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The application of the Viable System Model to enhance Transnet Property's business efficiency

By

Sibusiso Brightman Mabaso

981204422

A dissertation submitted in partial fulfilment of the requirements for the Master of Commerce Degree

Graduate School of Business and Leadership

College of Law and Management Studies

Supervisor: Dr Emmanuel Mutambara

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Last but not least, Philippians 4:13 “I can do all things through Christ which strengtheneth me”.

LIST OF ABBREVIATIONS

Abbreviations	Full Text
TP	Transnet Property
SOC Ltd	State Owned Company Limited
CEO	Chief Executive Officer
Exco	Executive Management Committee
GE	General Electric, USA
USA	United States of America
SA	South Africa
SAP RE	SAP Real Estate System
RACI	Responsible, Accountable, Consultation and Informed matrix
VSM	Viable Systems Model
TFR	Transnet Freight Rail
TNPA	Transnet National Ports Authority
TPL	Transnet Pipelines
S1	Implementation System of VSM
S2	Co-ordination System of VSM
S3	Control System of VSM
S4	Intelligence System of VSM
S5	Policy System of VSM
IPA	Interpretative Phenomenological Analysis
IT	Information Technology

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GLOSSARY OF KEY CONCEPTS

This section lists some of the key concepts that were mentioned in the study:

Viable System Model

The Viable Systems Model (VSM) was established by Stafford Beer in 1979, Beer (1979). Stafford Beer's objective in developing the model was "to understand the mechanisms which allow biological organisms to survive to changes in the environment", Herrera, Thomas and Belmokhtar (2011). "A system is defined as viable if it can maintain a separate existence, has problem-solving capabilities and can survive disturbances from its wider environment", Burgess and Wake (2012). "This implies the use of monitoring and response mechanisms and the distribution of responsibilities; the heart is for example responsible for blood circulation and the immune system reacts to infections", (Hildbrand 2013).

There are five necessary and sufficient sub-systems that make up a Viable System Model in an organization, Beer (1984). The 5 systems consist of the implementation, co-ordination, control, intelligence and policy. Each system or element has a distinct role or purpose which contributes toward achieving a common goal of the larger system e.g. each business unit making up TP (larger system) striving towards optimizing costs to ensure financial success of TP as an organization.

The VSM model consists of the Viable System Approach. The Viable Systems Approach (VSA) is derived from the Viable System Model (VSM), Barile *et al.* (2010). Barile *et al.* (2010) defines the VSA as a "theory rooted in systems thinking, or rather it may well be intended as an interpretation key useful for the observation of complex phenomena, based upon system theory, focused to the analysis of relationship among socio-economic entities, in search for viable interacting conditions".

Viability

Nhlabathi (2001) defines viability as a response to a stimulus that was not included in the list of anticipated stimulus when the system was designed. Flexibility, stability and efficiency are key concepts associated with viable systems when using the VSM. Asproth (2011) suggests that flexibility is the ability of the various operations to operate effectively individually having their independent mission statements, budgets etc.

Cybernetics

Dominici (2013, p. 42) defines cybernetics "as the art of governing, it is by definition the discipline of leading, deciding, and managing all social organizations of all level, including nations, firms and families". There is a direct link between cybernetics and VSM. Burgess and Wake (2012) suggest that both theories complement each other because "each of these sub-systems represents an interactive, cybernetic function acting as a filter between the environment and the organisation's management to connect management processes and their various communication channels". The Viable System Model (Beer 1979, 1981, 1985, 1994) as a cybernetic tool, provides a rule for diagnosing and designing complex systems, Archterbergh and Vriens (2011).

Law of Requisite Variety

The Ashby's Law of Requisite Variety forms the essential principle of VSM, Richter and Basten (2014). According to Richter *et al*. (2014), the Ashby's Law of Requisite Variety state that "only variety can absorb variety and variety can be regarded as the number of possible system states". Essentially every organization requires a control system that is able to effectively manage organizational variety to ensure survival thereof, Richter *et al*. (2014).

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ABSTRACT

Transnet Property is an operating division that manages the non-core property portfolio and provides property specialised services for the entire Transnet property portfolio. The non-core portfolio that is currently managed by Transnet Property is worth approximately R5 billion, and comprises of commercial and residential properties. The commercial portfolio consists of office, retail, warehousing, industrial, vacant land and agricultural space whilst the residential portfolio consist of vacant stands, individual houses, bulk residential, lodges, hostels and line camps. However, the non-core property portfolio encompasses only 13% of the total Transnet property portfolio, which is spread across its operating divisions, and its current worth is approximately R30 billion (2014/15). This substantial portfolio places Transnet as one of the significant property owners in South Africa.

The aim of the study is to apply the Viable Systems Model (VSM) to thoroughly diagnose most of Transnet Property's challenges in a structured and easy to solve manner. The VSM which forms part of the system's theory, assists management practitioners to be able to break down the whole system (i.e. the organization) into smaller manageable parts using the Law of Near Decomposability, Richter and Basten (2014). The smaller and more manageable parts of the whole system also enabled the researcher and the participants to drill down into specific challenges that were presented by each small system.

The research study was qualitative in nature. The case study, observations, interviews, value stream mapping and interpretative phenomenological analysis (IPA) are some of the methods and tools that were used to analyse and make sense of the data collected from all the study participants. The researcher observed that adopting the VSM theory relating to cybernetic principles of feed-forward and feedback, assisted in averting a possible state of crisis in managing the entire study

The challenges that were diagnosed and discussed in the report are summarized as follows:
a) Unclear purpose and interaction of systems which highlighted issues relating to duplication of work packages, inexistence of departmental strategies and the lack of integrated of processes and systems; b) Manual and ineffective business processes relating to master data management, contract management and utilities management; c) Ineffective communication across the organization.

There were a number of recommendations that were proposed by the research participants. The high level recommendations that were covered extensively in the report can be summarized as follows: a) TP Exco should appoint a strategist or strategy expert who will assist in the development of a comprehensive TP Strategy that is aligned to the Transnet Group Market Demand Strategy (MDS); b) TP Exco should prioritize the development of standard operating procedures (SOP's) that consist of a clear RACI matrix which is in line with the approved Transnet SOC Ltd's delegation of authority matrix. The SOP's should be comprehensive and governed by a properly mapped out, integrated and automated business process.

The TP's Information Technology (IT) Department should ensure that the IT systems adhere to the RACI matrix when issuing the automated systems notifications to the various departments to avoid duplication of work packages; c) The TP leadership should invest its resources in the creation of a more trusting, enabling and motivating environment. The TP leadership should also consider to schedule regular visits to the regions to communicate any changes and updates in the environment. The visits to the regions should be geared towards motivating the staff and boosting staff morale and motivation.

CHAPTER ONE
ORIENTATION TO THE STUDY

1.1 Background to the study

The study is based at Transnet SOC Ltd within a specialist property entity called Transnet Property (TP). Transnet Property was established on 1 January 2008 by merging the former property entities known as Propnet and Transnet Housing.

TP is a specialised unit that manages the non-core property portfolio and provides property specialised services for the entire Transnet property portfolio. The non-core portfolio that is currently managed by Transnet Property is worth approximately R5 billion, and comprises commercial and residential properties. The commercial portfolio consists of office, retail, warehousing, industrial, vacant land and agricultural space whilst the residential portfolio consist of vacant stands, individual houses, bulk residential, lodges, hostels and line camps. However, the non-core portfolio encompasses only 13% of the total Transnet property portfolio, which is spread across its operating divisions, and its current worth is approximately R30 billion (2014/15). This substantial portfolio places Transnet as one of the significant property owners in South Africa.

The context of this study targets the Transnet Property's Operations Department as its subsystem. This subsystem is strategically placed in the business because it interacts with most departments within Transnet Property. The Operations Department is technically a core function of the non-core portfolio and its role can assist in identifying the necessary improvement initiative within the business. The analysis of the organization's integration model and process improvement will be better conducted if one approaches the study from this subsystem. The TP integration model is defined below in **Fig 1.1**. The integration model refers to the ability of TP to combine, align and optimise productivity from its various business units and regions to support the Transnet SOC Ltd Market Demand Strategy, (Transnet Property Process Optimization Project 2014). The process improvement within TP can be defined as the identification and automation of key business processes to enhance efficiencies within the environment, (Transnet Property Strategy 2013).

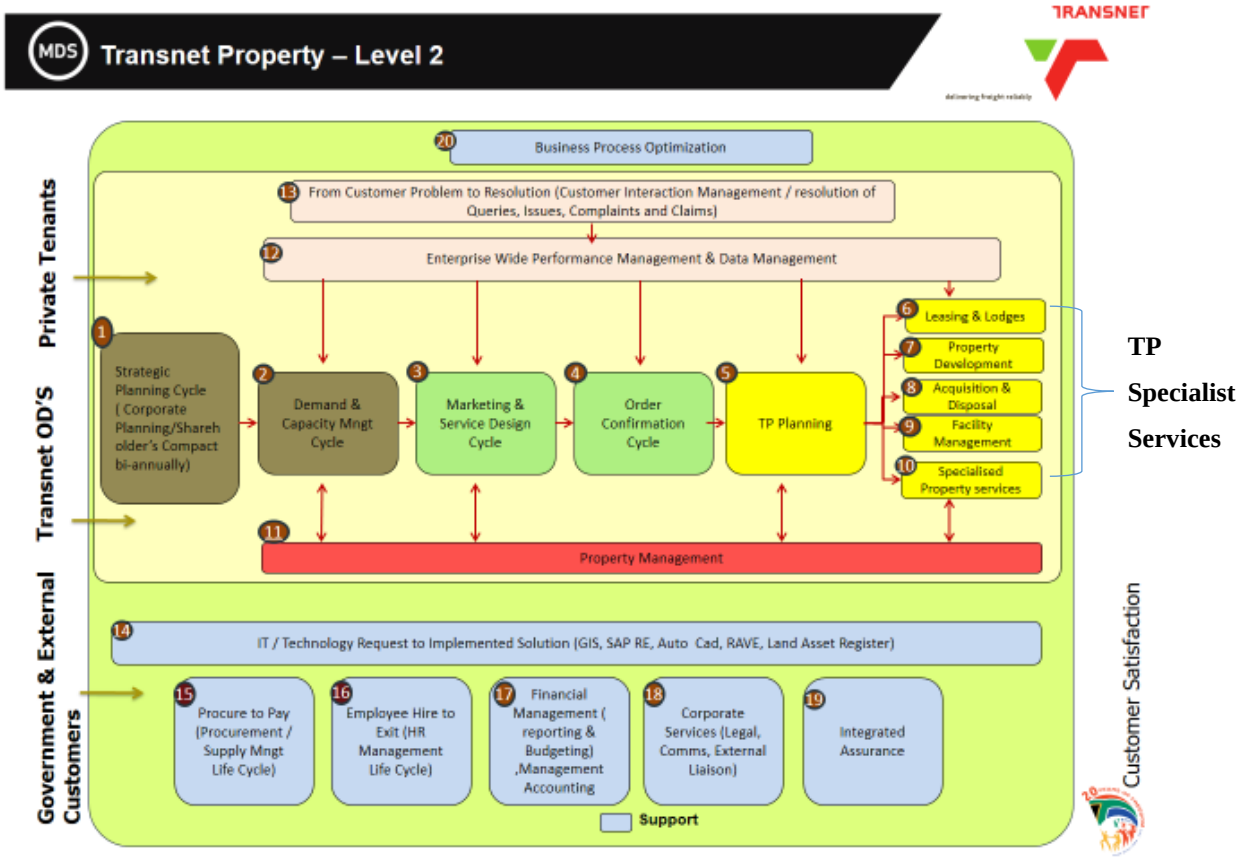

Figure: 1.1 TP Integration Model

(Adapted from the TP Process Optimization Project 2014)

1.2 Problem Statement

The company thrives at excellence when rendering its property management services to its existing clients and potential clients, TP Strategy Presentation (2014). However there exist challenges relating to low staff morale, poor recovery of utilities, inadequate lease income, under recoveries due to inefficient property management service charges processes and poor capital project execution resulting in low maintenance and upgrading of its properties. The stated challenges are likely to have an adverse impact on the overall turnover of the business.

The general business processes are not properly defined and clearly mapped out resulting in long turnaround times to complete any core process e.g. lease renewals, capital project executions, query resolution relating to facilities etc. Some employees attribute the problem to various departments operating in silos and their operational activities are not transparent. Harmony in managing work packages between the different business units does not appear to be efficient and smooth. Transnet Property's business processes are generally manual in nature

and do not support the TP's integration model mentioned in figure 1.1 above. Therefore the purpose of the study is to apply the Viable System Model in order to improve Transnet Property's business efficiency.

1.3 Aim of the study

The aim of the study is to apply the Viable System Model to enhance Transnet Property's business efficiency. The VSM is a "popular approach to assess organizations and their complexity", Richter and Basten (2014). The study seeks to respond to the following study objectives**:**

- To apply the Viable System Model towards enhancing TP's efficiencies
- To identify the factors impacting on TP's efficiency
- To establish the impact of VSM on TP's business efficiency
- To generate recommendations that should address TP's efficiency challenges

The researcher together with the study participants used the Viable System Model as a theoretical framework aimed at gaining better understanding of the issues and constraints facing Transnet Property. The issues and constraints that are perceived to be contributing to most of TP's challenges will be addressed by responding to the following questions:

- What are the factors impacting on TP's efficiency?
- What is Viable Systems Model?
- What is the impact of VSM on TP's business efficiency
- What recommendations can be made to enhance TP's business efficiencies?

1.4 Research Design and Methodology

The current study methodology is understood to be qualitative. A qualitative research involves a process of "describing, explaining and interpreting collected data", William (2007. The case study, observations, interviews, value stream mapping and interpretative phenomenological analysis (IPA) are some of the methods and tools that were used to make sense of the data from the study. The researcher also attended a three week training program at the General Electric (GE) organization based in the United States of America during the month of July 2016. The purpose of the visit was to expose the researcher to how some of the tools i.e. Value Stream Mapping were used to identify and eliminate waist within a business process. The GE training

also enabled the researcher to make a general observation of best practices from GE which were proposed to Transnet Property in an attempt to improve its operations.

1.5 Limitations of the Study

This section highlight some of the perceived and observed limitations of the study i.e.

- The study does not investigate the impact of TP business to the overall Transnet SOC Ltd environment to identify synergies and common challenges contributing to overall performance of Transnet.
- The scope of the research was limited to cover the TP's three main business processes i.e. Master Data Management, Contract Management and Utilities Management processes respectively. There are many other business processes e.g. Asset Management, Demand and Capacity Management, Human Resource Management, etc., that could be researched to enhance the overall business performance of TP.
- The Viable Systems Approach (VSA) is a contemporary theory. The application and use of the VSA literature is limited hence there are few reputable authors that could be used to improve the quality of the study.
- The sample data that was collected was characterized by generalization from the research participants. The generalization from the collected data made it challenging to arrive at an objective conclusion relating to specific questions that require objectivity and fairness.

1.6 Layout of the Dissertation

Chapter one of the report presents an overview of the situation within Transnet Property. This section highlights the background of the study, problem statement and the aims of the study. This section also provides a presentation of the research design and methodology.

Chapter two of the report presents the literature review. The literature review begins by providing a comprehensive historical background on the development of the Viable System Model (VSM). A comprehensive definition of VSM and the related diagram which includes the five different systems making up the VSM. The Viable System Approach and the principles associated with it are broadly covered within this section. The literature review section concludes by presenting factors impacting on TP and the impact of VSM in TP.

Chapter three of the report presents a methodology for the current study which highlights the much broader philosophical underpinning of the chosen research methods. The ***methods of data collection*** section are also presented in this chapter. The methods of data collections covered include the following: interview techniques, observations, analysis and interpretation, VSA and lastly value stream mapping.

Chapter four of the report provides an in-depth analyses and discussion relating to challenges emanating from Transnet Property operations. This section demonstrates a direct application of the Viable System Model to uncover comprehensive challenges and constraints facing TP. The factors impacting on efficiency within TP together with their associated challenges are presented. The impact of the Viable System Model in relation to the cybernetic principles, viability and the law of requisite variety forms the concluding topics of this section.

Chapter five of the report highlights conclusions and recommendations derived from using the Viable System Model as a theoretical framework to highlight key challenges within Transnet Property. The conclusion will also make reference to some of the questions that were highlighted in chapter one of this report.

1.7 Conclusion

Chapter one presents the background of the study. The aims of the study that are informed by a comprehensive problem statement are presented in this chapter. The research design and methodology provides insight in relations to methods and tools used to complete the study. The study limitations are highlighted to ensure that the gaps relating to the study are mentioned so that the report is objective in its findings. Chapter one concludes by detailing the layout of the report. Based on the presentation of chapter one, there exist a need to further expand on a relevant theoretical framework that is useful to the study. The next chapter will cover the literature review that the study is based on.

CHAPTER 2
LITERATURE REVIEW

2.1. Introduction

The literature review section aims to review literature related to the study in line with the study objectives as highlighted in chapter 1. Thus the literature begins by providing a comprehensive historical background on the development of the Viable System Model (VSM). A comprehensive definition of VSM and its diagram is discussed which includes the five different systems making up the VSM i.e. System 1 (Implementation), Systems 2(Co-ordination), System 3(Control and Auditing), System 4(Intelligence), System 5(Policy).

The Viable System Approach and the principles associated with it are broadly covered within this section. The VSA principles offer management practitioners with a methodological framework capable of analysing a system's development and redefinition, Barile *et al.* (2010). This section also present factors impacting on TP efficiency. The impact of VSM on TP is duly covered in this section. The author of the report also visited and tested other views that criticize the VSM model in this section. The criticism levelled against the VSM model is dispelled by the relevance of the VMS for the study section. This section concludes with an emphatic endorsement of applying the VSM to unearth efficiency related challenges within TP.

2.2 Background

Organizations operating in the millennium face complex challenges, Jackson (2000). "Complex problems involve richly interconnected sets of parts and the relationships between the parts can be more important than the parts themselves", Jackson (2000). Senge (1990, p. 10) suggests that team members within such organizations should suspend their assumptions and embark on intensive thinking in-order to address complex challenges. There is a need for organizations to learn and "learning organizations must foster team-based decision making to ensure synergy from the learning of the whole team", Jackson (2000).

The tendency of solving such complex and expansive challenges using a single type of solution normally results to more convoluted problems, Jackson (2000). The organizations that experience complexity related problems and attempt to intervene by solving these challenges, they may need to understand the concept of systems theory and its implications, Jackson (2000). Systems approaches like the VSM is useful in dealing with complexity and has its roots in the

systems theory, Paucar-Caceres (2009). Hildbrand (2013, p. 65) suggests that the VSM assist managers to manage complex organizational problems and there is a growing interest to use this tool amongst politicians, consultants and entrepreneurs etc.

2.3 Definition of Viable System Model

The Viable System Model was established by Stafford Beer in 1979. Stafford Beer's objective in developing the model was "to understand the mechanisms which allow biological organisms to survive to changes in the environment", Herrera, Thomas, and Belmokhtar (2011). The main objective of establishing the model, was to explain how some organizations could maintain their independent existence in the changing environment, Herrera *et al*. (2011).

The understanding of viability forms a fundamental principle to be able to derive the full benefits of using the VSM within the Transnet Property environment because of the inherent recursive nature of the model. Schwaninger (2006) defines recursion as a certain level of autonomy found in each operational unit of the organization that are viable systems on their own. These operational units have their own discretion which is only limited by them belonging to the overall system (i.e. TP) to ensure cohesion, (Hildbrand 2013). TP has a traditional management structure where decisions are taken from the top. The recursive nature of the VSM promotes a collective description of a system's identity and goals which usually empowers the lower operational levels of the organization, (Hildbrand 2013). Herrera *et al*. (2011) supports this view by suggesting that "VSM changes the view of the traditional management model based on command and control, in which a control system is designed as a pyramid and such decisions are disaggregated in a top-down manner at different structural levels".

Viability in this context can be loosely referred to as a "response to a stimulus that was not included in the list of anticipated stimulus when the system was designed" (Nhlabathi, 2001). What is the guiding principle to determine whether a system is viable? Jackson (2000) citing Beer (1979), "a system is viable if it is capable of responding to environmental changes, even if those changes could not have been foreseen at the time the system was designed to achieve the common goal of the larger system. Dominici and Basil (2013) support Jackson by suggesting that the organization is viable if it remains united, and complete; it should be homeostatically balanced both internally and externally in-order to adapt to its environment. Homeostasis is an important pre-requisite in ensuring that the organization is viable. Stephens and Haslett (2011)

define homeostasis as “the stability of a system’s internal environment despite the system’s having to cope with an unpredictable external environment”.

In understanding the concept of viability within Transnet Property, one could make reference to the organization’s ability to comply with the legislative compliance requirements of the Protection of Personal Information Act (POPI), POPI Act No. 4 of 2013. When TP was formed there was no knowledge that one day the President of South Africa will sign into law the POPI Act and all companies would be expected to comply. The POPI Act No. 4 of 2013 in summary suggests that the organization must ensure that it has systems, business processes and human resources to achieve the following compliant requirements; 1) notify the data subject (i.e. person whom personal information is collected) that his/her information is being collected from him/her or from another source; 2) the address and name of the person or organization collecting personal information must be communicated to the data subject; 3) inform the data subject of the reasons for collecting personal information; 4) highlight to the data subject whether the information being presented is voluntary or mandatory; 5) inform the data subject whether the information being collected is in line with the law; 6) access to rectify any details by the data subject is provided at all times; 7) the data subject’s personal information is intended to leave the country and if so will the organization or person collecting personal information guarantee protection of such information; 8) the data subject has a right to object to processing his/her personal information; 9) the Information Regulator’s contact details must be shared with the data subject in situations where the latter intends lodging a complaint with the Information Regulator.

The TP’s IT systems are not designed to store and retrieve personal information of the data subject as per dictates of the POPI Act. The TP’s business processes are not designed to enable the data subject updates his/her personal information on an IT system accessible to him/her. The human capital employed at TP are not trained to effectively ensure that the organization achieve full compliance of the Act. When POPI (i.e. the external compliance requirement) is implemented within TP, its internal environment i.e. IT systems, business processes and human capital must be homeostatic to ensure viability of the organization. Viability in this instance is TP’s capability of responding to environmental changes (i.e. compliance requirements), “even if those changes could not have been foreseen at the time the system was designed to achieve the common goal of the larger system”, Jackson (2000) citing Beer (1979).

The concept of viability has been discussed above but the question of what VSM is about still remains. Espinosa & Walker (2013, p. 126), defines VSM as "a comprehensive theory of organisational viability that explains in depth the issues of structural complexity". Stephen and Haslett (2011) suggest that VSM enables focussed and purposive operations within organization. The use of VSM can assist organizations in facilitating learning through self-organising processes by using meta-questions to allow people to share mental maps and knowledge aligned to organizational viability e.g. the Irish community who participated in the community development research study that was facilitated by Espinosa and Walker were requested to describe their problem statement by answering the meta-questions and drawing cartoons that explain the challenges faced by the Irish community, Espinosa and Walker (2013). The application of the VMS in the Irish community led to a shared mental maps within the community and it also highlighted challenges like fragmented functions and inadequate or ineffective communication structures, Espinosa and Walker (2013). It was evident in the Irish community research study that the community was able to self-organize through sharing of knowledge and experience using the VSM as a diagnostic tool.

The Viable System Model (Beer 1979, 1981, 1985, 1994) as a cybernetic tool, provides a rule for diagnosing and designing complex systems, Archterbergh and Vriens (2011). There is a direct link between cybernetics and VSM which is supported by Asproth (2011). Burgess and Wake (2012) suggest that both theories complement each other because "each of these sub-systems represents an interactive, cybernetic function acting as a filter between the environment and the organisation's management to connect management processes and their various communication channels". Since the VSM has its roots in the theory of cybernetics, the process of self-organising and the sharing of mental maps is influenced by both feed-forward and feedback mechanism. The feed-forward and feedback mechanism is dealt with in the cybernetics section of the report i.e. chapter 4.

The use of the VSM as the rationale to respond to the study objective, assisted in determining whether Transnet Property as a system understudy is able to adapt to its environmental changes that are caused by either internal or external stimulus. The VSM is known for its capability to facilitate effective organizational diagnosis and organizational design, Beer (1985; 1989); Jackson (2000). Although the VSM has its strengths but it also has its weaknesses. The elite group of the organization can take advantage and control the outcomes to suit their needs when using the VSM, Ulrich (1983). Checkland (1981; 2000) also criticizes the VSM by suggesting

that it does not provide a comprehensive framework or process to manage the different viewpoints making up the organization. A detailed discussing on the weaknesses and strengths of the VSM are discussed in detail under sections 2.7 and 2.8 respectively. Despite the shortcomings of the VSM raised by the two authors, its robust capabilities still assisted the researcher to obtain a better understanding of factors affecting efficiency within TP based on the strength of the model.

The observer of the system understudy was able to observe, learn by doing and also learning by mistake in a continuous loop i.e. feed-forward and feedback. It was be helpful to adopt the cybernetic principles of breaking down the bigger system into smaller elements i.e. business functions to smaller units. The exercise of analysing and studying the interactions that take place within each unit of the system should also highlight challenges relating to whether the current integration model (**Fig 1.1 above**) and the associated business processes within TP are effective or not. The integration model as highlighted in chapter 1 above, refers to the ability of TP to combine, align and optimise productivity from its various business units and regions to support the Transnet SOC Ltd Market Demand Strategy, (Transnet Property Process Optimization Project 2014)

There are five systems that make up a Viable System Model in an organization as depicted in Table 2.1 below. The 5 systems making up VMS are highlighted as implementation, co-ordination, control, intelligence and policy, Hildbrand (2013). Each system or element has a distinct role or purpose which contributes toward a common goal of the larger system e.g. Transnet Property's different business units and regions can be viewed as one of the five elements contributing to the attainment of a larger system goal i.e. to ensure that there exist harmony, efficiencies and productivity across all TP's business units and its regions. The TP business units and their respective regions are as follows: Office of the CEO, Operations, Finance, Legal and Compliance, Corporate Real Estate, Information Management Services, Human Resource Management, Geo-Spatial Services, Risk Management. The five TP Regions are Carlton, Inland, Eastern, Central and Western Region respectively.

System 5-Policy	Who or what will ultimately make the operational decision?
System 4-Intelligence	Who or what is to gather the required intelligence
System 3-Control	Who or what is to enable the operation self - regulation?
System 2-Co-ordination	Who or what will organise the commencement of the operation?
System 1-Operation	What does the operation concern?

Table 2.1: VSM's 5 elementary functions

Source: Stephens and Haslett (2011)

2.3.1 S1 - Implementation

S1 (depicted in Fig 2.1 below) which is regarded as system 1 of the Viable System Model deals with implementation within the organization. Nhlabathi (2001) asserts that "the system (S1) of the organization consists of the various parts or subsidiaries of which directly concerned with implementation that is, carrying out the task that the organization is supposed to be doing". Hildbrand (2013) quoting Watts (2009) suggests that "the remaining sub-systems are meant to assist S1 in the execution of its tasks".

Stephen and Haslett (2011) suggest that the implementation system is the organ of the organization and provides the fundamental activities of the system. (Leonard, 2006, Burnett and Durant-Law, 2008, Hutchinson and Warren, 2002) supports Stephen and Haslett (2011) by suggesting that the main purpose of S1 is to perform the core function of the system and also it is responsible for the generation of the system's revenue. In essence the implementation system makes up the core operations of the business.

In Transnet Property, S1 can be attributed to the operations section of the business. The operations department is mostly viewed as the heartbeat of the TP business. It consists of the core functions like lease management, business development, facilities management, Geo-Spatial and valuations services. According to the VSM literature each function should maintain

its autonomy and must exhibit all features of a viable system that is, each function must have its own respective environment and corresponding management system, Jun-Feng and Wo-Ye (2011). Each function within S1 should be able to contribute towards a common goal of the larger system (i.e. Transnet Property) without compromising on its individual mission, vision and expected outputs. Stability is key when the parts making up S1 interacts which each other to achieve the overall organizational outcomes. Stephen and Haslett (2011) summarizes S1 as a system that enables the organization to have focus and purposive operations.

2.3.2 S2 - Co-ordination

The interaction of parts within S1 has a potential of resulting in unpredictable and unsustainable outcomes that may have a negative effect on the whole organization. Hildbrand (2013) quoting (Devine, 2005, Johnson and Liber, 2008) supports this view by claiming that "S2 balances fluctuations, provides feedback, and aligns S1's activities to prevent conflicts around commonly used resources". Hildbrand (2013) quoting (Devine, 2005, Johnson and Liber, 2008).

The above point made by Hildbrand (2013) is further illustrated by using the following example i.e. if you take a marriage between two people, there is a potential that the interactions from partners in the marriage setup may potentially result in a conflict which brings about a total breakdown of their marriage (i.e. S1). There is a need to constantly obtain a balanced response from the interactions within S1 that may potentially cause such instability within the overall environment. Jun-Feng *et al.* (2011) suggests that S2 (depicted in Fig 2.1 below) deals with communication and conflict management systems respectively.

S2 lists potential conflicts and contradictions within operational units and thereafter devise an approach or methods that seeks to solve them, Jung-Feng *et al.* (2011). Herrera *et al.* (2011) suggests that the S2 as the co-ordination function does not have to perform its function in a top-down manner resembling a hierarchical structure. It can co-ordinate primary activities in a centralized or distributed manner to ensure co-operation and information exchanges. Nhlabathi (2001) supports this view by suggesting that S2 consists of control centres linked to the organization regulatory centre which are not necessarily hierarchical in their form or structure. "S2 sends feedback to the localized management of S1 to re-establish harmony, calling if necessary, the resources of S3", Nhlabathi (2001).

The support services or functions of TP can be categorized as the S2 co-ordination system. The Information Technology Department, Human Resource Department, Legal and Compliance Department, Risk Management Department, Finance Department, Communication Department etc., have glaring attributes of co-ordination capabilities because their roles and functions are designed to support and co-ordinate all activities taking place in S1 i.e. operations function. S2 of the Viable System Model therefore provides the capability to co-ordinate and oversee the interaction of primary activities within S1, Nechansky (2013).

2.3.3 S3 – Control

Bustard, Sterritt, Taleb-Bendiab, and Laws (2006); Clemens (2009); Gregory (2007) suggest that S3 is responsible for governing, controlling the everyday activities of the system's operational units. S3 (depicted in Fig 2.1 below) as a control system can be loosely explained by following the example from Walker (2001) where a construction company employees laying bricks to build up a structure. There are three workers each loading individual bricks in a wheel barrow, thereafter collecting a bag of cement which each worker finally mixes before building a wall or structure by him/herself alone.

Walker (2001) says that S3 would recommend that the construction company utilizes these three workers in an optimal manner. One worker's function could be specializing in collecting bricks, whilst the second worker specializes in mixing cement, finally the third worker could be responsible for laying the bricks as his/her main task. The execution of each activity can be achieved with minimum effort and optimal output. The essence of S3 is to bring about synergy which is obtained by collecting all un-coordinated parts of the whole system to create extra efficiencies, Walker (2001). Hildbrand (2013) agrees with Walker (2001) by highlighting the fact that S3 "seeks internal stability, synergies and an overall optimum among the units".

According to Stephens *et al*. (2011) they indicate that S3 can be viewed as the floor or base of the organizational brain which is mandated to control the complexity of the organizational muscles and organs. Walker (2001) asserts that it is essential for operational elements to be accountable and everything must proceed according to the agreement with Meta-system. The Meta-system in reference to the example above will be a person monitoring all the activities in brick laying like a supervisor, operation management, project manager etc., Walker (2001). Herrera *et al.* (2011) suggest that "control function is the function that defines the control/autonomy degree of the actions accomplished by the primary activities". Information

flow may suggest that productivity is down, morale low, then it is essential for S3 to intervene particularly if the stability of the whole system is at risk, Walker (2001). The S3 system is essentially responsible for "directly checking on quality, employee morale, adherence to maintenance procedures", Nhlabathi (2001).

During the S1 and S2 there is information flow that leads to S3. The information flow is regarded as Audit Channel or S3, Nhlabathi (2001). Herrera *et al.* (2011) views S3 as a system that regulates and ensures auto-generation of the system because of its nature to coordinate and monitor functions. There is generally the evaluation of actions from the primary activities emerging from S1, Herrera *et al.* (2011). Nechansky (2013) supports Herrera's views by suggesting that the function of S3 is to survey the performance of the various S1 and the optimization of processes of S1 and S2 respectively. The role of surveying performance of various S1 could be placed in the chief operation management, Nechansky (2013).

The Chief Operations office within TP is a suitable function to perform this role. The Chief Operations Officer role has a clear mandate to ensure proper allocation of resources to support operations and facilitate the optimal utilization of the deployed resources within the organization. Organizational performance as reflected in the weekly, monthly or yearly financial statements can provide better insight to the Chief Operations Officer of areas where productivity is low which will eventually pose risk in relations to the stability of the whole organization. According to Beer's design of the enterprise, S3 should provide near real time monitoring of S1 activities using a set of statistical filters to verify information, Walker (2001).

2.3.4 S4-Intelligence

S4 (depicted in Fig 2.1 below) has the responsibility of transferring instructions from the so called "thinking chamber" of the organization called S5 (i.e. Policy system), Walker (2001). S4 as the intelligence component of the systems is tasked with the collection of information (e.g. threats and opportunities) from both internal and external environments respectively and devise appropriate strategies to respond to such information, Tejeida-Padilla, Badillo-Pina,and Morales-Matamoros (2010) and Nechansky (2010). Jun-Feng et al. (2011) say "Intelligence system mainly focuses on the current and future development of the organization and supplies intelligence for making development plan of the organization". Herrera et al. (2011) further state that this function is responsible for system adaptability whereby the function plays a role of linking the primary activities and the environment.

Successful adaptation of the organization depends on the intelligence system or S4's ability to objectively anticipate any perturbations which would be informed by the information flowing from the various primary activities, Herrera *et al.* (2011). An example to illustrate the role of S4 could be the organization reaching the end of its lease contract period in a year's time. There exist a number of options to consider i.e. the organization may choose to extend its lease contract, relocate its offices to lease another site/location, purchase new office locations or buy land and construct its offices. In all options S4 must ensure that it considers all input from the various activities, systems and the external environment to ensure that the best optimal solution is adopted and adapted for the future survival of the organization. Stephen and Haslett (2011) asserts that S4 focuses on supplying information for planning, forecasting and predictive strategy.

It can be deduced that the main role of S4 is to collect and collate all necessary and relevant information about the entire environment or organization because it is presented with both internal and external information impacting on the organization, Tejeida-Padilla *et al.* (2010) and Nechansky (2010). Nechansky (2013) summarizes the role of S4 by highlighting that this system surveys the environment and external data i.e. technologies, markets, competition, society and their developments. If we visit the previous example of the organization considering to either renew its lease agreement for its office or purchase a new building, the options must be evaluated for their relevance to the organization by analysing both the property rental market/model against the property ownership market/model. Nechansky (2013) emphases the notion that S4 ought to evaluate the results of its observations and thereafter translating them into appropriate strategies and action plans for future activities.

The Intelligence System/S4 within Transnet Property could be the strategy office and the sales and marketing department of the organization. The synergy between the Transnet Group Strategy Office and the Transnet Property Strategy office could yield to improved detection of any perturbations emerging from both the external and internal environment. The Strategy office would be responsible for ensuring that the appropriate strategies and developed and implemented to respond to the Shareholder Compact as defined by the Minister of Public Enterprises. The Sales and Marketing Department will be responsible for conducting market research and provide marketing function that will ensure that TP effectively markets and improves its rental property occupancy across South Africa. The organizational constraints and challenges that emerge from

lower activities or systems can be easily communicated by S4. Nhlabathi (2001) clearly highlights that the Intelligence System should distribute "environmental information upwards or downwards" depending on the extent of relevance and importance emerging from both internal and external environments respectively.

2.3.5 S5-Policy

"S5 defines the direction of the system, and determines its identity, culture, policy, rules, values, norms and goals, and balances the various requests from different organisational parts", Hildbrand (2013) quoting (Sung, You and Song 2008, Clemens, 2009, Beer, 1984, Schwaninger and Rios, 2008). S5 or Policy system is tasked with a role of decision making affecting the entire organization, **Fig 2.1** below.

Nechansky (2013) alludes to the fact that within S5 "Here decision on strategy and policy are made, and the transition of action plans developed by system 4 into operations of system 3 and below is initiated and controlled". Stephen and Haslett (2011) supports Nechansky's views by suggesting that S5 is determines the strategic policies. The process of formulating policies is influenced by information that is passed to it by S4. The formulated policies must thereafter be communicated downward to S3 for implementation by the subsidiaries, Nhlabathi (2001).

Nhlabathi (2001) quoting Beer (1989) suggests that S5 should be "arranged as an elaborate, interactive assemblage of managers". The elaborate and interactive nature of the assemblage of manager is to ideal in ensuring flexibility and balance in decision making which supports the freedom of interaction amongst the agents in the system and reasonable degree of effective monitoring, Nhlabathi (2001).

The top management in the form of the Transnet Group Executive Committee Members and the Transnet Property Executive Committee Members can be regarded as S5 in the Viable System Model perspective. Nechansky (2013) suggests that the top management or government are some examples of S5. The Executive Committee Members have the responsibility of formulating organizational policies and deciding on strategies where input is sourced from S4 and thereafter communicated downward to S3 for implementation by the subsidiaries.

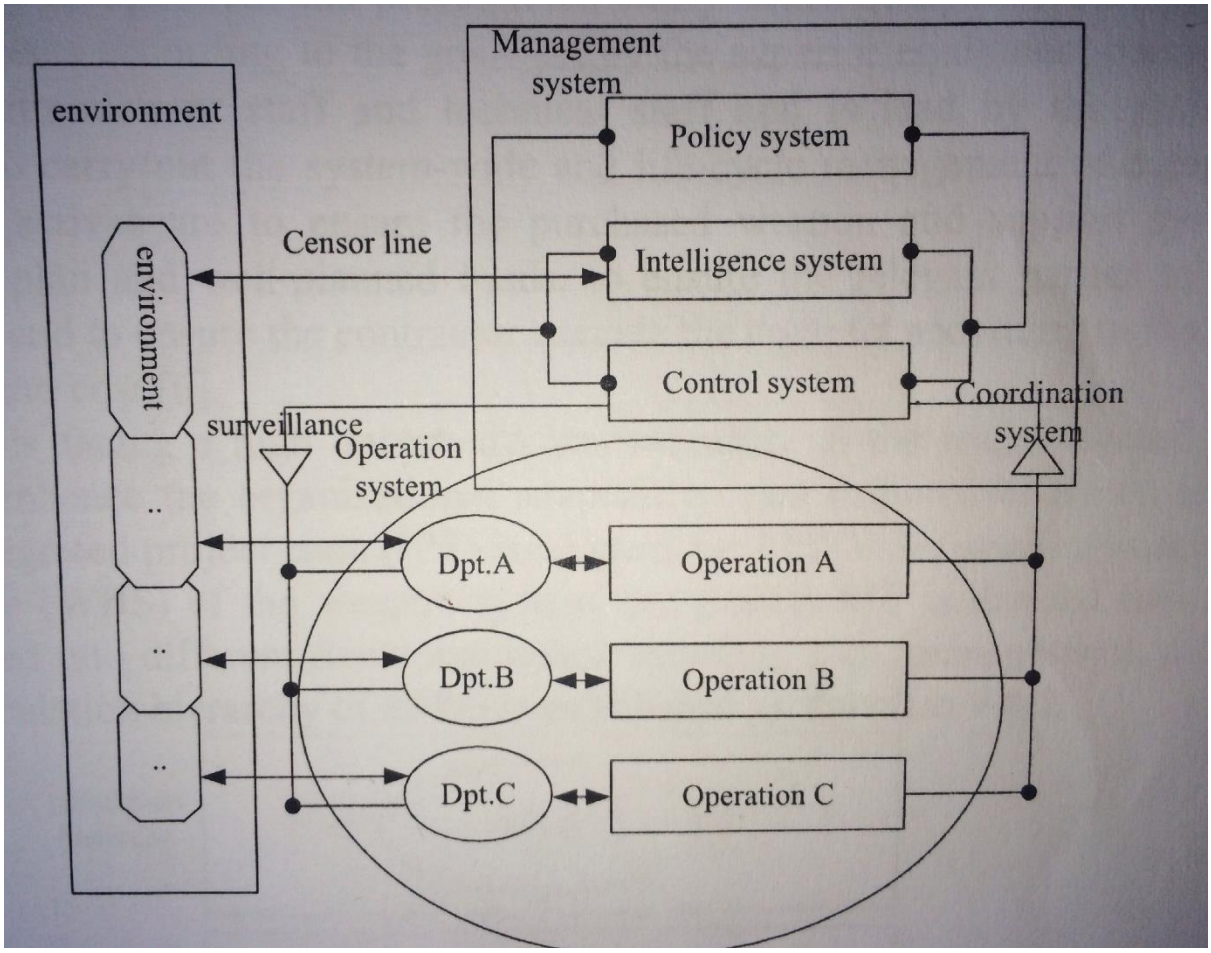

Fig 2.1. Content of VSM

Source: SUN Jun-Feng and Liu Wo-Ye (2011)

2.4 Viable System Approach

The Viable System Approach (VSA) is derived from the Viable System Model (VSM), Barile and Polese (2010). Polese and Di Nauta (2013) asserts that every entity e.g. business, individual etc., is a system of many parts or structures which are interlinked to achieve a common purpose or goal. According to the VSA theory, organizations are regarded as open systems that are goal oriented, cognitive and cybernetic, Dominici and Basile (2013). It is necessary to understand the formal definition of VSA, how does it help management practitioners in solving management challenges and what are its guiding principles.

According to Barile *et al.* (2010). the VSA is a "theory rooted in systems thinking, or rather it may well be intended as an interpretation key useful for the observation of complex phenomena, based upon system theory, focused to the analysis of relationship among socio-economic entities, in search for viable interacting conditions". The relationship among economic entities can be translated to subsystems or various departments within an organization interacting with each

other. At the core of the VSA is the ability of systems practitioners' ability to study and interpret the complex relationships that exist among entities, systems or subsystems depending on level where such interactions take place and analysed.

Wieland, Polese, Vargo and Lusch (2012), assert that VSA can be understood as an interpretive governance methodology that assists in the understanding of the different behaviours and relationships from various actors of the organization. VSA provides systems practitioners with a general framework and governance that looks at both the organization's structural configuration and dynamics of functioning; the relevant actors who influence decision making are successfully and easily identified in a complex situation, Barile *et al.* (2012). A distinct feature of the VSA is its ability to focus on the organization's relationship with its external environment rather than having its focus on its internal structures for survival, Dominici and Barile (2013). The methodological and governance approach offered by VSA ensures organizational survival and sustainability in uncertain conditions when the environment is challenged, Barile *et al.* (2012).

The various academic scholars (i.e. Wieland et al. (2012), Barile *et al.* (2010), Barile *et al.* (2012), Dominici and Barile (2013)) all agree that there exist fundamental principles underpinning the application of VSA. The principles underpinning the application of VSA are summarized as follows; ***multidisciplinary interpretive approach, open systems, systems boundaries, autopolesis and common finality, homeostasis and self-regulation, structures, systems and equifinality, consonance and resonance, system viability, adaptation and relationship development, complexity and decision-making.***

2.4.1 Multidisciplinary interpretative approach

The principles denotes that people, families, networks, enterprises and public are all viewed as actors within a greater system or they can also be viewed as systems on their own. It is understood that all the mentioned elements act as parts of a bigger system. The relationship that exist during the interaction of such parts, achieves a greater significant goal.

2.4.2 Open systems

The open systems phenomenon suggests that there exist information exchange with the environment in order for a system to achieve its specific goal. There exist a supra-system positioned at a higher lever and a number of sub-systems located a lower level. The open systems

principle acknowledges the fact that there exists a clear systems hierarchy during the interaction of actors in the system.

2.4.3 System boundaries

Every object has boundaries however a viable system must be able to open its boundaries in order to facilitate an effective exchange of information between itself and other systems. The boundary of the system can be perceived to be constantly changing as a result of the evolutionary dynamics when systems interact with one another.

2.4.4 Autopolesis, homeostatis and self-regulation

The principle suggests that every system is autopoietic i.e. the system has the ability to generate new internal condition. Self-organizing becomes the main objective of every system as it attempts to manage the internal and external complexity during the interaction of systems and subsystems in the environment. Every viable system ought to strive to attain a homeostatic state that will ensure that it obtains a state of equilibrium in its final state.

2.4.5 Reductionism and holism

There exist limitations in a human brain to understand and interpret complex phenomenon. The principle suggests that management practitioners should deploy a reductionist analytical approach when trying to identify systems elements and relationships that emerge from their interaction. Management practitioners are also advised to adopt a holistic perspective when attempting to understand the system as a whole.

2.4.6 Structures, systems and equifinality

There exist an understanding that every organization is characterized by a structure. The structure consists of individuals who are assigned roles, activities and tasks in accordance to the organizational rules and constraints. There is an iterative passage from structure to system which implies that there is a change from a static to dynamic view. A number of systems can emerge from the same structure due to dynamism of system interaction between internal and external environments. In such situations ***equifinality*** is obtained. "Equifinality is when various systems reaching the same end state from different starting conditions (that is, from different structures) by taking different evolutionary paths", Barile *et al*. (2010).

2.4.7 Consonance and resonance

Consonance refers to the systems compatibility which translates to the static vision of a potential harmonious relationship. Harmony amongst systems must be exist before it can obtain survival in its environment. The ability of systems working in a distinctive manner to obtain harmony in an attempt to achieve survival is referred to as ***resonance.***

2.4.8 System viability

"A viable system has to be consonant with the context and internally resonant, Dominici and Barile (2013). Nhlabathi (2001) defines viability as a "response to a stimulus that was not included in the list of anticipated stimulus when the system was designed". It is not sufficient for the organization to adapt to known changes, instead it must also have the capability to survive and adapt to changes that were not foreseen or originally planned when the organization was established.

2.4.9 Adaptation and relationship development

Organizations ought to continuous re-invent itself in order to compete and remain relevant to its changing environment. The principle suggests that viability within organizations can be obtained by analysing external changes in the environment and understanding the behaviour from its competitors. Business rethinking, restructuring, transformation, continuous dynamic process of adaptation are all elements that enable organization to adapt to its changing environment which ultimately ensures viability.

2.2.10 Complexity and decision-making

"The decision maker must be able to discern between: 'variety' (possible variants that a phenomenon might present at a given time), 'variability' (observed changes in variety over time), and 'indeterminacy' (the possibility to fully understand or not a given phenomenon)", Dominici and Barile (2013). Management practitioners should ensure that they obtain a cognitive alignment among all the engaged actors in the system. There should be an alignment between external observed complexity and internal possessed complexity in order to have a better appreciation of risks that may threaten the organisational viability.

2.5 Factors Impacting on TP Efficiency

2.5.1 Unclear Purpose and Interaction of Systems

The concept of "system" is generally and loosely mentioned in our day to day conversations. People generally refer to anything as a system e.g. system to monitor productivity or performance, system to manage one's diet requirements for his/her body, a system that identifies successful candidates from unsuccessful applicants etc. The meaning of the word "system" has over the years become meaningless as it has been used to refer to things in the world as the above examples depict. There is a need to gain in-depth understanding of the word "system" and the relationships that exist in a system when attempting to identify efficiency related challenges within Transnet Property.

Taylor and Lynham (2013, p. 93) claim that systems by their very nature and definition have a purpose to fulfil. Taylor and Lynham (2013, p. 93) argue that any system receives inputs, transforms these and delivers outputs. According to Taylor and Lynham (2013, p. 93), "systems have defined boundaries and exist to fulfil defined purposes". Fig 2.2 below provides a schematic diagram that provides insight of various systems and the agents interacting with one another within a defined boundary in an environment. The diagram reveals how inputs from the environment are transformed to deliver outputs. Transnet Property can be equally viewed as an environment that consists of the different agents or elements where inputs from these agents are transformed to outputs as a result of their interaction. The boundary is also clearly defined within the Transnet Property environment.

The system concept advocates the interdisciplinary practices, instead of the mechanistic approach that operates from a view that the world is whole and should be broken down into smaller parts Jackson (2001). The ability of VSM practitioners to successfully intervene and analyse the problem situation is dependent upon them understanding the theory and interpretation of systems and subsystem making up the VSM model i.e. the breaking down of the different departments (systems and subsystems) highlighting the different integration and handover points (i.e. relationships between the different departments) within the organization.

The VSM model consists of various systems and subsystem that interact with one another at different levels to deliver the desired outcomes. There exist a need to first define each system making up TP. Once such systems have be identified, it is then necessary to define the purpose of each system and subsystem in order to gain adequate understanding of the expected output

from each system and subsystem. Challenges relating to performance within the Transnet Property environment may be attributed to a lack of role clarity associated with each department or function, handover point between the various departments or functions and the shared purpose of various systems (i.e. departments making up the organization).

The interaction of various elements poses another challenge in respect to improving efficiencies in the environment. The understanding of relationships between the systems and subsystems assist in creating a shared and common view of how such systems are behaving against a set standard. The monitoring of behaviour emerging from such system can be enhanced thereby improving the performance at each level of interaction.

The VSM is resolute around the control of interacting elements. The ability to identify and distinguish between internal and external systems should assist management to understand what level of control and influence they possess over these elements. It is of no use to management to exert control over internal or external elements that they have no influence or control over e.g. changing economic condition impacting on TP business, changes of regulation within South Africa, reducing the number of employees who take maternity leave etc.

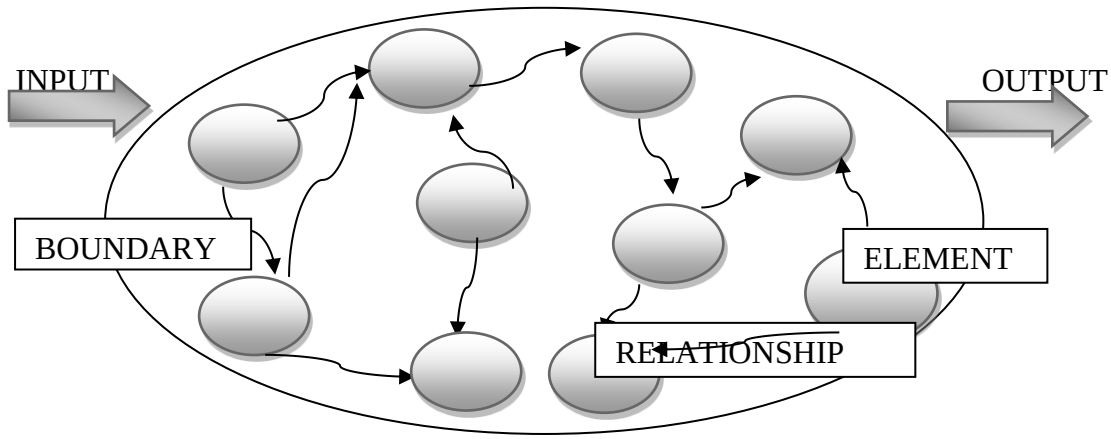

Figure 2.2: Schematic depiction of a system, indicating complex feedback and relational loops (Source: Taylor and Lynham, 2013:92)

2.5.2 Business Process Orientation

Seethamraju (2011), defines process orientation as "the awareness of the interdependencies and information sharing between various functional units and business models, with an underlying focus on integration, customer and customer needs". Bronzo, de Resende, and de Oliveira (2013) assert that business process is regarded as a best practice management principle which organizations adopt to create a platform for organizational structure and strategic planning. The aim of the business processes is to assist organizations achieve their economic objectives, Lorhmann and Reichert (2013). It is advisable for organizations to embark on a process to continuously improve their business processes. Continuous process improvement within the organization leads to improved quality, costs, speed and profitability, Seethamraju (2011).

Bronzo *et al*. (2013) quoting Lockamy and McCormack suggest that "companies with great guidance for their business processes reach greater levels of organizational performance and have better work environment based on much more cooperation and less conflict". The roles and responsibilities are usually clear and each employee understands the scope and nature of their work outputs. However how do organizations create such "best practice platforms" and still remain stable and relevant?

Schulte *et al*. (2015) suggest that organizations wishing to develop such best practice platforms must adopt a full business process lifecycle that comprise of evaluation, design, configuration and enactment as described in **Fig 2.5** below**.** The evaluation step in the process focuses on exploring all business units and assessing their effectiveness. The design and analyses involves identifying processes that have gaps in them and modelling them to have proper insight the challenges they face. The configuration process involves system selection, testing and deployment of a new process in the system. The last step called enactment focuses on operation monitoring and maintenance.

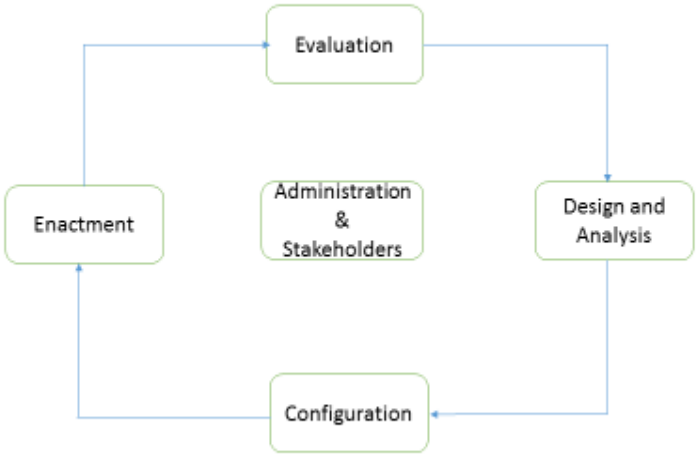

Fig 2.5 Business Process Lifecycle (Adapted from Schulte et al. (2015))

Lorhmann and Reichert (2013) suggest that business process artefacts should be implemented to ensure effectiveness of each and every step highlighted in **Fig 2.5**. The effectiveness criteria is highlighted in **Table 2.5** below. The analysis and control are understood to be very key because "the quality of business processes is assessed and analysed (either in the productive stage or even before), and control is exercised by feeding back into design and execution", Lehmann and Reichert (2013).

Transnet Property does not have its business processes clearly defined. The lack of defined and documented processes create challenges of standardization relating to the different business units. The different operations in various regions do not have a standard approach in managing its operations. The lack of standardized processes lead to a number of challenges relating to mapping out systems or Information Technology (IT) related processes, increased turnaround times relating to lease contract renewal, poor customer interaction and management etc.

The IT systems cannot be configured to support disjointed and less standardized processes. There is no clarity on integration and hand over points between different business units or regions. The inability to map out and define its processes also result in a lack of knowledge

management across the organization which ultimately impact on the quality and speed of service offering to the end customer. The lack of process orientation yield to the business duplicating its services to the end customer which impact on the financial resources.

Effectiveness Criteria	**Rationale**	**Implications**
Congruence to organizational targets	Explicit feedback loops in management control and performance measurement systems (e.g. [34]) Content of performance measures impacts managerial behaviour and decisions [20, 48] ("What gets measured, gets done!")	*Comprehensive coverage* of organizational targets for object in question *Exclusive coverage* of organizational target aspects for objects in question If full congruence cannot be achieved: *transparency on deficiencies* to mitigate defective governance effects
Perceived fairness	Organizations as a social environment: prerequisite for staff motivation and change management Performance measures are commonly used for individual target setting and remuneration [57] Equivalent provision for financial reporting [27, paragraph 46]: "true and fair view"	*Governance*: quality assessment reflects organizational responsibilities *Transparency and retraceability*: accountable managers' understanding the link between status, actions and assessment results, limited complexity
Cost effectiveness	Practical applicability in an economic context Equivalent provision for financial reporting [27, paragraph 44]	Avoid large *criteria catalogues* to be evaluated manually Avoid manual *inspectment of process instances* Formalize to allow for *automated Assessment*

Table 2.5 Effectiveness Criteria (Adapted from Lorhmann and Reichert (2013))

2.5.3 Communication

Effective communication forms a critical element in any mature and successful business. Cybernetic organizations depend on feed-forward and feedback mechanism when management is performing its tasks during the enquiry and action phase respectively. Management is expected to continuously communicate its discovery and action to all stakeholders impacted and the ability to communicate effectively assist employees to remain committed to their organization.

Men and Stacks (2014) quoting Grunig (1984), suggests that communication is a two way symmetrical model. "Communication is the willingness of an organization to listen and respond to the concerns and interests of publics", Men *et al*. (2014) quoting Grunig (1984). The two way symmetrical model supports how organizations interact with their employees. Organizations striving to improve communication should be willing to listen to their employees e.g. where services are delivered by the different employees within different departments; employees may suggest improvement initiatives that can enhance efficiencies in how the services are rendered. Business leaders should listen and be open to the suggestion of their employees.

According to Men *et al.* (2014), growing evidence indicate that effective communication is key in developing positive employee attitudes such as trust, job satisfaction and positive employee-organization relationship. An organization that has managed to achieve positive employee attitudes, trust and job satisfaction, is able to achieve higher performance targets by delegating tasks to its employees. Business leaders in such environment are equally optimistic about the ability of their employees delivering the expected results.

Bell and Muir (2014) agree that effective communication enables business leaders to properly assign responsibilities and authority to the right individuals at a right time. It can be deduced that the absence of effective communication equally results in a lack of trust between leaders and their employees. Business leaders are unable to assign responsibilities because they cannot effectively communicate their expectations and place trust on their employees. The current situation within Transnet Property is characterized by having most senior leaders not releasing the delegated authority and assigning tasks to levels below them due to lack of trust. The ineffective communication creates mistrust at an employee level rendering such employees to

be disengaged and dissatisfied with their roles. The situation ultimately result in poor delivery of services to the end customer or public.

2.6 Impact of VSM on TP Business Efficiency

2.6.1 Cybernetics

Cybernetics concerns itself with the ability of combining knowledge with the required actions by providing feedback and feed-forward in organized complex systems. Dominici (2013) asserts that organizations that adopt systemic-cybernetics approach are empowered with a practical approach to overcoming several possible states of crisis. Cybernetic organization are able to implement a prototype of actions through feed-forward and feedback causal loops. These causal loops enable such organization to learn and unlearn through their actions.

Dominici (2013, p. 42) defines cybernetics "as the art of governing, it is by definition the discipline of leading, deciding, and managing all social organizations of all level, including nations, firms and families". It is necessary to exercise the art of governing the interaction of the various agents, systems and relationships within TP. Burgess and Wake (2012) suggest that the cybernetics and VSM theories complement each other because "each of these sub-systems represents an interactive, cybernetic function acting as a filter between the environment and the organisation's management to connect management processes and their various communication channels". Based on Burgess and Wake's explanation, sub system 1-5 of the VSM interacts and assesses the environment to provide a comprehensive form of feedback and feed-forward mechanism that serves as input to enhance the management processes. It therefore can be concluded that the viable system model (Beer 1979, 1989, 1985) is a cybernetic tool for diagnosing and designing complex systems, Asproth (2011).

The view advocated by Asproth (2011) supports Dominici (2013) assertion that cybernetics as diagnostic tool, provides an organization with a practical approach to design complex systems through feed-forward and feedback mechanism. Paucar-Caceres (2009, p. 446) notes that practitioners using the cybernetic approach, consciously and unconsciously use images to try to explain the complex reality and its structures. The conscience and un-conscience use of images can be useful in demonstrating constraints and delays relating to each process within the Transnet Property value chain. The use of such images could play an important role in describing human behaviour and their relationships within the organization.

Paucar-Caceres (2009) citing Espejo et al. (2003) suggest that "management cybernetics assumes that there are three levels of management that need to be practiced: strategic (normative); administrative; and operational". The determination of the three levels together with their respective role players within Transnet Property can provide effective feed-forward and feedback. The feed-forward and feedback from the different segments of the organization can assist shape management response and intervention at each level of interaction.

Dominici (2013) argues that "the systemic cybernetics approach gives no 'magic formula' that can solve all problems with an algorithm, but it can give a practical approach to overcoming several possible states of crisis". According to Dominici (2013), every theory or model must be experimented within specific situation in the real world. The effective application of the Viable System Model as a diagnostic tool within TP can yield to an in-depth understanding and interpretation of efficiency challenges within the various levels of management in the TP environment. Hence the analysis of TP's challenges should also be viewed using the insight as advocated by both Paucar-Caceres and Dominici.

2.6.2 VSM as a Diagnostic Tool within TP

As mentioned above, the effective application of the Viable System Model as a diagnostic tool within TP resulted in a more in-depth understanding and interpretation of efficiency challenges within the various levels of management in the TP environment. Organizations should analyse and explore in a vigorous manner the complex nature of its problems with the view to obtain knowledge of the diverse perspectives that may inform the problem. Martellato (2013) is observed applying the VSM to diagnose the challenges faced by the council in the case study. Burgess and Wake (2012) on the other hand uses the VSM "as a diagnostic tool for SME's to undertake an audit of viability".

In both examples above the VSM offered both researchers the ability to adequately diagnose complex problems facing the organizations that they were researching. Burgess *et al.* (2012) designed a diagnostic approach using VSM model to identify viability within SME's i.e. the researchers designed structured questionnaires that focus on the organizational structure to diagnose elements of viability in the case study. The structured questionnaires also provided the researchers with an interview protocol that the administrators had to conform to. The use of structured questionnaires focussing on the organizational structure to diagnose efficiency challenges in TP was adopted following the example from Burgess et al. (2012)'s case study.

Martellato (2013) asserts that when diagnosing the organization it is important to identify challenges faced by the each system of the organization i.e. S1, S2, S3, S4 or S5. Martellato (2013) uses the example of S1 in the case study and suggests that S1 faces a number of financial challenges e.g. costs of amortization due to unfavourable age vehicle structure. The VSM is used in both cases studies in a manner that enables the researcher to identify specific challenges at each level of the organization.

The researcher of this study obtained a valuable insight by following the example of both Martellato (2013) and Burgess *et al* (2012). The researcher diagnosed the system i.e. Transnet Property using the VSM similar to how both Martellato (2013) and Burgess *et al* (2012) diagnosed their environments using the same VSM tool.

2.6.3 Viability

Nhlabathi (2001) defines viability as a "response to a stimulus that was not included in the list of anticipated stimulus when the system was designed". According to Green (2013) viability is defined as the organization's "ability to survive within a changing environment, it must undertake particular activities and there must be certain relations between them". It is not sufficient for the organization to adapt to known changes, instead it must also have the capability to survive and adapt to changes that were not foreseen when the organization was established, Jackson (2000).

Flexibility, stability and efficiency are key concepts associated with viable systems when using the VSM. Asproth (2011) suggests that flexibility is the ability of the various operations to operate effectively individually having their independent mission statements, budgets etc. The departments must be empowered to take decisions on their own provided that they are working towards achieving a common goal, Jackson (2000). Stability is viewed as the organization's ability to have an effective Systems 2 (coordination function within VSM), Asproth (2011). Asproth (2011) looks at efficiency as the organization's ability to optimize operational elements in the overall system. The presence of flexibility, stability and efficiency during unplanned changes within TP should enable the observer of the system to measure the degree of viability of all operations.

2.6.4 Law of Requisite Variety

The law of requisite variety has its foundations and origins within the area of cybernetics that was established by Ashby in 1957. Herrera *et al*. (2011) defines law of requisite variety as " a controller has requisite variety – that is, has the capacity to maintain the outcomes of a situation within a target set of desirable states – if and only if it has the capacity to produce responses to all disturbances that are likely to take outcomes out the target set".

Requisite variety is merely the capacity of the organization to control and take corrective action in situations where there are unforeseen and unplanned disturbances affecting the target system in the environment, Jackson (2000). Ojha, White and Rogers (2013) assert that requisite variety is the "capability of an organization to adapt to the needs of the marketplace in order to prevent loss of efficiency or control". The application of VSM to unpack constraints impacting on efficiencies within TP should assist in establishing the level of requisite variety available in organization. The prediction and the explanation of relationship between systems within the organization and uncertainties within the environment, are best explained by the law of requisite variety, Ojha *et al*. (2013). Chapter 4 of the report provides detailed analysis and explanation of relationship between systems within TP.

2.7 VSM Criticism

Paucar-Caceres (2009) criticizes the VSM by suggesting that the model treats organizations like machines. The VSM "underplays the purposeful role of individuals in organizations which may preclude proper attention being given to the generation of shared perceptions and values (to organizational culture)", Jackson (2000). Morris (1983) express this view in more creative and hilarious manner by suggesting that "the big toe also thinks". Jackson (2000) quoting Adams (1973) asserts that man forms the basic unit in an organization and VSM suggests that man is free the same manner that the knee is free to jerk i.e. more of a reflex action.

The inability of the model to accentuate the role played by individuals in organizations can be misleading to managers who intend improving the organizational efficiency and effectiveness, Jackson (2000). Instead the VSM theory places too much emphasis on "organisational structures, and a disregard of the human aspect in a system, such as

individual's freewill, their purposeful nature, reflectiveness, and capability to direct the organisation in any deliberate position", Hildbrand (2013).

(Harwood, 2009, Jackson, 2000, Thomas, 2006) describe the VSM as a model that is highly dictatorial, mechanistic, obsessed with control and very abusive towards the operational units. Hildbrand (2013) quoting Jackson (1988) claims that "some critics even accuse Beer of being irresponsibly satisfied with building a model that allows for autocratic use and fails to generate a mutually shared overall purpose, instead of generating a more appropriate system which establishes intrinsic motivation".

Some critics have also raised a claim that the VSM "serves the purposes of narrow elite groups", Jackson (2000). Ulrich (1981) agrees that this model is open to manipulation and abuse by powerful group in the organization. Ulrich (1981) also suggests that the model should be made or created to discourage any authoritarian use. Beer (1983) acknowledges that there exist a risk of subversion but he suggests that appropriate mitigations can be built in the model to safeguard and minimize the impact of any authoritarian use.

In arguing against the criticism levelled towards the VSM, Jackson (1988) asserts that the VSM has a decentralised control structure that effectively address the exertion of power by an 'elite' and 'powerful group' in the organization. Hildbrand (2013) quoting (Beer, 1979, Jackson, 1988, Espejo, 2004, Espinosa and Walker, 2006) further suggests that the VSM "stresses the importance of stakeholder involvement in decision-making and the need to define the system's identity, purpose, direction and values in a participatory manner".

The notion that the VSM endangers human freedom is not entirely valid because senior management is expected to support and not to oppress operational units, Jackson (2000). The VSM model "further concentrates on an element's function rather than its identity and individuals are free to leave the system at any time, without effecting its function", Hildbrand (2013). The opinion that VSM serves the 'elite' is misplaced because "an organization's goal is not externally defined but emerges as a compromise from among the various internal and external influences on the organization", Jackson (2000). I therefore reject most of the criticism levelled against the VSM model based on the understanding that when the model is used in organizations, it achieves the increased level of efficiency and effectiveness as supported by Jackson (2000, p. 177).

2.8 Relevance of VSM for the Study

The ability of the VSM model to achieve increased levels of efficiency and effectiveness when applied to organization makes it an obvious choice and suitable tool to unearth key challenges facing the environment under study i.e. TP. Jackson (2000) suggests that "the VSM can be used very effectively as a diagnostic tool to make specific recommendations for improving the performance of organizations".

Burgess *et al.* (2012) designed a diagnostic approach using VSM model to identify viability within SME's i.e. the researchers designed structured questionnaires that focus on the organizational structure to diagnose elements of viability in the case study. The use of structured questionnaires also provided the author of this report with a clear interview protocol that he had to conform to in diagnosing the efficiency related challenges within TP. The use of structured questionnaires focussing on the organizational structure to diagnose efficiency challenges in TP was adopted following the example from Burgess et al. (2012)'s case study thereby highlighting the effectiveness of VSM in completing the study.

Jackson (2000) alludes to the fact that when using VSM, control is spread across the design or architecture of the system understudy which enables self-organization within the organization. Beer (1979) is emphatic in suggesting that VSM advocates decentralization of control which ensures that parts of the system are granted autonomy that helps them effectively deal with variety. The decentralization of control when applying the VSM encourages and supports the unearthing of employee talents and skills within organizations. Jackson (2000) advocates this view when he suggests that "I should also acknowledge the contribution it can make to help the realization of human potentiality in enterprises". Jackson's assertion is witnessed in section 5 of the report where most recommendations are attributed to TP employees who demonstrated remarkable and creative talent with the solutions that they recommended.

The VSM tool has its foundation in the cybernetic principles of feedforward and feedback, Jackson (2000). Burgess and Wake (2012) suggest that the cybernetics and VSM theories complement each other because "each of these sub-systems (i.e. VSM) represents an interactive, cybernetic function acting as a filter between the environment and the organisation's management to connect management processes and their various communication channels". The tool's ability of feedforward and feedback makes it relevant in designing sustainable and well supported solutions for the organization.

2.9 Conclusion

The literature review demonstrates a direct link to the objectives of the current study as informed by a clearly articulated problem statement. The literature review managed to address the study objectives by; defining the VSM, applying the VSM to diagnose the efficiency challenges at TP, highlighting the impact of VSM at TP.

The use of VSM as a diagnostic tool within TP presented a very useful and informative intervention method which is relevant and structured to uncover key challenges facing the environment understudy. The various systems making up the VSM model adequately assist management practitioners to study, analyse every organizational structure and relationships that impact on the perceived challenges.

There were critics levelled against the use of the VSM tool that were highlighted in chapter 2 but most of these critics were less valid as discussed in this section. The relevance of the VSM dispelled and underscored such myths and opinions that the critics mentioned against the tool. I strongly supported the use of the VSM based on the counter-arguments that were highlighted within the 'relevance of the VSM for the study' section.

The next chapter covers in detail the research designs. The research designs will include the following sub sections i.e. research approaches, study methodology and data collection methods.

CHAPTER THREE
RESEACH METHODOLOGY

3.1 Introduction

This section presents a methodology for the current study which highlights the much broader philosophical underpinning of the chosen research methods. This part of the document include the following sub headings i.e. ***research approaches***, ***study methodology*** that address a number of methods. The ***methods of data collection*** section is presented in this chapter. The methods of data collections covers the following sub sections i.e. interview techniques, observations, analysis and interpretation and lastly value stream mapping.

3.2 Research Approach

There are two approaches normally used when collecting data and reporting on information and findings discovered during a business research i.e. the Positivist (quantitative) and Phenomenological (qualitative) approaches.

3.2.1 Positivism (Quantitative) Approach

The quantitative research approach provides a detailed account of what consumers think which can be described as 'better mental facts', Barnham (2014). According to Bryman & Bell (2007:16), the use of natural science methods is supported by the positivism approach when one is conducting studies on social reality. Gill & Johnson (2010) citing Saunders *et al., (*2012) assert that the application of the positivist approach is dependent upon collecting data on reality that is measurable, such data and information should be analysed to establish the relationships that exist in a population understudy**.**

The analysis of the observable data and information collected, should be thoroughly tested so that the conclusion is not based on mere perceptions instead it should be based on observable social reality, Saunders, Lewis and Thornhill (2009). The quantitative dominant crossover mixed analysis appears relevant for this study**.** Research practitioners sometimes find themselves presented with a set of quantitative data which requires interpretation and analyses in-order to develop a comprehensive research report. The quantitative dominant crossover mixed analyses is defined as "the combination of one or more sets of inferential analyses with qualitative analyses that generate some frequency data e.g. word count", Frels and Onwuegbuzie (2012). The use of a quantitative crossover mixed analyses ensures that quantitative data is converted to

be analysed qualitatively, Frels and Onwuegbuzie (2012). Although it is not a cost effective and time friendly approach, it enables the results to be generalizable to the population, (Saunders et al. 2009).

3.2.2 Phenomenological (Qualitative) Approach

The phenomenological concept was formally started by Edmund Husserl as a new approach of conducting philosophy, Kafle (2011, p. 183). During the period of 1889-1976 Heidegger shifted its focus from a philosophical perspective focusing on consciousness to focus more on a phenomena which elaborates the existential and interpretive dimension, Finlay (2009). Finlay (2009) asserts that "phenomenology is the study of phenomena: their nature and meanings". According to Kafle (2011), the phenomenological research assist in highlighting a rich textured description of lived experience.

Saunders *et al*. (2009) suggest that the social world is complex and not easily understood using theories when embarking on a phenomenological research. Bell and Bell (2015) agrees with Kafle (2011) by claiming that a phenomenology research is "a research method that attempts to document one's own experience or enter into mind of another person in order to have a complete understanding and empathy". The researcher is therefore expected to adopt a more empathetic position when studying and analysing social reality during the study. Bryman and Bell (2007) are in agreement with Bell and Bell (2015) that the phenomenological approach is premised on the understanding of human behaviour instead of explaining it.

In a phenomenological research, a non-probability sampling approach restricts generalization when adopted to arrive at a more comprehensive conclusion of the study. In analysing and drawing comprehensive conclusions on the study, the qualitative approach relies on what is common to the participants when they experience the phenomenon, Bell and Bell (2015). The observed reality within the environment presents common themes that emerge from participants. The common themes observed in a particular study form the basis of the qualitative approach analyses and recommendations respectively. The understanding of the factors contributing to inefficiencies within TP will rely on the observations made by the researcher and specific interviews being conducted to uncover common phenomenon experienced by the participants in the study. The process is time consuming and expensive.

3.3 Study Methodology: Phenomenology (Qualitative)

The study methodology was qualitative. A qualitative research is involved in "describing, explaining and interpreting collected data", William (2007). A researcher is highly involved in the actual experiences during the research process, William (2007) quoting Chreswell (2003). There are several methods that can be used to conduct a qualitative research e.g. case studies, grounded theory, ethnography, content analysis and phenomenological. These methods are discussed below.

3.3.1 Case Study

William (2007) quoting Chreswell (2003) refers to case study as "researcher explores in depth a program, an event, an activity, a process, or one or more individuals". According to William (2007), a case study can be bound by time and place. It can also be a single case being studied. Case studies have a distinct capability of providing generalization of report findings, Tsang (2014). Tsang (2014) asserts that this method has its limitations in the small number of respondents being interviewed to arrive at a broad generalization of patterns of occurrence of the dependent variable.

3.3.2 Grounded Theory

William (2007) quoting Chreswell (2003) defines grounded theory research as "the researcher attempts to derive a general, abstract theory of a process, action, or interaction grounded in the views of participants". Frost, Nolas, Brooks-Gordon, Esin, Holt, Mehdizadeh, and Shinebourne (2010) assert that researchers use the grounded theory to produce a supporting theory regarding patterns of behaviour and social processes that are relevant and problematic for the participants. Data is assumed to be raw and unmediated to reflect the participant's points of views, Frost *et al.* (2010).

3.3.3 Ethnography

Bell and Bell (2015) defines ethnography as "the study of local customs and practices by studying the meaning of the behaviours, language, and interaction among members of the culture-sharing group". The enormous amount of time a researcher must invest in studying a group and not just an individual proves to be a major downside of this method. Bell and Bell (2015) contends that the group understudy may not necessarily behave in a usual manner because of the presence of the researcher. The abnormal behaviour is potentially influenced by the presence of the researcher which can possibly distort the authentic picture of the observed reality.

3.3.4 Content Analysis

A content analysis is "a detailed and systematic examination of the contents of a particular body of material for the purpose of identifying patterns, themes, or biases", William (2007). The exploration of verbal, visual, behavioural patterns and themes forms the basis for using this approach, William (2007).

3.3.5 Phenomenological

Bell and Bell (2015) asserts that a phenomenology (qualitative) research is "a research method that attempts to document one's own experience or enter into mind of another person in order have complete understanding and empathy. In phenomenological research, a non-probability sampling approach restricts generalization when adopted to arrive at a more comprehensive conclusion of the study. In analysing and drawing comprehensive conclusion on the study, the qualitative approach relies on what is common to the participants when they experience the phenomenon, Bell and Bell (2015). Barnham (2015) recommends the use of open ended questions to understand the phenomenon. The use of a terminology '***like***' in the questions, allows respondents to share their responses using their own mental models as opposed to be using the researcher's mental models, Barnham (2015).

Barnham (2015) asserts that "qualitative research can outdo quantitative research at its own game and, by asking better 'what?' questions, reach a better understanding of these 'mental facts'". The qualitative methodology is viewed as a useful technique when attempting to understand consumers but it seems to be lacking in the underlying philosophy of science, Barnham (2015).

3.4 Methods of Data Collection

3.4.1 Interview Technique

Interviews were used to collect data for the current research on social reality. The amount of time available to elicit views on this study was limited. However the interview technique was adopted to elicit data about the TP environment and its associated challenges. According to Frels and Onwuegbuzie (2013), "Interviews represent one of the most common ways of collecting data in a qualitative research because they provide opportunities for the researcher to collect rich and meaning-making data".

Interviews can be enhanced when researchers collect more quantitative data alongside qualitative responses (Frels and Onwuegbuzie, 2013). The interviews could be telephonic or questions sent by e-mail particularly for quantitative type of research which focuses on the gathering of absolute figures. The qualitative type of research which focuses on explaining the causal relationships that take place when elements of the system interact with one another requires a researcher to narrate and describe his understanding of the phenomenon in detail.

In this study the researcher conducted face to face interviews with individuals from General Electric and Transnet Property respectively. The responses from the interviews were documented in a journal or notebook of the researcher. The researcher also made follow up telephonic calls to research participants with the aim to gain clarity and understanding of the responses generated from the initial interview. The questionnaire consisted mainly of open ended type of questions which enabled the researcher to gain in-depth knowledge about the nature of problems within the organization. The analysis and interpretations is greatly enhanced if the researcher uses open ended type of questions.

3.4.2 Observation

The observation technique is another method that the researcher used to gather data. Direct observation approach was used to collect reliable data as opposed to only relying on inputs from individuals in the organization. The research participants' i.e. junior staff, senior staff, managers in TP were observed over a period of time on how they interact and communicate with individuals from all levels. The observation also included how TP employees managed their work packages as guided by the current business processes. The researcher also undertook a trip from 07 July 2016 until 31 July 2016 to the United States of America. The researcher visited General Electric to conduct further observations that would form part of the final report. The observations from GE included but not limited to how GE manages the interaction of systems, communications, business processes and how they applied some of the tools like the value stream map to analyse business processes as discussed below.

According to Remenyi and Williams (1998, p. 176), "observation is thus one of the most valuable ways of collecting reliable evidence". The researcher will observe the interaction of individuals from both environment i.e. General Electric and Transnet Property. The observation from GE should provide one with a view on what is regarded as best practice standards to be recommended. The observation from Transnet Property should provide insight relating to the

perceived challenges faced by the organization in respect to some of the factors affecting efficiency i.e. interaction of systems, communication and business processes. The researcher thereafter measured the time taken to transact and complete various processes within TP. The evidence of data obtained was recorded on the researcher's notebook/journal and the digital images from the GE observations was also recorded on a digital camera provided by General Electric and Transnet Property permitted the researcher to use such device for recording the observations.

3.4.3 Analysis and Interpretation

An interpretative phenomenological analysis (IPA) and the inductive analysis has been used to interpret data from the study. Frost, Nolas, Brooks-Gordon, Esin, Holt, Mehdizadeh, and Shinebourne (2010) refer to interpretative phenomenological analysis as an analysis approach that is "concerned with a detailed examination of individual lived experience and how individuals are making use of that experience". The ability of the researcher to analyse and make comparison between lived experiences of employees coming from both GE in USA and Transnet Property in South Africa enhanced the quality of the final report.

The lessons learnt from such analyses and observation provided a clear approach that would inform the kind of solutions to be recommended within TP. Thus, the benefit of using the interpretative phenomenological analyses ensures that a researcher is presented with a comprehensive framework and process to analyse data alongside with the underpinning theory, Frost *et al*. (2010).

Bowen (p217, 2005) citing Patton (p306, 1980), regards inductive approach as meaning "the patterns, themes and categories of analysis coming from the data; they emerge out of the data rather than being imposed on them prior to data collection and analysis". The process of re-reading and analysing notes that were recorded on the researcher's journal or notebook and also answers to the questionnaires sent out to the research participants resulted in the emergence of themes and patterns relating to the problems in question. The common themes were grouped and summarized to present a singular view. The other themes were documented and used in the compilation of recommendations.

It was expected that the researcher would communicate and engage with key GE and TP employees who narrated most of the issues and challenges that they were experiencing within

their respective environments. The historic processes governing how employees from both organizations i.e. GE and TP conducted their duties forms part of the interpretative phenomenological analyses (IPA). Frost *et al*. (2010) quoting Eatough and Smith, 2008:184, assert that "IPA endorses social constructionism's claim that sociocultural and historical processes are central to how we experience and understand our lives, including the stories we tell about theses lives."

3.4.4 Viable Systems Model and Viable Systems Approach as Diagnostic Tools

As mentioned chapter 2 of this report, the Viable Systems Model (VSM) has its roots on the systems theory. Organizations should analyse and explore in a vigorous manner the complex nature of its problems with the view to obtain knowledge of the diverse perspectives that may inform the problem. Martellato (2013) is observed applying the VSM to diagnose the challenges faced by the council in the case study. Burgess and Wake (2012) on the other hand use the VSM "as a diagnostic tool for SME's to undertake an audit of viability".

In both examples above the VSM offered the respective researchers the ability to adequately diagnose complex problems facing the organizations under study. Burgess *et al.* (2012) designed a diagnostic approach using VSM model to identify viability within SME's i.e. the researchers designed structured questionnaires that focus on the organizational structure to diagnose elements of viability in the case study. The structured questionnaires also provided the researchers with an interview protocol that the administrators had to conform to.

The Viable Systems Approach (VSA) is also a grounded theory that assists in the interpretation of corporate behaviour and interaction of elements within systems, Golinelli, Barile, Spohrer, and Bassano (2010). VSA as a theory is derived from the Viable Systems Model (VSM), Barile *et al.* (2010). In the context of VSA, organizations are understood to be open systems that are goal oriented, cognitive and cybernetic, Dominici and Basile (2013). It is necessary to understand the formal definition of VSA, how does it help management practitioners in solving management challenges and what are its guiding principles.

Barile *et al.* (2012) assert that VSA can be understood as an interpretive governance methodology that assist in the understanding and management of social and business organizations. VSA provides systems practitioners with a general framework and governance that looks at both the organization's structural configuration and dynamics of functioning; the

relevant actors who influence decision making are successfully and easily identified in a complex situation, Barile *et al.* (2012).

Martellato (2013) asserts that when diagnosing the organization it is important to identify challenges faced by the each system of the organization i.e. S1, S2, S3, S4 or S5. Martellato (2013) uses the example of S1 in the case study and suggests that S1 faces a number of financial challenges e.g. costs of amortization due to unfavourable age vehicle structure. The VSM is used in both cases studies in a manner that enables the researcher to identify specific challenges at each level of the organization.

3.4.5 Value Stream Mapping

The success of many companies is usually associated with their ability to identify, understand and respond to their customer's "defined value", Gericke, Schabacker, Szélig, Vajna, (2015); Kennedy and Huntzinger (2005); Silva (2011). Ristikaarto (2016) asserts that "value is basically features and functions of a product or service which meet or exceed customers' expectations and therefore customer is willing to pay for it". What tools can be used by TP to be able to identify its customer's value? According to Ristikaarto (2016), the use of the value stream mapping tool can assist organizations to identify all activities that contribute to the understanding of the organization's customer value.

Zahraee, Hashemi, Abdi, Shahpanah and Rohani (2014) suggest that the rise and adoption of the value stream mapping came about as a result of its success within Toyota Japan during the 1980's. Taiichi Ohno (1988), Womack et al. (1990), Womack and Jones (1998, 2005), Rother and Shook (1999) are perceived as the pioneers of the value stream mapping as a tool to identify waste in the process, Sasikuma and Kumar (2013). The identified waste in the process is defined as "any substance or object which the holder discards or intends or is required to discard", Edtmayr, Sunk and Sihn (2015). The different types of waist that are identified when applying the value stream map are discussed below in section 3.4.5.1.

3.4.5.1 Types of Waste

Melton (2005) suggests that there are seven types of wastes that can be identified when using the value stream mapping tool as depicted below in **Fig 3.1.** Each type of waist is briefly explored below to provide better understanding and meaning as it relates to the study.

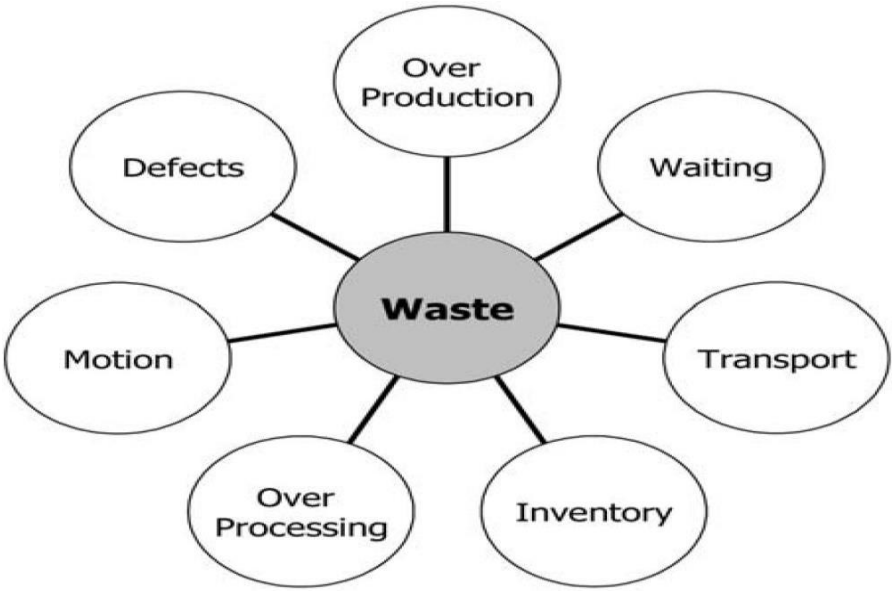

Figure 3.1 - Seven Types of Waste

Source: Melton (2005:665)

a) Overproduction

Overproduction is a concept mostly associated with the manufacturing industry where products are produced by various organisations in this sector, Ristikaarto (2016). This type of waist occurs when organisations produce more products than they need or produce products that are higher than the expected customer order, Chiarini (2013, p. 20-21); Hines and Rich (1997, p. 47-48). The resultant effect of overproduction is the increased inventories and lead times, Ristikaarto (2016).

Overproduction in a service type environment (e.g. TP) can be found in the administrative processes of the organization, Ristikaarto (2016). The excessive and irrelevant information that cannot be used or exploited are some example of overproduction, Oehemen and Rebentisch (2011); McManus (2005). "Also unnecessary details and too high accuracy of information or

over-dissemination are typical examples of overproduction in administrative processes", Ristikaarto (2016).

b) Waiting

Waiting within the administrative processes occurs when one person is idle due to lack of information needed to perform some activity within the value stream, Oehemen and Rebentisch (2011); McManus (2005). There are two types of waiting in the administrative processes i.e. scheduled and unscheduled, Oehemen and Rebentisch (2011); McManus (2005).

"Scheduled waiting means that waiting happens expectedly so people, information or resources are planned to stay idle for some time whereas unscheduled waiting means that waiting happens unexpectedly", Ristikaarto (2016). In a TP scenario a scheduled waiting may take a form of a Regional Manager knowingly waiting for the expiry of the current lease agreement before a new lease agreement is signed. Unscheduled waiting may occur as a result of manual processes whereby the Regional Manager is not informed by an IT system notification on when the current lease agreement expires and when the new lease agreement is due to take effect.

c) Transport

Transport is another form of waste that can be defined as "excessive movement of people, information or products which waste time, causes cost and rises a risk of damage", Ristikaarto (2016). In an administrative environment motion and transport are generally viewed as meaning the same type of waste that must be reduced and managed well since it cannot be entirely removed in manufacturing processes, Chiarini (2013, p. 26); Hines and Rich (1997, p. 48). There is a reason why this type of waste cannot be entirely removed e.g. if a product is in transit (in manufacturing environments) or a person is in transit to obtain valuable and much needed information (in administrative environments), then this activity serves a justifiable cause needed to complete the activity or process in the value stream, Ristikaarto (2016).

d) Inventory

Inventory as a concept is usually associated with the manufacturing environments however there exist inventory waste in the administrative or office processes as well, Oehmen and Rebentisch (2010, p. 16); McManus (2005, p. 58). In the administrative processes, inventory waste occurs when there is a lack of synchronization and fluency in the process, Oehmen *et al*. (2010); McManus (2005). Information could be produced in one step and there may exist a delay in taking such information to the next step because the next step is still processing the preceding information, Ristikaarto (2016). In a TP office environment, an example of inventory waste could be a situation where the legal department has been given a list of debtors who are in arrears but has to wait for the accounts payable department to run customer debit orders before they can send out letters of demand to customers for unpaid arrears.

Inventory in a manufacturing environment relates to "stored raw materials, semi-finished products or finished products", Ristikaarto (2016). The overproduction of inventory leads to excess inventory which requires a larger storage space in a warehouses, Chiarini (2013, p. 21); Hines *et al*. (1997). The general rule is that organizations should not encourage the production of excess inventory because this waste leads to high costs and increased lead times, hence the inventory waste must be eliminated or at least minimized, Ristikaarto (2016).

e) Over processing

Over processing is usually confused with overproduction. There is a distinct difference between both of these types of waste. "Over processing refers to excess activity in manufacturing processes which is not necessarily needed or not requested by customers and therefore it is not value adding; whereas overproduction means that production process produces goods more than needed", Ristikaarto (2016). In administrative processes over processing may occur where there are many unnecessary steps it takes to produce information leading to action being taken e.g. a process that contains too many approvals before action is taken, Oehmen *et al*. (2010); McManus (2005).

In a TP context over processing of information may take place in a situation where a Regional Manager has identified a need to conduct a facelift of a TP building and implement green technology. The COO from Head Office requests the Regional Manager to provide a detailed breakdown of costs and a detailed project plan. Once the COO is satisfied with the information provided he make recommendations to the CEO requesting funds to be released for such work. The CEO will in turn request the COO to provide him with a detailed business case justifying why

the funds should be released. Once the CEO is in possession of such information, the CEO will in turn setup a meeting for the Capital Investment Committee to approve the release of the funds. The TP example directly demonstrates the overprocessing waist characterized by many approval levels as suggested by Oehmen *et al*. (2010); McManus (2005).

f) Motion

Ristikaarto (2016) defines motion "as an unnecessary movement of people in office environment". This waste relates to people stretching, bending, picking up certain items and such waist should be totally removed from the organizational processes because it impacts negatively on productivity, Chiarini (2013, p. 23); Hines *et al.* (1997). Oehmen *et al*. (2010); McManus (2005) suggest that the handling of information by multiple people before such information finally reaches the intended person is another form of unnecessary motion or movement in the process that should be eliminated. "Unnecessary movement is normally caused by poor information systems, insufficient use of information systems, tools and equipment or separate location of persons which make cooperation complicated", Ristikaarto (2016). Chapter 4 of this report highlights in detail some of the causes relating to unnecessary movement or motion waist that Ristikaarto is emphasising.

g) Defects

Defects exist in both manufacturing and administrative processes respectively. Melton (2005) suggests that defects are those faults or errors that lead to extra work in the process that produce a product or service. The extra work results in direct additional cost of production in both manufacturing and administrative processes, Melton (2005, p. 666); Oehmen *et al*. (2010, p. 18-19); McManus 2005, p. 48). The example of extra work may be product redevelopment, repairing, extra product inspection, product scrapping, human errors or misunderstanding etc., Oehmen *et al*. (2010, p. 18-19); McManus 2005, p. 48).

3.4.5.2 Application of the Value Stream Map and its Benefits

The previous section has explained in details the different types of waist that the value stream maps should attempt to identify. However how can the value stream mapping tool add value to organizations characterized by process efficiency related challenges that inhibit them from meeting their customer expectations? According to Dadashzadeh and Wharton (2012), the value stream mapping as a Lean philosophy is normally used by many organizations to systematically identify and remove waste within the processes that produce products and services. Sasikuma and Kumar (2013) suggest that the value stream maps "are special types of process maps which

represent all actions, both value adding and non-value adding currently required to bring a product through the main flows essential to every product". It can therefore be deduced that the application of the value stream mapping tool can add value to organizations by systematically identifying all actions and activities whether value adding or non-adding with an aim to remove waist in their processes and activities.

Once the organization has identified value adding and non-value adding activities, there are key indicators that practitioners should use to systematically identify and remove waste within the processes that produce products and services as suggested by Dadashzadeh and Wharton (2012). The key indicators that assists practitioners in the identification and removal of waste in the process are: 1) operating time; 2) lead time, Edtmayr *et al.* (2015).

The practitioners are advised to observe and measure the indicators (i.e. operating time and lead time), then they need to draw comparisons between them; the greater the difference between the two indicators suggests that there is a high level of waste in the process which may result to a high process improvement achievement, Edtmayr *et al.* (2015). The ability of the value stream mapping tool to highlight all non-value added processes assists researchers to gather meaningful and accurate data. The data gathered assists practitioners to provide sustainable interventions during the implementation of process improvements across the value chain.

The tool is mostly used in the manufacturing environments as opposed to service oriented types of environment, Zahraee *et al.* (2014). A key benefit of using this tool is that it is continually in pursuit of waste reduction as defined within each activity that is non value adding when completing a specific product or service, Dadashzadeh and Wharton (2012). Zahraee *et al.* (2014) support Dadashzadeh and Wharton (2012 by stating that "values stream mapping has the ability of exposing waste in business processes or manufacturing by recognizing and eliminating non-value-adding actions that cause time and money wastage in every stage of production".

Another distinct benefit of the value stream mapping tool is that it provides a visual picture of the entire process which ensures that all participants use a common language to identify and remove all non-value adding processes or activities in the process, Zahraee *et al.* (2014).

3.4.5.3 Step to building a Value Stream Map

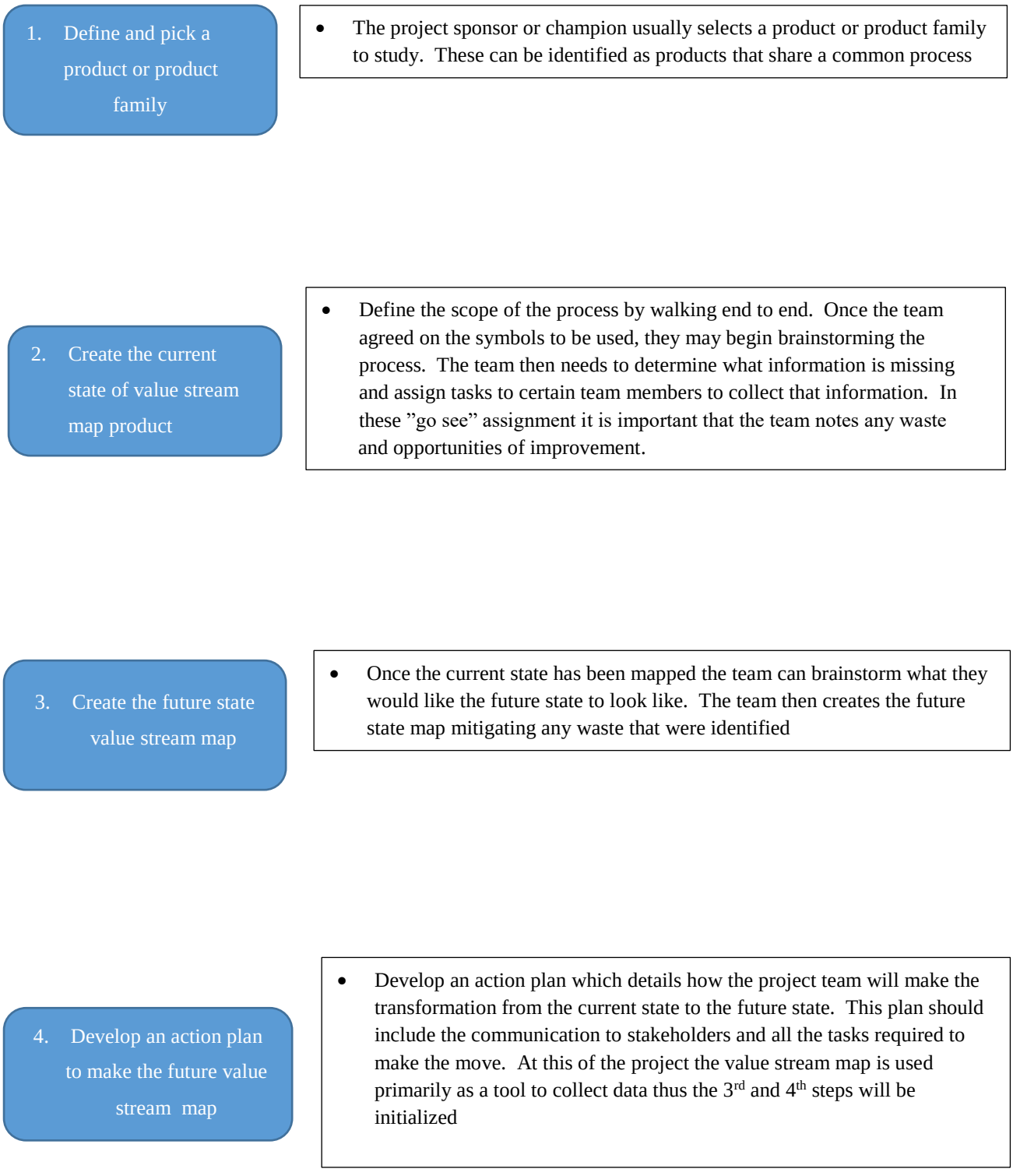

Figure: 3.2 Steps for Value Stream Mapping

(Adapted from the Lean Six Sigma Training Notes, 2016:65)

3.4.5.2 Value Stream Mapping at GE and TP

The value stream mapping tool usually produces high quality and reliable data in a form of visual images relating to data and information flows of the entire process. Although it is predominately used within the manufacturing environment, the tool is also used in service oriented environments. The application of the value stream mapping was also demonstrated at General Electric when the researcher was attending training.

The General Electric practitioners indicated that the use of the value stream mapping tool forms part of the working culture with GE. GE usually apply the value stream mapping tool before they deploy any technology earmarked to support the underlying business processes involved in producing products and services. Equally in most instances GE also applies the tool to identify and improve production processes.

The researcher used the basic tenets of the value stream mapping to understand in detail the elements that impact on the lack of efficiencies within Transnet Property. The observations from GE served as guidelines for the researcher. A workshop including key stakeholder impacted, was set up to define and select processes that have more than 80% impact on the overall business. Once the processes were selected, the researcher had to create the current state using value stream mapping. The current state highlighted the "as is" state of affairs within TP.

The use of brainstorming technique was thereafter deployed to identify areas in the process that were characterized by high waste. There were robust debates between participants as a result of transparency of all issues that the tool provided. Consensus had to be reached to enable the team to create the future state value stream map. The last initiative had involved the team developing action plans to that will implement the desired future state.

3.5 Conclusion

The study methodology for the current study was qualitative. This chapter comprehensively highlighted the different methods used in a qualitative research e.g. case studies, grounded theory, ethnography, and content analysis and phenomenological. The case study and phenomenological methods are very prominent in the study.

The researcher's ability to travel to GE in the United States of America demonstrated the strength of these methods in conducting a comprehensive research study. The case study method, phenomenological approach, interviews, observation technique, viable system model and the value stream mapping tools were instrumental in diagnosing, gathering and interpreting meaningful data impacting on this study within TP.

The next chapter will demonstrate the actual application, analysis and interpretation of the data using most of the tools discussed in this chapter.

CHAPTER 4
ANALYSIS AND DISCUSSION

4.1 Introduction

This section of the report provides an in-depth analyses and discussion relating to challenges emanating from Transnet Property. There is a direct application of the Viable System Model that will assist in presenting a comprehensive current situation within TP. The use of some of the tools presented in chapter 2 and 3 is expected to enhance the presentation of current challenges within TP. The factors impacting on efficiency within TP together with their associated issue and challenges will also be covered in this section of the report. The impact of the Viable System Model in relation to the cybernetic principles, viability and the law of requisite variety are covered in this section of the report.

The presentation of this section involves the researcher analysing all responses from the questionnaires that were sent out to the research participants. The open ended questionnaires that were sent out to the participants consisted of structured interviews and questions relating to the efficiency challenges in TP. The researcher also scheduled a workshops with key stakeholders who were impacted to try and gain insightful understanding of the current business processes where a value stream map was used to highlight some of the gaps in the current business processes within TP. The researcher decided to pick three key business processes as the area of focus for the study. The **Master Data, Contract Management and Utilities** processes were arbitrarily selected as the area of focus by the researcher due to the limited time frame for the study. TP's core business is Lease Management and these processes make significant contribution to the TP revenue and they are dependencies to the overall lease management process.

4.2 The current state at TP using VSM

The 5 systems making up the VSM model assisted the researcher to gain a better understanding of the current issues affecting each system within Transnet Property. The model assisted in identifying who were the key stakeholders; what were their roles in the organization and what were the perceived issues characterizing TP.

There are five systems that make up a Viable System Model in relation to Transnet Property as depicted below in Fig 4.2. The 5 systems highlighted are as follows; implementation, co-ordination, control, intelligence and policy. Each system or element has a distinct role or purpose which contributes toward a common goal of the larger system e.g. Transnet Property's implementation system i.e. operations can be viewed as one of the five elements contributing to the attainment of a larger system goal i.e. attainment of TP's profits.

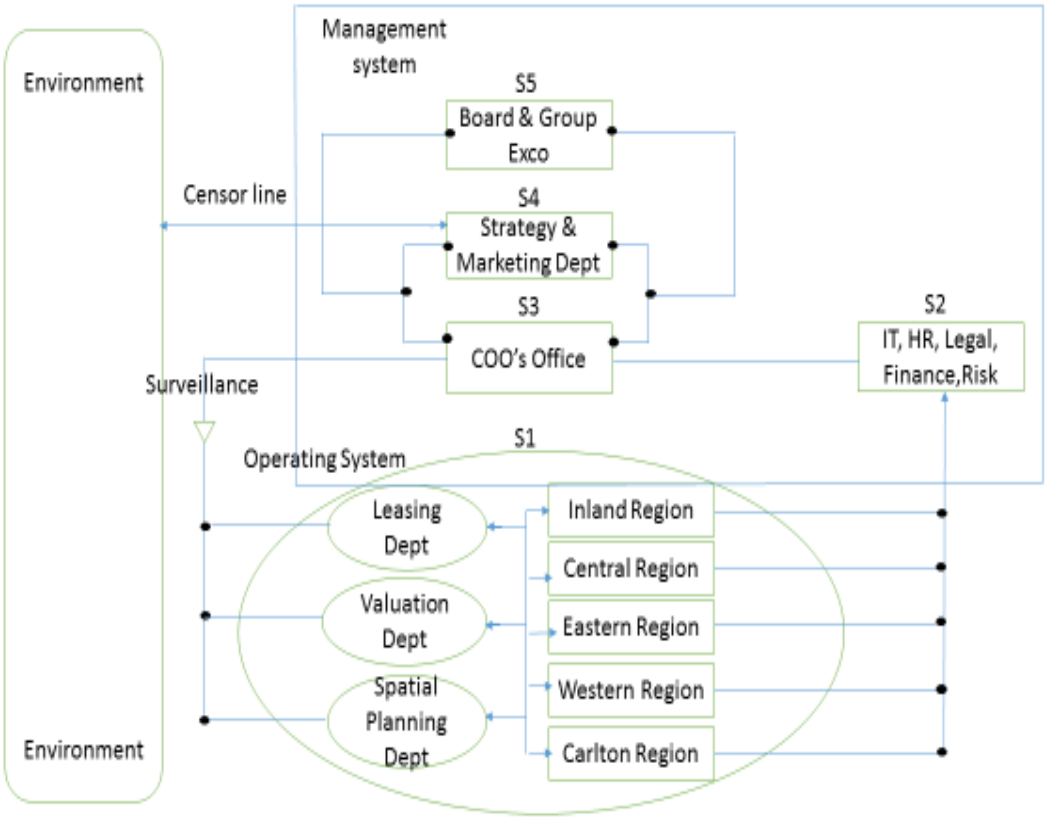

Fig 4.2 The Application of the Viable System Model at TP

4.2.1 Implementation (S1) – TP Operations

The S1 within Transnet Property is made up of the Operations Department as shown by **Fig 4.2**. The Operations Department is managed by the Chief Operations Officer who is a member of the Divisional Executive Committee and also a member of the Group Extended Executive Committee. TP's operations are decentralized across all provinces which are referred to as regions. The regions that make up operations are as follows: **Inland** (Gauteng, Mpumalanga, Northern Cape, Bloemfontein and North West), **Western** (Western Cape), **Central** (Eastern Cape), **Carlton** (Carlton Centre – Transnet SOC Head Offices) and **Eastern** (KwaZulu-Natal).

Stephen and Haslett (2011) suggest that the implementation system is the organ of the organization and provides the fundamental activities of the system. In essence the implementation system makes up the core operations of the business. The TP regions are regarded as the core of the business because if they do not increase rental occupancy in their respective regions, TP will fail to meet its yearly financial targets. Therefore the regions are mostly expected to drive all the operations and they are managed by a Regional Manager who is tasked with the overall performance of the region.

The regions are generally given specific operational and financial targets in a year. They are expected to ensure that their operations are effective and efficient. The notion of 'do more with little' forms a basic requirement of their operations. There exists a number of challenges when the regions do not obtain the necessary support from TP's Headquarters based at the Carlton Centre in Johannesburg. The study participants who are based at the regions mentioned a number of key challenges that they face at the regions.

4.2.2 Co-Ordination (S2)

S2 of the Viable System Model provides the capability to co-ordinate and oversee the interaction of primary activities within S1, Nechansky (2013). The Head Office which is mostly made up of support services or functions within TP can be categorized as the S2 co-ordination system. The Information Technology Department, Human Resource Department, Legal and Compliance Department, Risk Management Department and Finance Department (**Fig 4.2**); have glaring attributes of co-ordination capabilities because their roles and functions are designed to support and co-ordinate all activities taking place in S1 i.e. operations function.

The location of these support functions or services is ideally suited to ensure that consistency and standardization in relations to records management, business processes, information management systems, policies, communication, strategy execution etc., is obtained within Transnet Property. Barile *et al.* (2012) assert that VSA can be understood as an interpretive governance methodology that assist in the understanding and management of social and business organizations. VSA provides systems practitioners with a general framework and governance that looks at both the organization's structural configuration and dynamics of functioning; the relevant actors who influence decision making are successfully and easily identified in a complex situation, Barile *et al*. (2012)

There are governance structures and processes that are designed to assist in providing adequate support and co-ordination within TP when it relates to the regions. The S2 of Viable Systems Model assisted the researcher to easily identify the key role players and their responsibilities in ensuring that proper governance processes are in place to provide effective co-ordination function. It was observed that harmony between the regions and Head Office does not exist. There is a lack of harmony between the TP Head Office and the Regions. The frustrations from the regions emanates from a lack of effectiveness by the TP Head Office to resolve some of the operation's issues e.g. approval of lease agreements, poor data quality on the system, lack of training for the regions etc., (depicted in table 4.2 below). The existence of a number of challenges within TP provides an indication that the governance structures and processes making up S2 may not be agile and effective enough to support the operations (regions) optimally.

4.2.3 Control (S3)

Nechansky (2013) suggests that the function of S3 is to survey the performance of the various S1 and the optimization of processes of S1 and S2 respectively. The ability to obtain synergy and harmony amongst all operational units is important if the organization intends to be viable. The role of surveying performance of various S1 could be placed in the chief operation management office, Nechansky (2013). The Chief Operations Officer (COO) within TP is solely responsible for ensuring that the organizational resources are optimally deployed to enable the business achieve optimal results as depicted by **Fig 4.2** above.

S3 should provide near real time monitoring of S1 activities using a set of statistical filters to verify information, Walker (2001). The COO's role within TP has a clear mandate to ensure proper allocation of resources to support operations and facilitate the optimal utilization of the deployed resources within the organization. Organizational performance as reflected in the weekly, monthly or yearly financial statements can provide better insight to the Chief Operations Officer of the areas where productivity is low which will eventually pose a risk in relations to the stability of the whole organization. The observation and the responses from the study does not suggest that the TP COO is fully empowered to perform the S3 function optimally. A reputable business intelligence information management system which is supposed to assist the COO identify areas of poor performance is not in place in TP. The business intelligence system provides insight in a form of statistical analyses and information needed. The TP COO has in-fact gone on record to highlight his frustrations about a lack of statistical information to quickly identify areas requiring improvements and ensure proper control of S1.

The poor quality of master data (as indicated in the Table 4.2 below) within TP is perceived to be the root cause for a lack of business intelligence. The TP COO is unfortunately dis-empowered in relation to business intelligence however master data related challenges sit within his area of influence. S1 is responsible for generating data within the business however TP is faced with a lack of a proper data management strategy. The researcher's observations from GE was that GE had centralized the master data function. Likewise it would be prudent for TP to centralize master data management. The master data management responsibility currently resides at the regions which perpetuates the challenge of inconsistent, unreliable data quality.

4.2.4 Intelligence (S4)

Successful adaptation of the organization depends on the intelligence system or S4's ability to objectively anticipate any perturbations which would be informed by the information flowing from the various primary activities, Herrera *et al.* (2011). Jun-Feng *et al.* (2011) say "Intelligence system mainly focuses on the current and future development of the organization and supplies intelligence for making development plan of the organization".

The Strategy, Sales and Marketing Departments in TP are suitable candidates for S4 because this system is positioned to collect and collate all necessary and relevant information about the entire environment. The Strategy, Sales and Marketing Departments are presented with both internal and external information impacting on the organization. S4 surveys the environment and external data i.e. technology trends, markets, competition, and society. The researcher's observation from the GE offices concluded that the Strategy Department was incorporated into the Chief Executive Office's (CEO) structure. TP currently does not have a dedicated resource to drive the organizational strategy. The TP CEO's structure resembles the GE CEO's structure in relation to having a Strategy Management Officer reporting to the CEO.

The responses from the study participants as highlighted below suggested that the TP strategy was not effective and comprehensive. The strategy was designed by the previous TP CEO and it was approved by the Transnet SOC Board in May 2013. It has been observed that the strategy documents bears little relevance to current external property market developments. All TP Department's operational plans do not even conform to the original tenets of the strategy.

The Sales and Marketing Department does not exist in TP. The study through the participants has also observed that the absence of the Sales and Marketing Department pose a risk to the business. Some of the respondents have raised their frustrations over the fact that the TP leadership expects the regions to have full occupancy within their properties but there is no mechanism in place to market and expose these properties to the general market. The researcher's observation from GE is that the Sales and Marketing Department is regarded as the driver of the business. This Department is expected to identify opportunities for new revenue streams. The absence of this department implies that TP leadership is not concerned with the potential new revenue streams and the branding of TP as an organization which could potentially enable it to compete well with the other property market leaders.

There is an urgent need to fill in the role of the TP Strategy Management Officer who will have to be mandated to develop a new and relevant TP strategy that is aligned to local and international industry norms. TP would have to ensure that they establish the Sales and Marketing Department and resource it with competent individuals who will play a critical role of marketing of vacant properties across the country.

4.2.5 Policy (S5)

It has been indicated earlier in this report that Transnet Property as the system understudy is a subsidiary of the Transnet SOC Ltd. Transnet SOC Ltd has its management structure in the form of the Board and the Group Executive Management Committee (Exco). The Transnet Board and the Group Executive Management Committee as a 'Top Level Ethos' are mandated to provide policy direction within the organization. The TP Exco also forms part of the Extended Group Exco to ensure decision taken at these levels cascade to all operating divisions.

Nechansky (2013) suggests that the top management or government are some examples of S5. Walker (2001) asserts that S5 has two main functions i.e. a) "Supply logic closure; the loop between system 3 and 4 is potentially unstable and must be overseen Metasystemically; b) To monitor the goings on in the whole organization". The roles of the Transnet Board, Group Exco and the divisional Exco's are essentially to ensure that stability in the organisation is maintained through the development and implementation of policies. Nechansky (2013) supports Walker (2001) by suggesting that S5 is responsible for making decisions on strategy and policy. The report has noted that S4 in TP is made of Strategy, Sales and Marketing Department which do

not have any resources at this point. The future strategies designed by the Strategy Department to provide marketing services to improve occupancy in TP would be taken by S5.

This study has highlighted the need to have S4 established within TP. The absence of S4 may continue to result in TP being misaligned with S5. S5 is currently executing its duties satisfactorily. There are more than adequate policies within TP but the challenge rests with the implementation of such policies due to missing key functions and departments. The S5 at GE functions optimally because it has sufficient intelligence and information provided by S4 to make sustainable policy decisions that ensure stability of the entire organization. The researcher has observed that the absence of key functions causes frustration at lower levels of the organization i.e. S1 & S2 which threatens the stability of the entire organization. S3 finds itself trying very hard to bring about control in the environment but due to the absence of S4 within TP, these frustrations and issues end up not being resolved and become the *modus operandi* of the organization. A perception is thereafter created that the TP leadership is incapable of resolving key operational challenge.

The following table presents a list of key issues/challenges obtained from the study participants in relations to the current situation at TP

No.	Issue	Description
1.	Lease Contract Approval	• The approval processes relating to leases are mostly manual in nature and the process involves a number of people to approve a lease agreement.
2.	Master Data Management	• The data on the system is not reliable and complete which impacts on the quality of business decisions. There is no business intelligence and reporting generated by the system.
3.	Standard Operating Procedures (SOP's)	• The standard operating procedures(SOP's) are not consistent across regions. • The inconsistency in SOP's results in in-accurate reporting relating to lease management and it becomes very difficult to manage talent where employment opportunities exist in other regions. • Also there may exist a senior role in the lease management

		department of another region but the application of the employee knowledge in relation to lease management may require a different skill set in another region due to the differences in the adoption of SOPs by the regions.
4.	System Authorization	• Some of the lease management resources had authorization on the system to execute transactions in the system which they should not have be authorized to perform based on their existing job profiles. • This may result in potential fraudulent activities taking place due to uncontrolled system access.
5.	Manual Business Processes	• TP consists of a number of manual processes which results in longer process times and the possible incompletion of tasks.
6.	Unclear Departmental Objectives	• The various TP Departments do not have clear operational strategies and targets that are responding to the overall TP strategy. • The performance targets as set out by the organization become the only targets that all Departments strive to achieve instead of each Department having a short to medium term goals and objectives in support of the overall strategy.
7.	Training	• Lack of continuous system and business process training results in poor system usability and limited business operations understanding.
8.	Integration	• There is a general lack of system and process integration across the business. • There are no third part system connected to the core system i.e. SAP Real Estate. The third party systems that are not integrated relate to the Land Asset Register (LAR), Geographic Information

		System (GIS), Geospatial Portal (Rave) and Hotel Management (IFCA). • Important information is missing from the core system (i.e.SAP RE) due to a lack of system integration. • A complete contract management process cannot be achieved due to lack of asset attribute related information like photographs, property plans, measurements etc.
9.	Leadership Style	• The TP leaders are perceived to be 'divorced' from operations and not hands on. • The instructions to the staff are generally not clear. • There is a view that the instructions from TP leadership are ill informed and do not reflect the situation on the ground.
10.	TP Strategy	• The strategy document is outdated and lacks relevance. • Most TP Departments are not aligned to the tenets of the approved strategy. • The TP Strategy Management Officer role is vacant and there has never been a person occupying the role since the inception of TP in 2008. • Lack of strategy implementation monitoring by a TP strategist.
11.	TP Sales and Marketing	• TP does not have a role of Sales and Marketing function in its operational structure. • There is no branding of TP property portfolio which could potentially result in additional revenue generated from the advertisement sales income. • There is a lack of a comprehensive marketing strategy that will improve the Gross Lettable Area (GLA) of TP's properties.
12.	Underutilization of	• The SAP RE provides a dual view functionality in

	the SAP Real Estate (RE) Solution	respect to architecture. • The dual view of the system consist of the Architectural View and the Usage View respectively. • The dual view of the master data process enables employees to create and manage all types of real estate objects (business entity, land, building, rental unit, rental space, rental room). • TP only utilize the Usage View which limits the potential of the system in respect to business intelligence and reporting. • The water and electricity(utilities) business processes are not defined.

Table 4.2 Key Issues/Challenges facing TP using VSM

4.3 Factors Impacting on TP Efficiency

4.3.1 Unclear Purpose and Interaction of Systems

It has been mentioned earlier in this report the fact that the ability of VSM practitioners to successfully intervene and analyse the problem situation is dependent upon them understanding the theory and interpretation of systems and subsystem making up the VSM model. The ability of the researcher to break down the different departments into systems and subsystems has highlighted constraints relating to a lack of integration and handover points (i.e. relationships between the different departments), lack of defined Departmental strategies, duplication of work and the lack of SOP's which all lead to inefficiencies within TP. These issues which relate to inefficiencies within TP are briefly discussed below to demonstrate a link between the factors affecting efficiencies and the actual challenges observed.

4.3.1.1 Lack of Departmental Strategies

The breaking down of the entire organization into smaller sub-systems has provided better insight of challenges facing TP as highlighted in Table 4.2 above. The different Departments within TP do not have clear strategies which guides them towards achieving the results that have been set at the beginning of a financial year. The absence of Departmental strategies and the outdated organizational strategy has created confusion between departments. The lack of the

well documented up to date strategies has resulted in some Departments initiating IT projects without the involvement of IT who are supposed to champion these project. The absence of such basic requirements results in unnecessary conflict between departments.

4.3.1.2 Duplication of Work Packages and the lack of SOP's

The research participants highlighted the fact that there is duplication of work between the Departments e.g. the Geo-Spatial Planning Department would travel to a vacant property to take measurements of the gross-lettable area whilst the Leasing Department also perform the same exercise to determine the total square meter to be included in the lease agreement. The duplication of this particular activity results in two separate measurements that must be captured in two separate di-integrated the information management systems i.e. SAP Real Estate and Rave. The duplication of work is merely caused by the lack of SOP's in the environment or the lack of updated SOP's. The SOP's governs how employees perform their daily tasks and activities. They assist employees to understand the scope of their work and the expected quality of work that they have to produce. These should be regularly updated as it is the case at GE.

4.3.1.3 Integration of Processes and Systems

Handover of work packages between the different Departments pose as a serious challenge at TP. The study has uncovered that in some instances there are no system's notifications that should sensitize Departments once work has been completed by a certain Department. The researcher has even observed a challenge that most of the information systems are dis-integrated which results in unnecessary delays when completing a single process. Integration should exist from a business process level but it has been discovered that the current business processes and IT system processes are not integrated and they are misaligned. The observed GE business processes were well documented and updated regularly to ensure that efficiencies are obtained. TP leadership has not invested in mapping out and the documentation of all the business processes to drive effective business integration. IT systems and processes should only mirror the mapped out integrated business processes.

4.3.2 Business Process Orientation

The current study highlighted in table 4.2 above what has been understood to be key challenges impacting on TP's efficiencies. The manual business processes that result in longer processing times are also one of the key challenges mentioned by the research participants. Bronzo *et al.* (2013) asserts that business processes are regarded as the best practice management principle that organizations should adopt to create a platform for organizational structure and strategic planning. The aim of the business processes is to assist organizations achieve their economic objectives, Lorhmann and Reichert (2013). Seethamraju (2011) agrees with Lorhmann and Reichert (2013) that continuous business process improvement within the organization leads to improved quality, costs, speed and profitability.

Schulte, Janiesch, Venugopal and Weber (2015) suggest that organizations wishing to develop best practice platforms must adopt a full business process lifecycle that comprise of evaluation, design, configuration and enactment. The researcher together with his team invested a significant amount of time in following the business process lifecycle as suggested by Schulte *et al*. (2015). There were a number of workshops that were organized to try and understand the key process of TP i.e. **Lease Management**. The value stream mapping was one of the tools that was used to identify non-value adding processes within the lease management process. The tool is also aligned to the process lifecycle management framework. During the value stream mapping stage called "define and pick a product phase", the research team agreed to focus on the lease management process as the main process to study because this process accounts for more than 70% of the TP revenue. The creation of a current state using the value stream mapping tool produced three key sub processes impacting on lease management i.e. **Master Data Management, Contract Management and Utilities** processes as discussed below. The creation of the future state value stream map as dictated by the value stream mapping tool resulted in the research team identifying all the non-value adding activities and replacing those with sustainable solutions. The proposed sustainable solution relate to the master data management, contract management and utilities management as covered in detail in the next section of the report.

4.3.2.1 Business Process Orientation – ***Master Data Management(As-Is)***

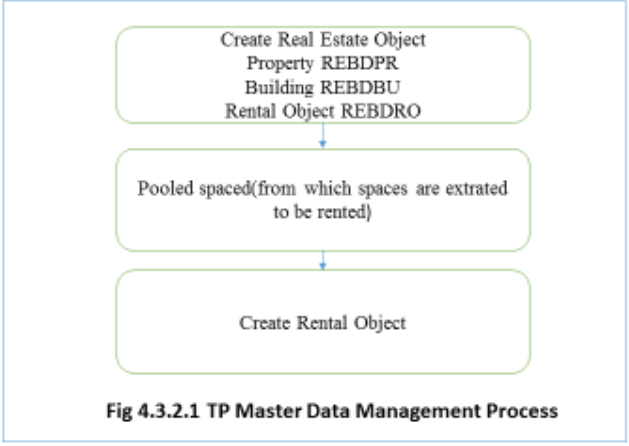

Fig 4.3.2.1 TP Master Data Management Process

There is no standard checklist that is used by TP employees when creating master data. The master data function is decentralized and resides in each region. The decentralization of the function results to a number of data inconsistencies at TP. The data inconsistency causes a substantial amount of rework to fix the data that does not provide meaningful information to TP management. Currently there is no interface to third party systems as indicated in Fig 4.3.2. The lack of an interface which connects the current SAP RE system to 3rd party systems (Rave), compels the employees to capture master data in a number of information management systems(duplicating efforts and increased turnaround times were observed) as indicated earlier in the report.

The SAP RE information management system provides a functionality for a dual view of master data i.e. the ***architectural view*** and the ***usage view*** respectively. The dual view of the master data process enables employees to create and manage all types of real estate objects (business entity, land, building, rental unit, rental space, rental room). The current business process caters for the usage view only. TP business is not optimizing the capability of what the SAP Real Estate information management system provides. The reporting and business intelligence could add value in relation to executive decision making within TP. The underutilization of the SAP RE system contributes to inefficiencies and informed decision making.

4.3.2.2 Business Process Orientation – ***Contract Management (As-Is)***

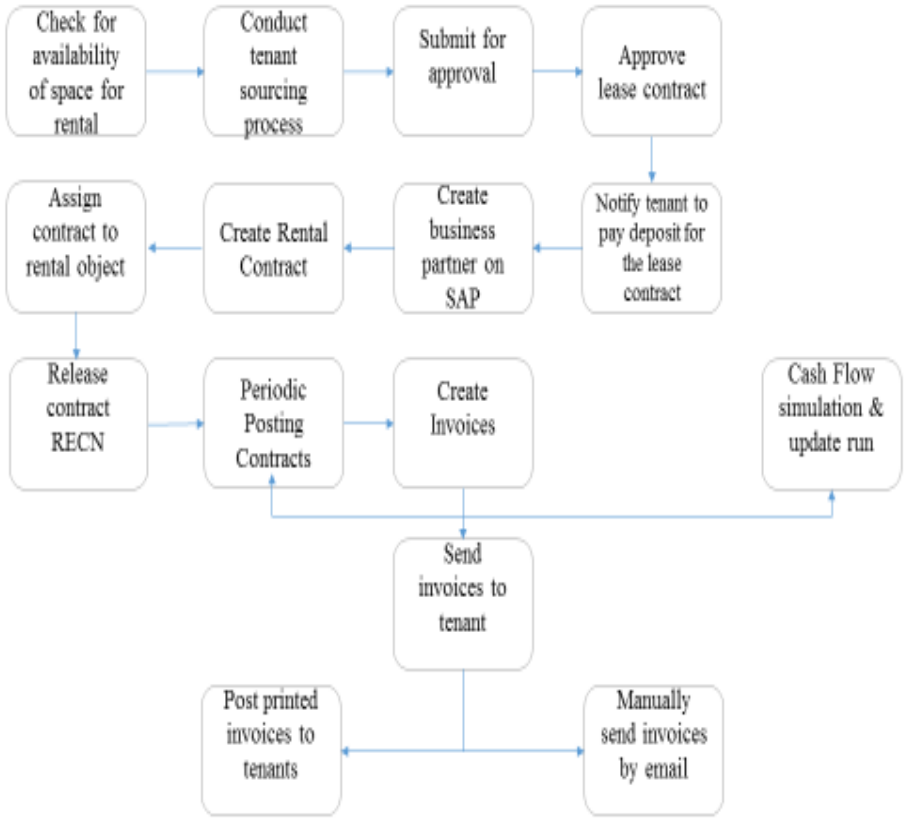

Fig 4.3.2.2 TP Contract Management Process

The TP contract management processes depicted in Fig 4.3.2.2 account for most of the revenue generated by the TP business. The process is also manual in nature which impacts on the turnaround times. There are direct freight costs involved when shipping the submission document to TP Head Office. The research team observed that the current sub process takes more than five months to complete. It had been noted that most of the delays occur in the approval of a lease contract process. The approval lease contract process entails the Regional Manager compiling a submission that must be submitted to TP Head Office for review and sign off. The back and forth review of the submission takes nothing less than two months before final approval is granted.

The research team has also observed that the Delegation of Authority (DOA) that is governing the approval limits given to each Regional Manager is very low. The low DOA limits create unnecessary bottlenecks in the entire process. It has been observed that the TP leadership does not portray adequate trust to the Regional Managers that they have requisite skills and knowledge relating to their work. The lack of trust eventually result in an unintended delays in the process. By increasing the DOA limits, the lease contract approval process could potentially be improved because most of the lease contracts could be approved at the Regional level and not at the TP Head Office level as the current process dictate.

The automation of the lease contract approval sub process could drastically reduce freight related costs and the overall turnaround time in approving future lease agreements. The automation and running new system's scheduling jobs for the 'sending invoices to tenants' sub process could ensure that TP's customers receive their statements and invoices timeously to make timeous payments as opposed to receiving their statements late in the month and then making payments late to TP. The posting of statements and invoices to tenants could also be eradicated by the automation of this sub process. The printing and mailing costs could be drastically reduced resulting in additional cost savings and optimization.

4.3.2.2 Business Process Orientation – ***Utilities Management(As-Is)***

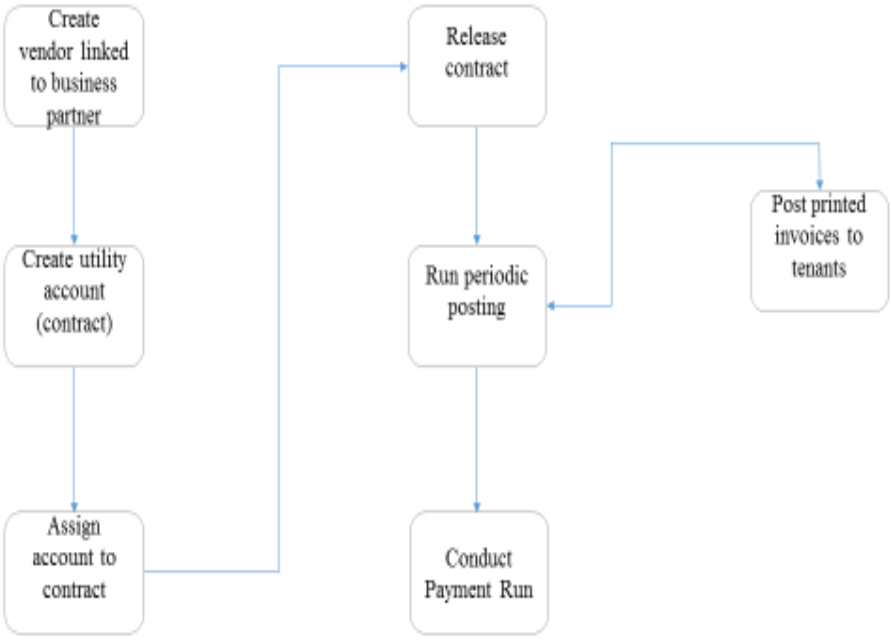

Fig 4.3.2.3 TP Utilities Management Process

TP does not have a defined utilities management process in place. The recoveries from tenants are usually low due to a lack of system information that guides the Accounts Receivables Department of what utilities amount it should recover from its tenants. The Accounts Receivables Department currently waits for the delivery of an invoice from the local Municipality. The invoice indicates a bulk amount TP should pay toward the municipality for utilities that relate to the tenants occupying its premises in that local municipality.

The enablement of the Utilities module of SAP RE will ensure timeous allocations of tenant recoveries and accurate payments recovered by TP. The recovered amount will improve and it will be accurate for all of TP's tenants. The Utilities management process will provide the ability to capture utility consumption i.e. water and electricity using appropriate metrics, rand value in order to manage consumption and taxes related to rental objects.

4.3.3 Communication

Men et al. (2014) indicated earlier in this report that growing evidence indicate that effective communication is key in developing positive employee attitudes such as trust, job satisfaction and positive employee-employer relationship. An organization that has managed to achieve positive employee attitudes, trust and job satisfaction, is able to achieve higher performance targets by delegating tasks to its employees. Business leaders in such environments are equally optimistic about the ability of their employees delivering the expected results.

The research team observed very low trust levels. The low trust levels were observed from a perspective of TP leaders and employees respectively as result of ineffective communication. The TP leaders usually communicate through the email system, the release of the Delegation of Authority (DOA) to each Regional Manager with very low approval limits. The impersonal and often inadequate DOA impact on the ability of the Regional Manager to effectively execute his/her duties. The approach usually creates suspicion from the Regional Managers that they are being set up to fail by TP leaders and that is why TP leaders do not sit them down at a personal level and explain the content of the DOA to them. On the contrary it has also been observed that some of the employees who were entrusted with a higher DOA approval limits had abused their powers by improperly entering into lease agreements with customers that run for very long periods. The improper lease agreements have exposed TP to litigations as result of longer lease agreements e.g. twenty years and more facilitated by these scrupulous employees who abused their powers.

The TP leadership style of communication has been noted as a concern by the research team. The study has observed that leadership changes in the environment are poorly communicated. The communication usually is in the form of an email and very impersonal after many days have elapsed since the event had occurred. In some instances it has been noted that the TP leadership does not even communicate important announcements from the Transnet Group Exco. All of the highlighted communication gaps within TP have created an unhealthy employer/employee relationship. The TP research participants had indicated that they often feel discouraged and demotivated because it seems that the TP leadership does not really care about them. They also highlighted the need by TP leadership to improve communication to the staff through personal engagements and interactions.

4.4 Impact of VSM on TP Business Efficiency

4.4.1 Cybernetics

Dominici (2013, p. 42) defines cybernetics "as the art of governing, it is by definition the discipline of leading, deciding, and managing all social organizations of all level, including nations, firms and families". The report has highlighted the fact that cybernetic organizations are able to implement a prototype of actions through feed-forward and feedback causal loops. These causal loops enable such organizations to learn and unlearn through their actions.

The presentation of this report to the TP leadership will present an opportunity of whether TP is capable to learn and unlearn through the recommended actions presented in the next section. The feedforward and feedback causal loops will even provide TP employees an opportunity to rid themselves of the current ineffective and inefficient business practices and adopt some of the best practice standards that have been highlighted by the report.

TP should ideally prepare itself by establishing the necessary structures to drive the implementation strategies highlighted in the report. The report had also noted the absence of a competent and effective Strategy Department. Paucar-Caceres (2009) citing Espejo et al. (2003) suggest that "management cybernetics assumes that there are three levels of management that need to be practiced: strategic (normative); administrative; and operational". The existence of the TP Strategy Department will ensure co-ordination between the three levels mentioned by Paucar-Caceres (2009) so that the business achieves maximum benefit from the implementation

4.4.2 Viability

Nhlabathi (2001) defines viability as a "response to a stimulus that was not included in the list of anticipated stimulus when the system was designed". TP will be faced with new interventions that were not part of the original organizational design. The inclusion of some of the new processes and departments that the report will be proposing in the next chapter will also highlight the extent of flexibility and viability that exist within TP. Asproth (2011) suggests that flexibility is the ability of the various operations to operate effectively individually having their independent mission statements, budgets etc. The different operations should be able operate effectively if they prioritize the recommended tasks that are aimed at making TP survive and become efficient.

4.4.3 Law of Requisite Variety

Ojha *et al*. (2013) describes requisite variety as the "capability of an organization to adapt to the needs of the marketplace in order to prevent loss of efficiency or control". The intervention that this report seek to address covers specific areas that require improvement. It has been noted that the participants of this study are very enthusiastic to implement the recommended changes. The collective support from TP leadership and management will determine whether TP is capable of adapting to the new ways of managing its operations. The new ways of managing its operations have a common objective i.e. improving efficiencies and making TP profitable.

4.5 Conclusion

The analyses and discussion section i.e. chapter four has presented extensive application of the Viable Systems Model within TP. The use of the VSM model as a diagnostic tool, assisted the researcher in diagnosing the current challenges within TP. The current challenges were dealt with in detail to ensure in-depth understanding of the challenges within TP. The report demonstrated that the factors affecting efficiencies in TP are aligned to the issues and challenges discussed above. This section ended by covering in detail the impact of the VSM model in TP in relations to cybernetic principles, viability and the law of requisite variety.

The following section of this report i.e. chapter five will address recommendations and conclusion of this study. The recommendations and conclusion will make reference to some of the questions that are highlighted in chapter one of this report e.g. constraints and limitation of the study etc. The researcher's reflection and learnings will also be dealt with in the following chapter five of the report.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter addresses conclusion and recommendations derived from using the Viable System Model as a diagnostic tool to highlight key challenges within Transnet Property. The summary of the study section presents a high level view of the study findings. This chapter thereafter makes conclusions from the findings observed. The conclusions makes reference to some of the questions that were highlighted in chapter one of this report e.g. constraints and limitation of the study etc. The detailed recommendations of findings from the study are presented to assist TP with proper intervention to address its shortcomings. This chapter also presents a section highlighting the scope for further research. The researcher's reflection and learnings will also be dealt with in this section of the report. The overall conclusion of the study is presented as a last section of this section.

5.2 Summary of the study

Transnet Property is characterized by a need to improve its business operational efficiencies. The company thrives at excellence when rendering its property management services to its existing clients and potential future clients. The study uncovered a number of challenges relating to low staff morale, poor recovery of utilities, inadequate lease income, under recoveries due to inefficient property management service charges processes and poor capital project execution resulting in low maintenance and upgrading of its properties.

The study also observed that there is a low quality of the master data in general. The master data is currently unreliable, incomplete, lacks integrity and credibility because there are too many people who manage master data without a clear data management strategy. The master data function is decentralized and resides at both TP Head Offices and at the regions which leads to data in-consistencies. There was a general observation that the TP employees do not trust the TP leadership and the lease contract approval processes are mostly manual in nature which leads to longer turnaround times. The TP leadership expects high output and delivery from these employees but the supporting tools and structures are not in place.

It was observed that some of the research participants highlighted the issue of a DOA that it is not empowering them enough to effectively execute their duties. The DOA approval limits regarding lease contracts approval were understood to be very low whilst the TP leadership expects a quick turnaround on its property occupancy. The manual nature of the lease contract approval processes was understood to add to the dissatisfaction of employees. The SOP's supporting the TP processes were highlighted as inconsistent and out of date which added to the complexities relating to the duplication of work packages.

The lack of integrated processes and systems was highlighted to also cause duplication of work packages. The disintegrated processes and systems have contributed to the poor communication between departments. The integrated processes and systems generally enables ease of communication which is facilitated by the system workflow capabilities which were non-existent within TP. The integration of systems and processes encourages proper and sustainable automation of processes which improves efficiencies and turnaround of activities within processes.

There is a need to implement a sustainable intervention using reputable tools and methodology that will emphasise what is perceived to be key challenges in TP. The research team adopted the Viable System Model and the various other tools to identify constraints and propose solutions.

5.3 Conclusions

The research team highlighted the following conclusions regarding the findings that were observed:

- The master data management, lease contract management and utilities management processes must be redefined, integrated and automated.
- The manual processes can be automated by using Kofax solution that Transnet owns.
- Incorrect authorization access to SAP RE should be revoked.
- TP should develop a proper data management strategy that is supported by the centralization of the function.
- DOA approval limits for Regional Managers to be reviewed.
- The TP strategy should be reviewed and updated. The TP Strategy Management Officer role should be filled with immediate effect.

- The TP leadership should conduct regular visits to the regions.
- The TP IT Department should implement system workflows to improve system communication and provide real time notifications for approvals.
- The TP IT Department should integrate the SAP RE to 3rd Party systems like Geo-Spatial, GIS and IFCA. It is recommended that a project should be initiated to implement an Integrated Property Management System. The Integrated Property Management System will ensure consolidation of property assets that reside in the various operating divisions i.e. TFR, TNPA and TPL respectively.
- TP should invest resources towards collecting and cleansing all its property management data to which will improve integrity and quality of information from its business intelligence system.

5.4 Recommendations

The key challenges that were discussed above should be complemented with sustainable solutions that seek to eliminate some of the constraints listed earlier. The research team proposed a number of interventions which may require both short and long term interventions. The recommendations make reference to the listed challenges in the same order as depicted in the previous section of the report i.e. Table 4.2 and sections 4.3 respectively. It is the researcher's view that TP does have the adequate and sufficient level of requisite variety to resolve all its challenges

Recommended solutions to key issues/challenges facing TP using VSM

No.	Issue	Description	Recommendations
• 1.	• Lease Contract Approval	• The approval processes relating to lease contracts are mostly manual in nature and the process involves a number of people to approve a lease agreement.	• Automate the lease contract approval process. • Schedule the IT system batch jobs to run automatically in-order to print, send customer statements and invoices via email. • Develop a customer facing portal that will assist customers to track and trace their statements and invoices from the portal

			and also log in their queries related to their accounts.
• 2.	• Master Data management	• The data on the system is not reliable and complete which impacts on the quality of business decisions. • There is no business intelligence and reporting generated by the IT system.	• TP should develop an interface that integrates the core SAP RE system to 3rd Party systems. An Integrated Property Management system should be implemented. • The master data management function should be centralized and better controlled at TP Head Offices to ensure data integrity and consistency. • Implement a SAP Fiori tool that will provide a digital presentation of the executive management dashboards covering the end to end TP business processes. • The IT Department should rollout Business Warehouse (BW) tool. The BW tools provides custom developed reports that can assist the business in decision making.
• 3.	• Standard Operating Procedures (SOP's)	• The standard operating procedures (SOP's) are not consistent across regions. • The inconsistency in SOP's results in in-accurate reporting relating to lease management and it becomes difficult to manage talent where employment opportunities exist in other regions. Also there may	• Develop a single version of SOP's that is consistent across all regions. • Involve all staff at regions to provide input into the final SOP document to ensure ownership. • Implement a fair consequence management procedure to be

		exist an opportunity of a senior role in the lease management department of another region but the application of the employee knowledge in relation to lease management may require a different skill set in another region due to the differences in the application of the SOP's by the other regions.	applied in the event of deviations to the SOPs. • Implement stricter version control management. • Communicate effectively any updates and changes to the SOP's to all the staff.
• 4.	• System Authorization	• Some of the lease management resources had authorization on the system to execute transactions in the system which they should not have be authorized to perform based on their existing job profiles. • This may result in potential fraudulent activities taking place due to uncontrolled system access.	• Implement a system access management strategy that first identifies the anomalies and thereafter revoke incorrectly assigned access. • Re-design the system role profiles to eradicate any incorrect authorization objects. • Ensure that the newly designed system roles are aligned to the new business process. • Cancel SAP_All authorization of all users who do not need it.
• 5.	• Manual Business Processes	• TP consists of a number of manual processes which results in longer process times and the possible incompletion of tasks.	• Automate the master data management, contract management and utilities business processes as recommended below.
• 6.	• Unclear	• The various TP Departments do	• TP leadership should redevelop

	Departmental Objectives	not have clear operational strategies and targets that are responding to the overall TP strategy. • The performance targets as set by the organization become the only targets that all Departments strive to achieve instead of each Department having a short to medium term goals and objectives in support of the overall strategy.	the organizational strategy to ensure relevance to the current property management market trends. • The TP leadership should appoint with immediate effect a TP Strategy Management Officer. • A performance management system should be deployed by the TP leadership to measure Departmental performances in line with the TP strategy.
• 7.	• Training	• Lack of continuous system and business process training results in poor system usability and limited business operations understanding.	• The induction programme should also include a high level section of the TP's end to end business processes. • The IT Department should schedule regular system training in line with the newly deployed system functionality. • The IT resources should also receive training of the TP's SOPs to enhance business process understanding and improve business support.
• 8.	• Integration	• There is a general lack of system and process integration across the business. • There are no third part system connected to the core system i.e. SAP Real Estate. The third party systems that are not	• The IT Department should develop the Abap interfaces that integrates the core system with 3rd Party systems like Rave etc. • The IT Department should document the overall

		integrated relate to the Land Asset Register (LAR), Geographic Information System (GIS), Geospatial Portal (Rave) and Hotel Management (IFCA). • Important information is missing from the core system due to lack of integration. • A complete contract management process cannot be achieved due to lack of assert information like photographs, property plans etc.	integration process and highlight key responsibilities of impacted processes and employees. • The IT Department should set up IDOC's (i.e. Intermediate Documents) that send messages between systems querying for information.
• 9.	• Leadership Style	• The TP leaders are perceived to be 'divorced' from operations and are not hands on. • The instructions to the staff are generally not clear. • There is a view that instructions from TP leadership are ill informed and do not reflect the situation on the ground.	• The TP Exco is advised to schedule regular visits to the regions so that they can have a better appreciation of the property portfolio challenges at regions.
• 10.	• TP Strategy	• The strategy document is outdated and lacks relevance. • Most TP Departments are not aligned to the tenets of the approved strategy. • The TP Strategy Management Officer role is vacant and there has never been a person occupying the role. • Lack of strategy implementation	• The Strategy Management Officer role should be filled by the TP leadership. • A new TP strategy should be written and approved by the Transnet Board. • TP Departments should develop operational plans aligned to the TP strategy. • A performance measurement

		monitoring by a TP strategist.	system should be implemented to monitor organizational performance.
• 11.	• TP Sales and Marketing	• TP does not have a role of Sales and Marketing function in its operational structure. • There is no branding of TP property portfolio which could potentially result in additional revenue generated from advertisement sales • There is a lack of a comprehensive marketing strategy that will improve the Gross Lettable Area (GLA) of TP's properties	• TP leadership should develop role in the organizational structure for the Head of Sales and Marketing and thereafter facilitate the appointment to fill such role. • A research and development function should be established to provide market trend analyses and developments
• 12.	• Under-utilization of the SAP Real Estate (RE) Solution	• The SAP RE provides a dual view functionality in respect to architecture. • The dual view of the system is Architectural View and Usage View. • The dual view of the master data process enables employees to create and manage all types of real estate objects (business entity, land, building, rental unit, rental space, rental room). • TP only utilize the Usage View which is limits the potential of the system in respect to business intelligence and reporting. • The water and electricity(utilities) business processes are not defined.	• The IT Department should Activate the Architectural View of the system to provide a dual view capability. • The COO's office should facilitate the mapping of the utilities management business processes. • The IT Department should activate and align the Utilities module of SAP Real Estate system to business processes for improved water and electricity management.

Table 5.4: Summary of Recommendations

5.4.1 Unclear Purpose and Interaction of Systems

5.4.1.1 Recommendation - Lack of Departmental Strategies

The study recommends that the TP Exco should appoint a strategy expert who will facilitate and schedule a workshop to develop a proper TP strategy. The stakeholders who should attend the workshop must be properly identified to ensure a well balance strategy output. Transnet Group Strategy must form part of the session to provide direction and guidance. The new strategy must be of a high quality for ease of approval by the Transnet SOC Ltd Board. Once TP has developed an approved strategy, the Departmental Heads must also draw up three to five year departmental plans aligned to the TP strategy. The strategy together with the Departmental plans must become a living document that is characterized by clear targets, measurements and critical success factors incorporated.

5.4.1.2 Recommendation - Duplication of Work Packages and the lack of SOP's

It has been noted that there are many factors contributing to the duplication of work packages. The development and realignment of SOP's should begin to address this problem. The SOP's must have a proper RACI i.e. Responsible, Accountable, Consultation and Informed matrix. The RACI matrix will ensure that each team is acutely aware of its responsibilities to alleviate the current challenges. The COO's office must begin an exercise to analyse all business processes and implement proper RACI's in the environment.

The automated system workflows will also assist in providing system notifications to various teams responsible for individual work packages. The workflow capability is not only limited to systems notifications but it will assist in the approval processes where a senior authority is required to review and approve work packages. The system workflow is very useful in monitoring work packages completed. The IT Department must ensure that the system workflows capabilities are well defined in line with the business processes and the approved delegation of authority (DOA). The enablement of these workflows will provide a proper tracking of work packages and total elimination of duplication of services within work packages.

5.4.1.3 Recommendation - Integration of Processes and Systems

The IT Department together with the COO's office must perform a detailed analysis of the integration between SAP RE and non-SAP solutions. The business processes together with integration points must be clearly identified and documented by the COO's office. The successful identification of these integration points will assist both the COO's office and IT Department to identify change-over points and easily implement system interfaces that will ensure automatic smooth handover of work packages.

The research team recommends that after the identification of process integration points, the IT Department must thereafter immediately develop a system interface between SAP RE and Land Asset Register (LAR), Geographic Information Systems (GIS), Geo-Spatial Portal (Rave), Hotel Management (IFCA). The IT Department can use ABAP interface tools which will provide customized interfaces to the other TP legacy systems. The challenge with these customized interfaces will emerge during the SAP system upgrade period. The SAP system does not support such interfaces. The IT Department must ensure proper documentation which will be useful during future system upgrades. The IT Department can make use of IDOCs (Intermediate Documents) which sends messages between systems querying for information. The IDOC's are not difficult to implement. The IT Department can also use BAPI's (Business Application Programming Interfaces) which are written and supported by SAP. The use of BAPI's will ensure smooth integration to third party systems highlighted above.

The system interface or integration will ensure that TP does not maintain each system separately instead there will be a single system to update i.e. SAP RE and the synchronization will take place automatically.

5.4.2 Business Process Orientation

*5.4.2.1 Recommendation - **Master Data Management Processes***

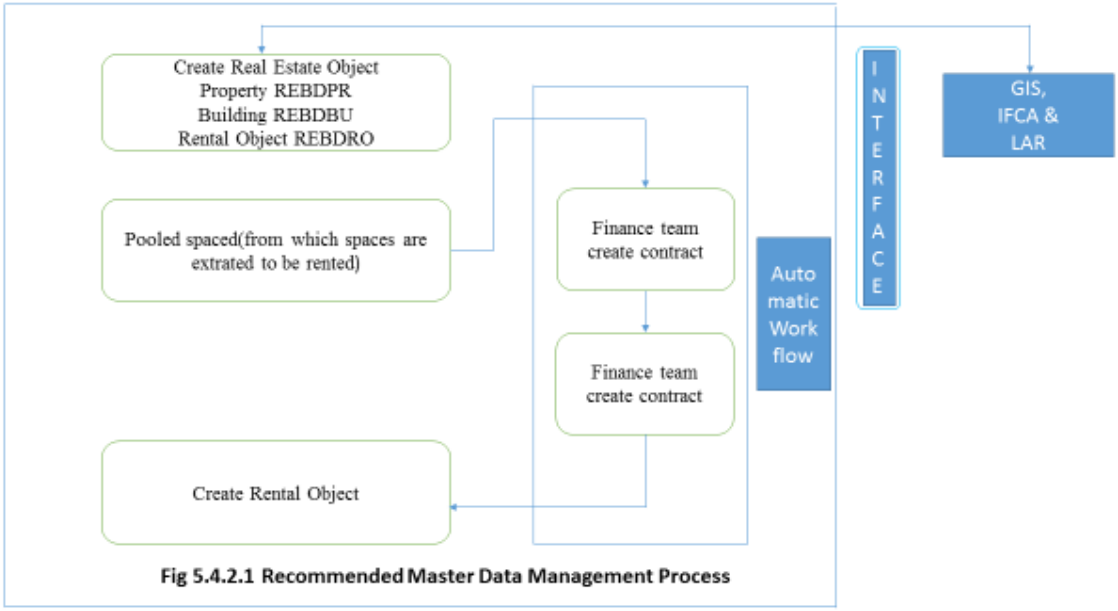

Fig 5.4.2.1 Recommended Master Data Management Process

The report recommends the automation of the end to end Master Data Management process. The IT Department is advised to implement an integration layer or interface that will connect the main system to 3rd Party property management systems as depicted in Fig 5.3.1 above. The COO's office is advised to first conduct a master data collections and cleansing exercise. Once the process is complete, regular and periodic data cleansing and scrubbing initiatives must be carried out. The exercise involves standardization of data, de-duplication of records to create a single view of the data including data stored in scattered IT systems. The report also recommends that the COO should conduct a cost benefit evaluation of implementing these recommendation against the cost of allowing poor data quality to persist.

The COO should establish a single source of data quality governance and procedure to ensure consistent data across all regions. The report recommends that the COO should centralize the management of master data and appoint a master data steward. The role of the master data steward will be to develop a sustainable data management strategy and templates that could be

utilized by all operations and Head Office employees. The data management strategy should highlight how data will be managed, controlled, cleansed and reviewed on regular intervals.

*5.4.2.2 Recommendation - **Contract Management Processes***

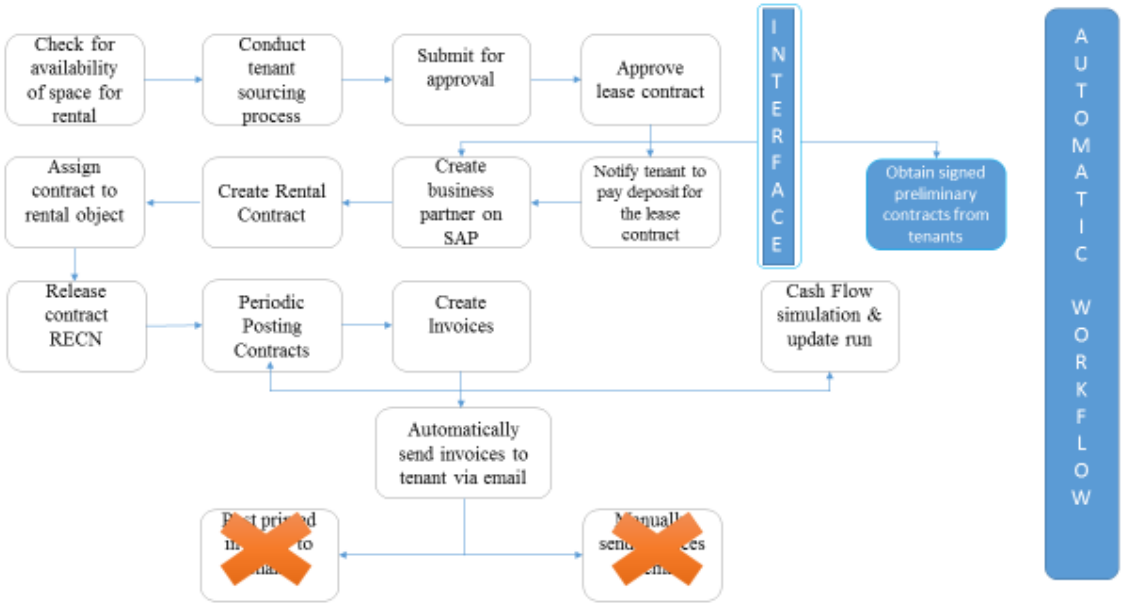

Fig 5.4.2.2 Recommended Contract Management Process

The report recommends that the IT Department should implement a system workflow to automate all approval processes in the system. The automation of the lease contract approval will translate to cost and time savings related to the preparation of lease contract submissions. There will be no need for regions to print enormous amount of paper that is manually submitted to TP Head Office instead all submissions will be submitted through the IT system. The TP leadership should also consider increasing the DOA limits that is given to Regional Manager. The increase will ensure that the bulk of contracts are quickly approved by the respective regions without having to be mailed to the Head Office.

It is also noted that the implementation of system workflow will shorten the overall processing time and the last two processes depicted above in Fig 5.3.2 will be eliminated. The elimination of these processes will translate to a reduction of costs associated with mailing statements and invoices. The IT Department together with the COO should define measurable key performance indicators (KPIs) for each process to avoid possible performance issues. The defined KPIs must be regularly monitored and improved to ensure maximum value derived from the IT system as highlighted by both Lorhmann and Reichert (2013) and Seethamraju (2011). Seethamraju

(2011) and Lorhmann and Reichert (2013) say that continuous business process improvement within the organization leads to improved quality, costs, speed and profitability.

5.4.2.3 Recommendation - ***Utilities Management Processes***

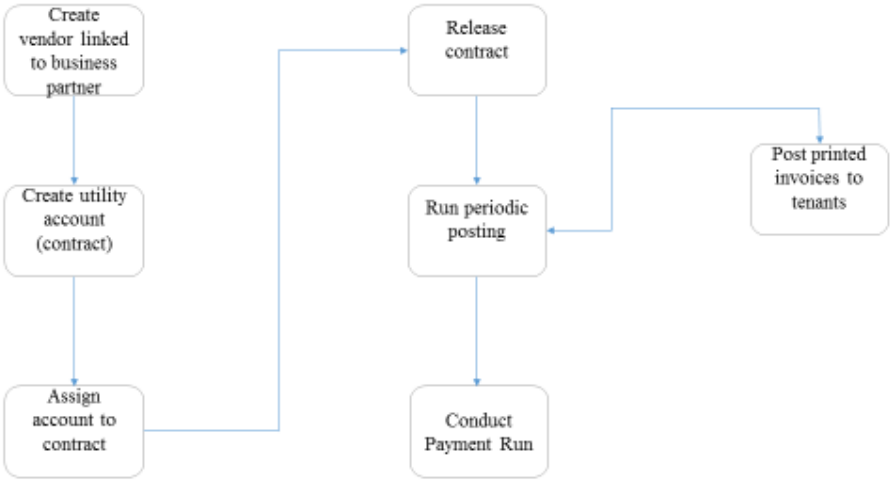

Fig 5.4.2.3 TP Utilities Management Process

TP currently does not have a utilities management process in place. The report recommends that the IT Department should activate the utilities module of the SAP Real Estate system. The Utilities management process will provide the ability to capture utility consumption i.e. water and electricity using appropriate metrics, rand value in order to manage consumption and taxes related to rental objects. The COO and his team should ensure that the utilities management business processes are clearly mapped out with the accompanying RACI. The proposed utilities processes should also be incorporated into TP's SOPs.

The enablement of the Utilities module of SAP RE will ensure timeous allocations of the recoveries and accurate payments received by TP. The recovered amounts will improve forecasting of recoveries from TP's tenants.

5.4.3 Recommendation – Communication

The report recommends that the TP leadership should invest more resources towards a creation of a trusting and motivating environment. A more trusting and motivating environment cannot be achieved through formal engagement within the office. A trusting relationship could be achieved by creating more team building sessions with employees. There has been no team building sessions or activities within TP for more than three years.

The leadership is advised to visit the regions more and invest more time in understanding the challenges that exist at various regions. The visibility of the TP Exco at regional level will eradicate perceptions that the TP Exco is 'divorced' from operations. The availability of Exco at regions will assist in communicating all leadership changes. Although TP Exco visits the regions annually, the report has established that such visits are not entirely effective because they usually focus on outlining a year's programme and a reflection of the previous year performance. The study discovered that TP Exco should attempt to hold frequent management conferences at each regions at least once a quarter and communicate all updates. The use of video conference facilities could assist the TP Exco when running one session that is broadcast live throughout all regions in each quarter.

5.5 Scope for further research

The research report had indicated that the research team only managed to focus on unpacking three main business processes i.e. Master Data Management, Contract Management and Utilities Management processes. TP as a property management organization consist of a number of processes impacting on its value chain i.e. Asset Management, Facilities Management, Capital Execution, Procurement, Specialized Services, Legal and Compliance, Human Resource Management, Demand and Capacity Management Cycle and Strategic Planning Cycle processes. The above listed processes present an opportunity to conduct a further research study because there exists efficiency related challenges within these respective environments. The current study also highlighted notable findings that impact on these environments.

5.6 Learnings from the study

The direct application of the VSM model provided the researcher with a very steep learning curve. It is true that there is a vast different experience between theory and practice. The actual application of the model helped the researcher to have thorough understanding of the advantages and disadvantages of using the model as highlighted above. It became apparent to the researcher that the research participants were eager and passionate to find solutions to the problems identified at TP. Some even highlighted their frustrations and interests about the bureaucratic nature of the environment.

The researcher's own mental model was challenged throughout the study and he had to reframe some of the situations to make sense of the challenges facing the environment. The study presented the researcher with a proper action research learning curve where the researcher was presented with a situation that needed adequate intervention. The researcher had to draw up goals and assumptions upfront and thereafter collect data to support some of the assumptions and goals drawn at the beginning. Generating options by both the researcher and the team followed and finally the research team was able to map out clear actions that must be taken as recommendations presented above.

5.7 Limitations of the study

The research team believes that there should not be any generalization from the results of the study in relations to other TP processes. The scope of the research was limited to cover the TP's three main business processes i.e. Master Data Management, Contract Management and Utilities Management processes respectively. Although the Lease Management process was studied extensively, it is not advisable to think that the approaches and recommendations made for this particular process can apply to all processes within TP. There are many other business processes e.g. Asset Management, Demand and Capacity Management, Human Resource Management, etc., that could be further researched to enhance the overall business performance of TP. Essentially there is no one size fits all approach when applying the Viable System Model to understand organizational constraints and challenges.

The inability of the VSM to deal with organizational softer issues like culture, communication and different viewpoints as indicated by Checkland (1981; 2000), poses another limitation of using the tool. The VSM approach assumes that there is an existing structure in place and there are no different viewpoints in the environment. The assumption that there is an existing organizational structure means that small and medium enterprises which do not have clearly defined organizational structures may be excluded from using the Viable System Model as a methodology to diagnose challenges and constraints in their respective environments.

There were no dedicated resources to assist in the collection of data. The researcher was expected to collect and analyse all the data within a very short period of time. It was for this reason that the researcher arbitrarily decided to select one key business process and focused on it to provide a comprehensive list of issues and challenges that were used to complete the study. The researcher had to suspend his employment for the initial period of two weeks to conduct the work and thereafter six months to correct the report. The researcher had to eventually quit his employment and dedicate time to ensure that the final report meets the required standard. The sponsored trip to the United States of America assisted the study in relations to financial resources. Ordinarily the researcher would not have been able to travel afar to collect useful data that was used in the study

5.8 Conclusion

The VSM literature review demonstrated clearly that there is a direct link between the research objectives of the current study and the proposed intervention needed to address the articulated problem statement. The ability of the VSM model to achieve increased levels of efficiency and effectiveness when applied to organization made it an obvious choice and suitable tool to unearth key challenges facing TP. Jackson (2000) suggested that "the VSM can be used very effectively as a diagnostic tool to make specific recommendations for improving the performance of organizations".

The VSM theoretical framework used to diagnose and study efficiencies within TP presented a very useful and informative intervention approach which is relevant and structured to uncover key challenges facing TP. The use of structured questionnaires also provided me with a clear interview protocol that I had to conform to in diagnosing the efficiency related challenges within TP. The various systems making up the VSM model assisted the researcher as a management

practitioner to study, analyse most of the organizational structures and relationships that impact on the perceived challenges as per the scope to the study.

The case study and phenomenological methods were very prominent in the study. The researcher's ability to travel to GE in the United States of America demonstrated the strength of these methods in conducting a comprehensive and reputable research study. The researcher was presented with a rare opportunity to observe best practice and thereafter make recommendation on his observations. The case study method, phenomenological approach, interviews, observation technique, viable system model and the value stream mapping tools were instrumental in diagnosing, gathering and interpreting meaningful data impacting on this study within TP.

The researcher has immense appreciation of the opportunity that the study presented. The extensive academic material that was used to identify issues/challenges and thereafter make recommendations was very useful. The researcher is optimistic that although there are some business processes that were not covered by the study, the TP Exco will embrace the need and challenge to cover other areas that the study could not cover.

The study concludes by acknowledging the fact that most if not all questions relating to the study were adequately addressed. The study objectives together with the recommendations bear witness to the fact that the VSM model was an appropriate literature framework that enabled the researcher to unearth most of the issues/challenges with complementary solutions.

CHAPTER SIX
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UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

06 July 2018

Mr Sibusiso Brighton Maboso [981204422]
Graduate School of Business & Leadership
Westville Campus

Dear Mr Maboso,

Protocol reference number: HSS/0768/018M
Project title: The application of the Viable System Model to enhance Transnet Property's business efficiency

Full Approval – Expedited Application

With regards to your application received on 03 June 2018. The documents submitted have been accepted by the Humanities & Social Sciences Research Ethics Committee and FULL APPROVAL for the protocol has been granted.

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 Shenuka Singh (Chair)

/pss

Cc Supervisor: Dr Emmanuel Mutambara
Cc Academic Leader Research: Dr Muhammad Haque
Cc School Administrator: Ms Zarina Bullyraj / Ms Ellen Mokwena