epitomises projects executed by these organisations.

The developed framework advocates for the utilisation of enterprise management offices as a means to improve accurate stakeholder feedback. The organisations that are the subject of this study both utilise the project, programme and portfolio management structure wherein enterprise management offices function. However, should it be the case that the framework is being applied in an environment where these are not present, the user will find that project status reporting is not massively hindered. Nevertheless, utilisation of enterprise management offices, at project, programme or portfolio levels is highly recommended for organisations that are large and geographically dispersed. As shown in section 4.3, enterprise management offices add immense value within the organisation.

During project status reporting, this study recommends that the principles of Integrated Reporting (*IIRC, 2013*) be adopted. IR produces cohesive and proficient status reports. It eliminates the silo mentality, reduces information duplication and improves reporting quality. It gives internal and external stakeholders sight of how the organisation strategically creates

value over time. IR may include traditional financial accounting information, but essentially it should make provision of how the company's mission, strategy, governance, and business model combine and interact with one another to facilitate the company's ability to create value over time (Fried *et al.*, 2014). It should do this in a concise, all-encompassing manner that describes how these factors interact with one another.

It has been suggested that, with minor modifications, this framework may be utilised within the construction industry. It is recommended that if this is applied in the new context then the utmost care should be taken in such an application because the variables that pertain to SOCs may not align perfectly with those of the construction industry. Even though the former, insofar as the execution of megaprojects, is a subset of the latter.

9.5 Direction for Future Research

There certainly is potential for future studies aimed at enriching the project management body of knowledge to contribute positively in the areas that have been a topic of discussion in this study, and other areas which this study has merely hinted at. First, the researcher can surmise that future research may want to rank the project management constraints discussed in subsection 8.3.2 to determine the impact that each has in comparison to the others. Furthermore, where each constraint should be reported within the enterprise project management office framework, should such a facility exist. Second, if the developed project status reporting framework is adopted within the construction industry, one may find that this industry contains elements which can differ markedly compared to those of the organisations that are the subject of this study. Differences will need to be considered and accounted for during the application of the framework. Perhaps future studies may investigate the fundamental differences between these variables, as a means to reconcile them, to further contribute to the project management body of knowledge.

9.6 Conclusion

This study has developed a project status reporting framework which should be utilised within Transnet and Eskom to apprise internal and external stakeholders of project progress. The identified challenges that SOCs face during project status reporting will be overcome if this framework is used. There are a number of key characteristics that will allow this. It formalises

project status reporting pertaining to SOCs. It nurtures effective communication, a key attribute in the project management environment. It promotes accurate flow of holistic project status information to both internal and external stakeholders, in an effort to aid problem-solving and decision-making during the project lifecycle. It considers a holistic view of project management constraints, to give stakeholders an unparalleled view of all the project management disciplines. It advocates the utilisation of enterprise management offices as a means to improve stakeholder feedback. And, it eliminates bureaucratic project management structures as a factor that is capable of undermining reporting.

Further to the abovementioned objectives, the project status reporting framework facilitates other virtues that this study has hinted at throughout. It aids information communication of the highest quality, thus minimising the unwanted effects of erroneous, partial and impertinent reporting, which has the potential to affect various stakeholders such as DPE, DNT, DoE, NERSA, and NNR, to name but a few. It considers all pertinent, applicable and available information at the time of reporting, clarifies instances where the project status information is not applicable, as well as cases where the information is not available at the time of reporting. Considering the persistent, volatile economic climate which is stunting job creation and hampering GDP growth, it assist organisations in stretching taxpayers' money. The framework minimises the effects of selective reporting, and as a result minimises spiralling costs, runaway schedules, ever-changing scopes, and substandard quality that epitomises projects executed by these organisations.

Ineffective reporting has the ability to influence negatively the entire project management structure in a costly, time-consuming and generally destructive manner. It can quickly reverberate and amplify throughout the entire organisation and beyond, with devastating and wide-ranging consequences. Accordingly, this research study set out with the primary goal of determining the most appropriate framework for project status reporting. To determine this, it first had to ascertain the project status reporting processes that are currently in existence. Thereafter, it discussed the outcomes of these processes. This was important in ascertaining the key variables of the reporting processes, since challenges that emanate from these processes could not otherwise be determined. Addressing all these research questions would bring to the fore a suitable and cogent project status reporting framework that is able to overcome the challenges that have been identified. From what has been said herein, this study has achieved its primary objective of contributing towards the project management body of knowledge, by developing a framework for project status reporting in South African SOCs.

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Appendices

Appendix 1: Introductory Letter

UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)

APPLICATION FOR ETHICS APPROVAL
For research with human participants

INFORMED CONSENT

Information Sheet and Consent to Participate in Research

Date: 22 March 2018

Dear Colleague,

My name is **Malusi Luthuli** (209519213). I am a **Doctoral** candidate studying at the University of KwaZulu-Natal, **Westville Campus**. The title of my research is: **Developing a Framework for Project Status Reporting in South African State-Owned Companies (SOCs)**.

As indicated by the title of the research, the aim of the study is to contribute towards a body of knowledge aimed at developing a framework for project status reporting in South African SOCs. The research is aimed at ascertaining the project status reporting process currently in existence, including the outcomes thereof. The study will measure the processes put in place to assure accurate flow of project-related information within the organisation. Furthermore, it will explore the processes aimed at assuring accurate flow of project status information to external stakeholders. It will then ascertain the extent to which the reporting processes are able to achieve the desired results. Recommendations will then be made based on the outcomes. I am interested in interviewing you so as to share your experiences and observations on the subject matter.

Please note that:

- The information that you provide will be used for scholarly research only.
- The study is wholly funded by the researcher.
- Your participation is entirely voluntary. You have a choice to participate, not to participate or to stop participating in the research. You will not be penalised for taking such an action. If you chose not to participate or to withdraw from participating, kindly indicate this to the researcher.
- Your views in this interview will be presented anonymously. Neither your name nor identity will be disclosed in any form in the study.
- The duration of your participation if you choose to enrol and remain in the study is expected to approximately 25-30 mins.

- The record as well as other items associated with the interview will be held in a password-protected file accessible only to myself and my supervisor. Data in the file will be destroyed after a period of 5 years, in line with the rules of the University.
- If you agree to participate please sign the declaration attached to this statement. A separate sheet is provided for signatures.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number HSS/0173/018D).

In the event of any problems or concerns/questions you may contact the researcher at malusiluthuli@gmail.com or on 063 407 3419, or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

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

DECLARATION

I…… (*full names of participant*) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire. I understand the intention of the research. I hereby agree to participate.

SIGNATURE OF PARTICIPANT DATE:

……

Appendix 2: Interview Guide

Name: For tracking during data analysis only (will remain anonymous)

A. Respondent's Background

1. Job title
   _____
2. Brief definition of role within the organisation
   _____
   _____
3. In which region are you based?
   _____
4. How many years have you worked in this organisation?
   _____
5. How many years' experience do you have in a project management environment?
   _____

B. Project Management

6. In which region are the projects you are currently associated with (managing / working on) located?
   _____
   _____
7. In your experience, what are the most important project management constraints?
   _____
   _____
   _____
   _____
8. How do you communicate missed targets/milestones to your immediate superior(s)?
   _____
   _____
   _____
   _____
9. How do you communicate important targets/milestones with your team members?
   _____
   _____

C. Project Reporting

10. What means and/or resources do you use to report project progress within the organisation?

11. How often are formal project reports circulated?

12. When sharing project progress, as far as possible, do you utilise the same benchmarks with your juniors as you do with your superiors?

13. How do you monitor the accuracy of project status reports?

14. How do you verify/validate project status information?

15. Who ensures final approval of reports before they are published?

16. Who are the most important stakeholders within this organisation that are involved in the project status reporting process?

17. When the project team communicates projects status updates, how do you ensure similar benchmarks are used by the entire team?

_____
_____
_____
_____

18. How often do you find discrepancies between your project status interpretation and the interpretations of other team members?

_____
_____
_____

19. If discrepancies occur how are they addressed by the team to ensure alignment?

_____
_____
_____
_____

20. What is the best way to deal with inaccurate information that has been reported to management?

_____
_____
_____
_____

21. How do you deal with inaccurate information that has been reported by site personnel?

_____
_____
_____
_____

22. How do you handle intolerance by management regarding perceived substandard project progress?

_____
_____
_____
_____

23. What changes would you make to the project reporting process?

_____
_____
_____
_____
_____
_____
_____

24. If any, explain the fundamental differences between internal and external reports?

25. Any other comments?

Appendix 3: Gatekeeper's Letter

Transnet SOC Ltd
Registration
Number
1990/000900/30

Carlton Centre
150 Commissioner
Str. Johannesburg
2001

P.O. Box 72501
Parkview
South Africa, 2122
T +27 11 308 2526
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TRANSNET

www.transnet.net

MEMORANDUM

To: Humaira Mooketsi-Choonara, GM: HR, Transnet Group Capital

From: Malusi Luthuli, Reporting Specialist, Transnet Group Capital

Date: 02 November 2017

SUBJECT: **REQUEST FOR PERMISSION TO COLLECT DATA FOR DOCTORAL RESEARCH**

PURPOSE:

1. The purpose of this memorandum is to request permission to collect data for a doctoral study.

BACKGROUND:

2. I am currently enrolled at the University of KwaZulu-Natal's Graduate School of Business and Leadership for a Doctoral Degree in Leadership Studies. The proposed research is aimed at, and accordingly entitled, 'Developing a Framework for Project Status Reporting in South African State-Owned Companies'.

3. My supervisor is Dr. Bibi Z. Chummun (Senior Lecturer) at the Graduate School of Business and Leadership located in Westville College Campus at the University of KwaZulu-Natal. Her contact details are 031 260 8943 and chummunb@ukzn.ac.za.

MOTIVATION AND DISCUSSIONS:

4. The research is aimed at developing a framework aimed at overcoming challenges of holistic project status reporting in large, geographically dispersed State-Owned Companies executing mega-projects of strategic importance to the South African economy.

5. The research design that will be utilised in the study will employ primary data and secondary data. Primary data will be collected using self-administered structured interview guides.

6. The collected data and subsequent information will be used solely for academic purposes.

7. The name of the organization will remain anonymous and confidential. Its name or identity will not be disclosed in any form during this study.

8. Participation of the research sample will be entirely voluntary and views expressed will be presented anonymously. Neither name nor identity of the research sample will be disclosed in any form during this study.

9. The research proposal can be made available upon request. Moreover, the results of the study will be made available and research findings presented, upon request.

FINANCIAL IMPLICATIONS:

10. There are no financial implications.

BUDGET IMPLICATIONS:

11. There are no budget implications.

RECOMMENDATION:

12. It is recommended that permission to collect data for a doctoral study be granted.

Compiled by:

[redacted]uli
Reporting Specialist
Transnet Group Capital
Date: 02/11/17

Recommended / Not Recommend by:

[redacted]
EM: Standards and Systems (Acting)
Transnet Group Capital
Date: 2/11/2017

[redacted]**mmend by:**

GM: Capital Governance and Controls
Transnet Group Capital
Date: 2/11/17

Approved / Not Approved by:

[redacted]
Humaira Mooketsi-Choonara
GM: Human Resources
Transnet Group Capital
Date: 06/11/2017

Appendix 4: Ethical Clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

14 March 2018

Mr Malusi Luthuli (209519213)
Graduate School of Business & Leadership
Westville Campus

Dear Mr Luthuli,

Protocol reference number: HSS/0173/018D
Project Title: Developing a Framework for Project Status Reporting in South African State-Owned Companies

Approval Notification – Expedited Application

In response to your application received 06 March 2018, 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

[redacted]
Dr Shamila Naidoo (Deputy Chair)

/ms

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Appendix 5: Editing Certificate

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DECLARATION

This is to certify that the FOLLOWING Dissertation has been English Language Edited

Developing a Framework for Project Status Reporting in South African State-Owned Companies

Candidate: Luthuli MK

[redacted]

DISCLAIMER

Whilst the English language editor has used electronic track changes to facilitate corrections and has inserted comments and queries in a right-hand column, the responsibility for effecting changes in the final, submitted document, remains the responsibility of the client.

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Appendix 6: Turnitin Report