DEVELOPING A FRAMEWORK FOR THE ADAPTION OF LEAN MANUFACTURING PRINCIPLES FOR STATE- OWNED ENTITIES IN SOUTH AFRICA

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Developing a framework for the adaption of lean manufacturing principles for state-owned entities in South Africa

I declare that the above thesis is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I submitted the thesis to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

Unathi Thango *2 February 2024*

Signature Date

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I thank God, my heavenly father, who is the giver of all wisdom and understanding. He carried me through the toughest season of my life, truly all things work together for the good of those who are in Christ Jesus and are called according to his purpose (Romans 8:28).

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DEDICATION

This dissertation is dedicated to my two children Luminjalo Thango and Zama Thango

ABSTRACT

Imagine a South Africa where state-owned entities (SOEs) not only drive economic growth but also deliver impeccable services to citizens, all while operating efficiently and sustainably. Unfortunately, this vision is currently marred by governance issues, mismanagement, and waste within SOEs. Although much has been discovered about lean manufacturing as a methodology that promises to reduce waste and improve efficiency, the examination of various lean manufacturing frameworks revealed certain gaps. The first gap is that none of the frameworks proposed in the literature review offers a tailored fit for the adaption of lean principles within the public sector environment. The second gap is a noticeable inclination to a top-down approach among the reviewed lean manufacturing frameworks. This propensity, although appropriate in certain contexts, may face constraints when implemented in the case of SOEs in South Africa. Drawing upon insights from contingency theory, this study revealed both the potential advantages and hurdles associated with the application of lean manufacturing principles to SOEs in South Africa. The researcher examined the systematic interplay of lean principles within the SOE context through the lens of viable systems theory (VST). The study therefore laid out an argument for developing an effective lean framework that is tailored for the reinterpretation of lean principles and concepts according to the unique nature of the public sector. The Schedule 2 SOEs in South Africa constituted the target population of the study. The qualitative sample comprised 10 participants from each entity. The systematic interaction of the lean principles with the context of the SOEs was explored from the perspective of VST and contingency theory, laying out an argument for a framework that demonstrates that it is possible to adapt lean principles to SOEs for value creation and the reduction of waste. A qualitative methodology in the interpretivist paradigm was employed to investigate three Schedule 2 SOEs. Thirty participants were purposively selected for semi-structured online interviews. It was found that value creation by an organisation's leadership requires the participation of both internal and external stakeholders. It is essential to have the backing of important external stakeholders, including government, partners, users, interest groups, and donors, to create value effectively. Through stakeholder consultation, the leadership of an organisation can gain insights into the needs and expectations of the organisation's customers, enabling it to tailor its services and initiatives to meet these needs effectively. The implications of ignoring the reinterpretation of these themes may lead to the use of inappropriate or unhelpful measurements involving the numerical quantification of quality through targets and create impossible expectations in citizens, leading to frustration and dissatisfaction. The implementation of lean

manufacturing principles should begin with understanding and determining the context within which SOEs operate. The context of an organisation includes factors such as the organisation's structure, culture, strategic goals, and stakeholders, together with legislative and other requirements, which is important when considering the implementation of lean manufacturing principles.

Key words: Lean; State-owned entities; Value creation, Waste elimination, Contingency theory, Viable systems theory; Government; Bottom-up approach

OPSOMMING

Stel jou ’n Suid-Afrika voor waar staatsentiteite nie net ekonomiese groei aandryf nie maar ook onberispelike dienste aan burgers lewer, terwyl dit doeltreffend en volhoubaar funksioneer. Ongelukkig word hierdie visie tans geskend deur regeringskwessies, wanbestuur en vermorsing in staatsentiteite. Hoewel daar baie ontdek is oor skraal vervaardiging as ’n metodologie met die belofte om vermorsing te verminder en doeltreffendheid te verbeter, het die ondersoek van verskeie skraal ververvaardigingsraamwerke sekere gapings getoon. Die eerste gaping is dat nie een van die raamwerke wat in die literatuuroorsig voorgestel is ’n aangemete passing bied vir die aanname van skraal beginsels in die openbaresektoromgewing nie. Die tweede gaping is ’n merkbare geneigdheid vir ’n afwaartse benadering onder die hersiende skraal vervaardigingsraamwerke. Hierdie geneigdheid, hoewel toepaslik in sekere kontekste, kan beperkings hê wanneer dit in die geval van staatsentiteite in Suid-Afrika geïmplementeer word. Met insigte van die gebeurlikheidsteorie het hierdie studie sowel die potensiële voordele as die struikelblokke getoon wat geassosieer word met die toepassing van skraal vervaardigingsbeginsels op staatsentiteite in Suid-Afrika. Die navorser het die stelselmatige interaksie van skraal beginsels in die staatsentiteitskonteks ondersoek deur die lens van ’n uitvoerbare stelselteorie. Die studie het dus ’n argument uiteengelê vir die ontwikkeling van ’n doeltreffende skraal raamwerk wat gemaak is vir die hervertolking van skraal beginsels en konsepte volgens die unieke aard van die openbare sektor. Die Skedule 2-staatsentiteite in Suid-Afrika het die teikenpopulasie van die studie uitgemaak. Die kwalitatiewe steekproef het bestaan uit tien deelnemers van elke entiteit. Die stelselmatige interaksie van die skraal beginsels met die konteks van die staatsentiteite is verken uit die perspektief van die uitvoerbare stelselteorie en gebeurlikheidsteorie, en lê ’n argument vir ’n raamwerk uiteen wat demonstreer dat dit moontlik is om skraal beginsels aan te neem vir staatsentiteite vir waardeskepping en die vermindering van vermorsing. ’n Kwalitatiewe metodologie in die interpretivistiese paradigma is aangewend om drie Skedule 2-staatsentiteite te ondersoek. Dertig deelnemers is doelbewus gekies vir halfgestruktureerde aanlyn onderhoude. Daar is gevind dat waardeskepping deur ’n organisasie se leierskap die deelname van beide interne as eksterne belanghebbers benodig. Dit is noodsaaklik om die ondersteuning van belangrike eksterne belanghebbers te hê, insluitende die regering, vennote, gebruikers, belangegroepe en skenkers, om doeltreffend waarde te skep. Die leierskap van ’n organisasie kan deur belanghebberkonsultasie insigte verkry in die behoeftes en verwagtings van die organisasie se kliënte, en die organisasie in staat stel om sy dienste en inisitiewe doeltreffend

te verander om te pas by hierdie behoeftes. Die implikasies daarvan om die hervertolking van hierdie temas te ignoreer kan lei tot die gebruik van ontoepaslike en onbehulpsame maatreëls wat die numeriese kwantifikasie van gehalte behels deur teikens en om onmoontlike verwagtings te skep by burgers, wat lei tot frustrasie en ontevredenheid. Die implementering van skaars vervaardigingsbeginsels moet begin deur die konteks waarbinne staatsentiteite funksioneer, te verstaan en te bepaal. Die konteks van ’n organisasie sluit in faktore soos die organisasie se struktuur, kultuur, strategiese doelwitte en belanghebbers, tesame met wetlike en ander vereistes, wat belangrik is wannneer die implimentering van skaars vervaardigingsbeginsels oorweeg word.

Sleutelwoorde: Skaars; staatsentiteite; waardeskepping; uitskakeling van vermorsing; gebeurlikheidsteorie; uitvoerbare stelselteorie; regering; opwaartse benadering

ISISHWANKATHELO

Yiba nomfanekisongqondweni woMzantsi Afrika apho amaqumrhu karhulumente (iiSOE) angaqhubeli phambili nje ukukhulisa uqoqosho kodwa enikezela ngeenkonzo ezigqibeleleyo kubemi, ngelixa esebenza ngokufanelekileyo nangokuzinzileyo. Ngelishwa, lo mbono okwangoku unyhashwa yimiba yolawulo, ulawulo olugwenxa, kunye nenkcitho kwiiSOE. Nangona kuninzi okuye kwafunyaniswa malunga nemveliso yokunciphisa inkcitho njengendlela ethembisa ukunciphisa inkcitho kunye nokuphucula indlela yokusebenza, uphuhliso lwezikhokelo ngezikhokelo zemveliso yokunciphisa inkcitho luveze umsantsa othile. Umsantsa wokuqala kukuba akukho nasinye isikhokelo esiphakanyisiweyo kuphononongo loncwadi olusetyenzisiweyo kuphando esibonelela ngokulungelelaniswa kwemigaqo yokunciphisa inkcitho kwicandelo likarhulumente. Umsantsa wesibini lutyekelo oluthe lwahlolwa olubonakalayo kwindlela yolawulo esuka kwabaphetheyo eya kubemi phakathi kwezikhokelo zemveliso yokunciphisa inkcitho. Olu tyekelo, nangona lufanelekile kwiimeko ezithile, lunokujongana nemiqobo xa luphunyezwa kwimeko yeeSOE eMzantsi Afrika. Ngokusekelwe kwiimbono ezisuka kwingcingane yendlela yolawulo ngokwemeko (i*contingency theory*), olu phando lubonise uncedo kunye nemiqobo eyayanyaniswa nokusetyenziswa kwemigaqo yemveliso yokunciphisa inkcitho kwiiSOE zoMzantsi Afrika. Umphandi uphonononge ukusebenzisana okucwangcisiweyo kwemigaqo engqingqwa yokunciphisa inkcitho ngaphakathi kwimeko yeSOE ngokusebenzisa inkalo yengcingane yolawulo olucwangcisiweyo ye-*viable systems theory* (i*VST*). Olu phando ngoko ke lwandlale ingxoxo yokuphuhlisa isikhokelo esisebenzayo sokunciphisa inkcitho esilungele ukuqubulisana kwakhona nemigaqo nengcamago yokunciphisa inkcitho ngokohlobo olulodwa kwicandelo likarhulumente. IShedyuli yesi2 yeeSOE eMzantsi Afrika ibandakanye abantu ekujoliswe kubo kolu phando. Isampulu yophandontyilazwi ibinabathathinxaxheba abali10 kwiziko ngalinye. Kuphononongwe intsebenziswano ecwangcisiweyo yemigaqo yokunciphisa inkcitho ngokwakwimeko yeeSOE ngokwembono yeVST kunye nengcingane yendlela yolawulo ngokwemeko, eyondlala ingxoxo yesikhokelo esibonisa ukuba kuyenzeka ukulungelelanisa imigaqo yokunciphisa inkcitho kwiiSOE zokudala imveliso enexabiso kunye nokunciphisa inkcitho. Kusetyenziswe indlela yophandontyilazwi kwindlela yokufumana ubunzulu obungakumbi ngokukhangela amava neengcamango zomxholo othile wezentlalo ukuphanda iiSOE ezintathu zeShedyuli yesi2. Kukhethwe abathathinxaxheba abangamashumi amathathu ngenjongo yodliwanondlebe olucwangciswe mayane lwangeintanethi. Kufunyaniswe ukuba ukudalwa kwemveliso enexabiso ziinkokheli zequmrhu kufuna

intathonxaxheba yabo ababandakanyekayo bangaphakathi nabangaphandle. Kubalulekile ukuba nenkxaso yababandakanyekayo ababalulekileyo bangaphandle, kubandakanywa urhulumente, amahlakani, abasebenzisi bemveliso, amaqela anomdla, kunye nabaxhasi/abanikeli, ukudala imveliso enexabiso ngempumelelo. Ngokubonisana nababandakanyekayo, iinkokheli zequmrhu zinokufumana ulwazi ngeemfuno kunye nokulindelekileyo kubathengi belo qumrhu, olunozenza ukuba zilungelelanise iinkonzo namaphulo alo okuhlangabezana nezi mfuno ngempumelelo. Iziphumo zokungahoyi ukuqubulisana kwakhona nale mixholo zinokukhokelela ekusetyenzisweni kwemilinganiselo engafanelekanga okanye engancedisiyo ebandakanya ubungakanani ngokwamanani bomgangatho koko ekujoliswe kuko nokudala ukuba abemi balindele okungenakwenzeka, okukhokelela emsindweni nasekunganelisekeni kwabo. Ukuphunyezwa kwemigaqo yemveliso yokunciphisa inkcitho kufuneka kuqale ngokuqonda kunye nokufumanisa imeko iiSOE ezisebenza phantsi kwayo. Imeko yequmrhu ibandakanya izinto ezifana nolwakhiwo lwequmrhu, inkqubo, iinjongo zobuchule, nababandakanyekayo, uwisomthetho nezinye iimfuneko, ezibalulekileyo xa kuqwalaselwa ukuphunyezwa kwemigaqo yemveliso yokunciphisa inkcitho.

Amagama angundoqo: Ukunciphisa inkcitho; Amaqumrhu karhulumente; Ukudalwa kwemveliso enexabiso, Ukupheliswa kwenkcitho, Ingcingane yendlela yolawulo ngokwemeko, Ingcingane yolawulo olucwangcisiweyo; Urhulumente; Indlela yolawulo esuka kwabaphetheyo eya kubemi

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SOE	**State-Owned Entity**
IMF	International Monetary Fund
CEO	Chief Executive Officer
CT	Contingency Theory
ESG	Environmental, Social, and Governance
GDP	Gross Domestic Product
ICT	Information and Communication Technology
ISO	International Organization for Standardization
KPIs	Key Performance Indicators
NT	National Treasury
OECD	The Organisation for Economic Co-operation and Development
PFMA	Public Finance Management Act
PRC	Presidential Review Committee
R&D	Research and Development
ROI	Return on Investment
VS_Model	Viable Systems Model

CHAPTER ONE

ORIENTATION AND OVERVIEW OF THE STUDY

1.1 INTRODUCTION

The public sector environment has different types of wastes (Mungovan, 2009), which are more prevalent across different government spheres worldwide (Asnam, Nordin & Othma, 2015; Bortolotti & Romano, 2012; Kadarova & Demecko, 2016; Luo, Sudath & Uddin, 2016). In South Africa, these wastes are also reported in the public sector environment (Bronkhost, 2017; Fikelepi, 2010; Kayane, 2015; Ovens, 2013) and cost the government an average of 16.6 to 2124.9 billion between 2008 and 2015 (National Treasury, 2015). Mungovan (2009:16) classifies different types of waste that can be found in the public sector environment, as outlined in Table 1.

Table 1: Wastes in the public environment (**Source**: Mungovan, 2009:16)

Waste	**Examples of Public Environment**
Defects	Data errors, Missing information
Overproduction	Unneeded reports, doing work not requested
Waiting	Unnecessary approval cycles
Motion	Trips to remote printer of files
Complexity	Unnecessary process steps
Moving Items	Report routing, File storage

This classification by Mungovan is supported by several researchers such as Sutrisno, Vanany, Gunawan, and Asjad (2018), who identify many of the same activities as deadly wastes that are inherent in the public sector. To cope with the need to improve performance while reducing costs, government agencies have discovered the use of lean manufacturing practices, which

thus far have mostly been used in private organisations (Gebre, Hallman, Minukas & O'Brien, 2012:30). However, most of the waste elimination frameworks (lean frameworks) developed for the private sector are incongruent with those for the public sector because of the multiple and conflicting objectives that are mandated for the public sector (Costa, Resende, Dias, Pereira & Santos, 2020). The incongruence between waste elimination frameworks developed for the private sector and their application in the public sector stems from the nuanced objectives and complexities inherent in public sector operations (Costa, Resende, Dias, Pereira & Santos, 2020).

Public sector environments are characterised by multifaceted objectives, including political influences and government mandates that extend beyond traditional profit-driven motives (Pedersen & Huniche, 2011; Costa, Resende, Dias, Pereira & Santos, 2020).These political influences manifest through the government's multifaceted roles as a policymaker, shareholder, and regulator (Marse & Jansen, 2013), further compounded by distinctive differences such as equal access and rights, transparency, accountability, and the absence of direct competition (Bharosa et al., 2008).

While customer value remains a crucial tenet in both sectors, its interpretation in the public domain necessitates considerations beyond individual customer satisfaction, interweaving public values and diverse stakeholder interests (Maarse & Janssen, 2012).

Hence, the translation of lean principles into the public sector demands thoughtful adaptation to accommodate these distinct characteristics, including public values, financial considerations, and cultural subtleties. Another area of difference in applying lean practices between the private sector and public sector is about employee participation and empowerment (Kregel & Coners, 2018). Rodgers and Anthony (2023) explored this topic in detail in a recent systematic literature review of the use of lean principles in the public sector. They found that the golden thread of employee involvement as a driver of improvement is often neglected.

Overall, the spread of lean in the private sector can easily be measured in monetary value, where the implementing authority follows a defined path for the success of the programme. In contrast, the prevalence of lean is not easily measured in monetary value in the public sector, where government organisations operate their funds under a controlled budget and where profit is not always the focus (Sreedharan & Raju, 2016). Finally, the impact of bureaucracy in driving organisational culture in the public sector environment cannot be overstated

(Sreedharan, Sandhya & Raju, 2018). This culture is due to a combination of citizens, contractor, union and non-union employees (Carvalho, Azevedo & Cruz-Machado, 2017; Elias, 2016). Therefore, to overcome these issues, a robust model that is straightforward and readily acceptable to employees is required (Sreedharan & Raju, 2016).

1.2 CONTEXT OF THE RESERCH PROBLEM

This section explores the extent of the use of lean principles in the public sector environment with the aim of assessing lean frameworks presented by previous researchers, as well as the geographical focus of previous and current lean research applicable to the public sector environment. Lastly, this section provides a balance that argues for the gaps and suitability of existing lean frameworks for the public sector environment in South Africa.

1.2.1 Geographical focus of lean research

A critical analysis of publications relating to the application of lean principles in the public sector environment reveals some gaps that inform the development of future research agendas (Dondofema, Matope & Akdogan, 2017.; Carter, Danford, Howcroft, Richardson, Smith, & Taylor, 2016; Procter & Radnor, 2016; Kregel & Coners, 2018). These gaps include the extent of the use of lean materials (Elias & Davis, 2018), the broad use of key words such as “government” and “public sector” in searches (Rothstein & Hopewell, 2009; Simonsen, Herrera & Atencio, 2023) and the geographical focus of previous lean research.

Dondofema, Matope, and Akdogan (2017) considered the geographical focus of lean research, particularly for public sector implementation, and found a very scant representation of lean research from African countries. The scant representation may reflect the disparate deployment of lean principles in the public sector and the fact that their use is still relatively new and that their appropriateness is actively debated. This explanation is supported by papers that have explored a systematic literature review of the use of lean principles in any organisational sector, which has confirmed that only a few studies have been conducted in Brazil and South Africa (Dube, 2014; Kamiya et al 2017; Zhang et al., 2012). The review is depicted in Figure 1.

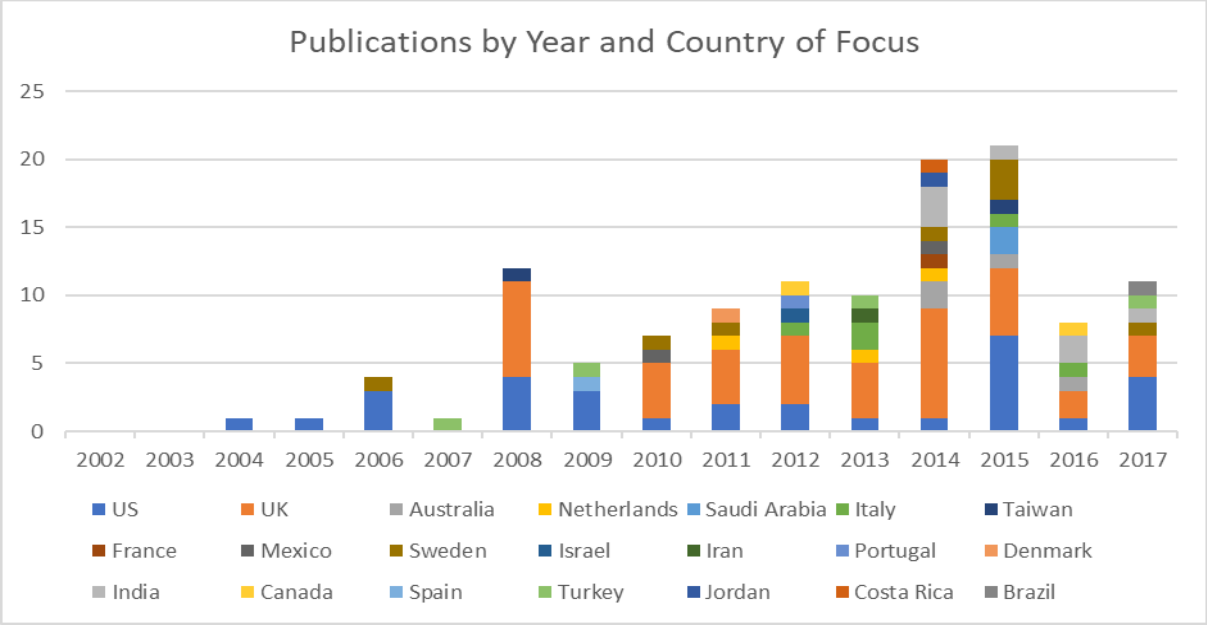


Figure 1: Number of articles by year and country of focus (**Source:** Rodgers, 2018:8).

As graphically depicted in Figure 1, most lean research between 2004 and 2006 was conducted in the U.S., with other countries emerging from 2008 onwards. Most notably, there is an absence of lean research in African countries. In South Africa, a study like that of Rodgers (2018) was conducted by Dondofema, Matope and Akdogan (2017), who surveyed several publications concerning the implementation of lean practices. Their study revealed 32 papers from a South African perspective that were published by various institutions from 1989 to 2015. These included a total of 12 journal articles and 20 conference papers. The researchers observed that the application of lean principles was divided mainly into three industrial domains, where publications focusing on the private sector contributed 66%, those on the service sector, 25%, and those on the public sector category, 9%.

Although there is evidence of increasing research interest in lean principles in South Africa for improving public health care (Kregel & Coners, 2018), the education system (Kholophane & Vandayar, 2014), and rail and transport activities (Tendayi & Fourie, 2013), the literature review indicates that this interest has not been extended to a wider range of public sector organisations. The lack of research applying lean principles in important public sectors, such as energy, communication, financial services, and water, creates a noticeable gap. Figure 2 presents a concise overview of the extent of lean research that is limited to the geographical boundaries of the Republic of South Africa (Dodnofema, Matope & Akdogam, 2017).

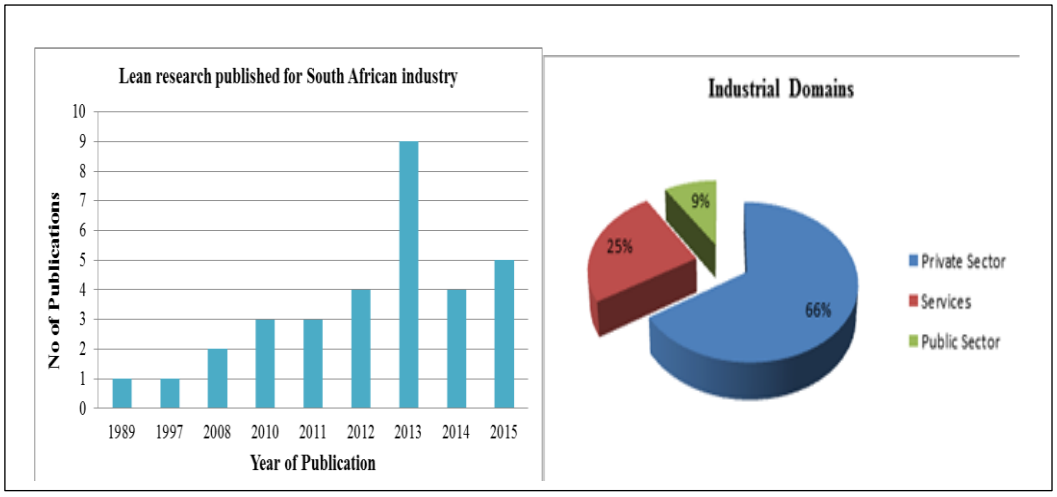


Figure 2: Lean concept research output chronology for South Africa (**Source**: Own).

1.2.2 Review of lean implementation frameworks

Against the background highlighted in the preceding section, several lean implementation frameworks have been studied and created in the past decade (2010-2020). Anand and Kodali (2010) comprehensively analysed lean frameworks and found that most of the frameworks are conceptual in nature, focusing on defining the elements of lean rather than providing practical guidance regarding lean implementation. While Almanei, Salonitis, and Xu (2017) proposed that these frameworks provide guidance for lean implementation, some researchers criticise them for lacking contingency (Chay, Xu, Tiwari & Chay, 2015; Shah & Ward, 2003; Tiwari, Turner & Sackett, 2007).

Kregel and Coners (2018) established a framework grounded in the fundamental steps essential for the implementation of lean practices. The steps are categorised as preparation, design, and implementation. Nevertheless, Karim and Arif-Uz-Zaman (2013) contended that this framework lacks a structured approach to identifying inefficiencies, assessing current production performance, eliminating identified inefficiencies, reassessing performance, and employing sustainable lean implementation tools for ongoing enhancement.

The framework developed by Kregel and Coners (2018) follows a pattern of describing the methodology and then discussing its application to the organisation. However, information on the criteria used for selecting the methodology and how it was compared to strategic aims or organisational culture is lacking (Kregel & Coners, 2018).

Nordin and Othman (2015) introduced the use of lean principles in the public sector. Their framework outlines the essential components necessary for adopting a lean concept, with particular focus on change management spearheaded by top-level executives and the active involvement of employees. Nevertheless, the framework fails to consider the needs of shop floor workers from the beginning and instead narrowly concentrates on strategic levels. This approach may create an obstacle to the implementation of lean principles in public sector settings. In contrast, Kregel and Coners (2018) emphasised the importance of implementing a lean framework in the public sector by providing training to shop floor employees. This training would enable them to contribute to the efficient and dependable creation of value. Moreover, fostering a sense of ownership among employees at lower levels within the organisation results in a culture that is open to new ideas and possesses the expertise necessary to facilitate progress (Kregel & Coners, 2018).

Netlanda, Schloetzerc and Ferdows (2015) found that employees at various hierarchical levels in an organisation have varying perceptions of the obstacles to implementing lean practices. The main obstacles were ascribed by top executives to lean tools and techniques, but workers predominantly identified management-related difficulties. Upon examining the perspectives of Vargo et al. (2008), Netlandi et al. (2015), and Radnor and Osborne (2013), it becomes evident that there is a necessity to translate lean ideas into diverse situations rather than simply replicating them.

The framework created by Kregel and Coners (2018) aims to address the deficiencies found in current frameworks by integrating a collection of essential components for lean implementation. While the framework makes a valuable contribution to the implementation of lean practices, it is primarily applicable to small and medium enterprises (SMEs) and may not be suitable for application in other contexts.

Kregel and Coners (2018:9) examined a project-based framework that emphasised three key elements: the deployment of lean expert teams to improve success rates, the execution of lessons-learned reviews and documentation, and the implementation of monitoring and controlling mechanisms to ensure long-lasting lean outcomes. In addition, Mostafa et al (2013) asserted that their proposed framework works by addressing the shortcomings of existing frameworks. They present a streamlined implementation framework that encompasses all the success elements reported in prior studies.

The lean frameworks examined by Mostafa et al (2013) have four primary weaknesses. These include a deficiency in addressing contingency and managing variability (Anand & Kodali, 2010), a failure to incorporate human factors (Vukadinovic, Macuzic, Djapan, and Milosevic, 2019) and an inadequate approach to project sequencing (Tortorella & Fettermann, 2018). The data collection was limited to the perspective of a particular firm and was only relevant in a certain environment (Freytag & deHaas, 2011). The essential aspects emphasised by Mostafa et al (2013) may need modification to be verified for use in the public sector context. An illustration of this is that the achievement of sustained lean outcomes relies significantly on the active participation of senior executives and the use of an evidence-based approach to decision-making.

Nevertheless, decision-making within the public sector is dispersed across various departments. The paradigm proposed by Mostafa et al. (2013) exhibits bias towards employee ownership at all levels and is mostly implemented through top management initiatives (Chay et al 2015). Chay et al. (2015) and Xu et al. (2015) evaluated lean frameworks and discovered that most of the available lean implementation frameworks favoured a top-down approach rather than a bottom-up approach. Researchers frequently disregard improvement measures proposed by shop floor employees. Upon comparing the survey results of various lean frameworks examined (Asnan et al 2015; Belhadi et al 2016; Chay et al 2015; Mostafa et al 2013 Xu et al 2015), it is evident that none of these frameworks can be fully tailored to suit the public sector context. Furthermore, none of the frameworks facilitate the incorporation of lean implementation to address the bottom-up approach, albeit showcasing certain overarching principles such as change planning and aim setting that may provide some level of adaptability.

1.3 RESEARCH PROBLEM

Despite the increasing amount of research on the application of lean practices in the public sector, it is clear from the literature that this application has not been clearly articulated, particularly in the public sector environment in South Africa, compared to elsewhere in the world (Dondofema, Matope & Akdogan, 2017).

Moreover, as stated earlier in this study, there is a growing emphasis on the wider implementation of lean practices in areas of health and education as well as in rail and transport activities than in other areas of the public sector (Kruger, 2014).

Based on this premise, there are several identified gaps in the literature regarding the application of the lean concept to the public sector environment. First, common issues drawn from the literature centre around the translation of themes to the unique make up of public sector organisations as opposed to the private sector (Bharosa, Feentsa, Gortmaker, Klievink & Jansen, 2008; Pedersen & Hunichee, 2011).

Lean themes such as value, customers and waste are translated differently in the public sector than in the private sector environment; thus, reinterpretation cannot be ignored (Bonaccorsi et al 2011; Carter et al 2011). For example, value in the public sector setting is more about creating public value. Hence, the theoretical framework of lean philosophy, centred on the satisfaction of customers (citizens) and the creation of value, ought to be augmented by the incorporation of the notion of public value (Maarse & Janssen, 2012). The lean frameworks highlighted in the preceding sections of this research do not satisfy the translation of the nature of value and the customer for the public sector setting. The implications of ignoring the reinterpretation of these themes may lead to the use of inappropriate or unhelpful measurements with the numerical quantification of quality through targets and create impossible expectations in citizens, leading to frustration and dissatisfaction (Elias, 2014).

There is very little research on the applicability of lean manufacturing principles for public sector organisations in South Africa (Dondofema, Matope & Akdogan, 2017). Research conducted by Dondofema revealed that much of the lean manufacturing research has involved automotive enterprise management (Dem et al 2012; Louw, 2012; Mund et al 2015; Ndaba, 2015; Singh & Rathilall, 2011; Van der Merwe et al 2015), food processing and beverages (Petrarolo, 1997) and the assembly of electronic components (Treurnicht, 2011).

There has been much interest in improving the public health care service delivery system (Kruger, 2014; Kanakana, 2013; Kregel & Coners, 2018) and the education system (Chibaira & Hattingh, 2013; Kholopane & Vandayar, 2014; Pretorius, 2010) throughput. Additionally, lean tools have been implemented for rail (Tendayi & Fourie, 2013) and road transport activities (Kienhöfer, 2010). Evidence suggests that lean tools have helped organisations to achieve operational excellence, and in this way meet both traditional and contemporary organisational objectives such as profitability, efficiency, responsiveness, quality, and customer satisfaction (Garza-Reyes, Kumar, Chaikittisilp & Tan, 2018). More broadly, there is a significant gap in the literature that applies lean practices to other public sector

environments that play a significant role in the South African economy in key sectors such as electricity, transport, and telecommunications (Chibaira & Hatting, 2013).

These aforementioned public sector organisations are the engine of the economic development of South Africa; thus, moving the public sector into broad-based lean thinking and practice requires additional research and initiatives that aid with lean implementation and training (Bronkhost, 2017).

Third, most of the analysed frameworks were prone to a top-down approach, which may be limiting in the case of the public sector environment due to restricting policies and some legislative requirements (Chay et al 2015; Xu et al 2015). For example, one typical complexity of the public sector, as noted by Maarse and Janssen (2012), is related to the procurement process, where constraints are created by legislation, heterogeneous stakeholders involved and activities that are fragmented across several departments.

This assertion further highlights the need for other contemporary versions of the lean concept that strike a balance between operational and strategic levels, where the operational level is about eliminating waste (core process owners), and the strategic level filter through the broader aspects of public value. Hines et al. (2012) supported this view and asserted that improvement and the reduction of lead times, even in the abovementioned process, lie in the hands of the front-line worker and thus strengthen the argument for a bottom-up approach.

None of the frameworks proposed in the reviewed literature provides a tailored fit for the practical application of lean within the public sector environment; therefore, they layout an argument for developing an effective bottom-up lean framework that is tailored for the public sector environment in particular state-owned entities in South Africa. The problem statement for this study has therefore been formulated as follows: “Existing lean implementation frameworks do not adequately translate the lean concept to the unique characteristics of the public sector environment, such as public value, organisational culture and hierarchy, which may impose barriers to the application of lean principles to the public sector environment in South Africa”.

1.4 RESEARCH QUESTION

1.4.1 Primary research question

The primary research question that formed the crux of the research reads as follows:

How can lean principles and tools be adjusted and reinterpreted into a framework that can be a better fit for application to the unique nature of public sector organisations (state-owned entities) in South Africa?

1.4.2 Secondary research questions

The secondary research questions are listed below:

- What constitutes value from the public sector perspective?
- What are the critical factors that determine the applicability of lean tools in a new setting?
- What lean strategies can be used to eliminate waste in the public sector?
- What factors can impede the successful implementation of lean practices within the public sector environment?

1.5 RESEARCH OBJECTIVES

1.5.1 Primary research objective

The primary objective of this research is to develop a bottom-up framework for the adoption of lean manufacturing principles at state-owned entities in South Africa.

1.5.2 Secondary research objectives

The following secondary objectives will assist the researcher in achieving the primary objective:

- To identify constituents of customer value from a public sector perspective.
- To explore the critical factors that determine the applicability of lean principles in the public sector.
- To determine lean strategies that can be used to eliminate waste in the public sector.
- To identify factors within public sector structures that can potentially impede the successful elimination of waste and thus hinder lean implementation.

1.6 PRACTICAL RELEVANCE

Over the past few years, there has been an increased demand for quality and efficiency in public sector organisations. This demand has increased the need for strategies to improve the public sector. Although these continuous improvement strategies are significant to public sector organisations and have been used for more than a decade with a degree of success, researchers

believe that continuous improvement strategies could be more effective if the approaches are interpreted to reflect the unique nature of value and demand in public services. To cope with the need to improve performance while reducing costs, the use of lean manufacturing principles, which have mostly been used in private sector organisation may be applicable pending adaptation to the public sector environment. The research outcome details a framework with implications and challenges specific to the public sector environment, which in turn may assist public sector organisations in implementing framework milestones for their own unique processes to aid waste reduction and operation efficiency, reduce lead times and improve quality.

1.7 THEORETICAL RELEVANCE

Various lean implementation frameworks have been proposed by previous researchers. These frameworks have been widely applied to the private sector as opposed to the public sector where characteristics such as public values, financial aspects, and culture impede the direct use of the lean concepts. The current literature on lean principles in the public sector does not focus on interpreting lean concepts when considering the nature of the public sector environment; it remains generic. Furthermore, there is a limited body of evidence regarding the applicability of lean principles to the public sector environment in South Africa, which is mostly focused on automotive, energy and public health care. However, notably, there is no research highlighting the application of lean principles to key public sector organisations that contribute to the national developmental goals. A wider gap also exists in the adaptation of the existing lean frameworks to the unique nature of the public sector environment. This study will pay attention to the reinterpretation of lean tools and concepts to the unique nature of the public sector environment in South Africa to create and sustain a culture of continuous improvement and, in so doing, bridge the current gap in the literature.

The integration of contingency theory and viable systems theory serves as a comprehensive approach to understanding organisational dynamics. Contingency theory, as highlighted in Lawrence and Lorsch's seminal work, highlights the importance of studying organisations as open systems. This perspective aligns with the fundamental concept of viable systems theory, which views organisations as dynamic entities embedded in a complex environment. By recognising that an organisation's structure and functions cannot be defined in isolation from its context and environmental variables, this research acknowledges the need for a systemic

study that will allow lean manufacturing principles to be adapted to complex and dynamic environments.

1.8 METHODOLOGICAL RELEVANCE

Several studies have conducted a literature review to propose a conceptual framework for lean implementation (Almanei, Salonitis & Xu, 2017; Anand & Kodali, 2010; Anvari et al 2011; Wright, 2015). Other studies have suggested the use of a lean road map as a means of theoretical verification based on empirical data and survey methodologies that offer a structured approach to implementing lean practices (Anvari, Norzima, Rosnay, Hojjati & Ismail, 2010).

In this study, multiple independent measures (mixed methodologies) were used to review the existing frameworks; cross-sectional examination of success factors; and concepts and methods that can be integrated into a framework that addresses the public sector challenges such as a focus on public value, waste elimination, and improving efficiency. The framework may further be validated by its application to different public sector environments in South Africa. This study used qualitative methodology to explore the application of lean principles in the South African public sector. This research, based on contingency theory and viable systems theory, delved into the perspectives and experiences of key stakeholders, identifying challenges and opportunities. The study also explored unique public values, financial considerations, and cultural aspects that influence the implementation of lean principles.

1.9 KEY ASSUMPTIONS

The assumption on which the research is undertaken is that the public sector entities in South Africa operate in a similar manner and that a framework that is developed for the adoption of lean principles for public sector organisations will be applicable to all state-owned entities in South Africa.

1.10 SCOPE OF THE STUDY

The field of study is lean manufacturing. The industry in which the geographical boundary of this research falls is the public sector, more specifically, state-owned entities in South Africa. There are approximately 715 state-owned entities (SOEs) in South Africa, as classified by the National Treasury report, and they fall into three broad management categories in terms of their performance (National Treasury, 2010:10).

- Urgent Management Attention (Red Zone):
    - Eskom, South African Broadcasting Corporation, Sentech, Denel, South African Airways (SAA), Transnet, Independent Developmental Trust.
- Close Monitoring (Yellow Zone):
    - Land Bank, Developmental Bank of Southern Africa, Airports Company South Africa, Trans-Caledon Tunnel Authority, Air Traffic and Navigation Services, Infraco,
- Ongoing Monitoring (Green Zone):
    - Armscor, South African Post Office, Industrial Development Corporation, South African Forestry Company Limited, South African Nuclear Energy Corporation (NECSA).

With such a large portfolio of SOEs, this study investigates the historical performance of Schedule 2 state-owned enterprises, as they represent the major entities that contribute to national developmental plan goals, particularly zooming in on red zone enterprises, as mentioned above.

1.11 LIMITATIONS AND DELIMITATIONS

While acknowledging the potential of lean manufacturing practices for enhancing performance and cost-effectiveness, it is essential to consider the limitations of this study. Despite primarily finding application in the private sector, the adaptation of lean principles to the public sector remains a complex undertaking, necessitating careful attention to unique public sector characteristics, particularly in discerning what holds value from a public perspective. However, the scope of this study may be limited due to its focus on a restricted sample size, examining only three public sector organisations among the larger landscape of approximately 315 SOEs. This constrained focus might impact the generalisability of the findings and the comprehensive understanding of how lean frameworks could be adapted effectively within the broader spectrum of public sector organisations.

The researcher proposes a framework that will be applicable for lean implementation in the public sector environment by adapting lean manufacturing principles based on the complexity and the environment of public sector organisations. However, the study is limited to only SOEs in South Africa. According to National Treasury research (2017), South Africa comprises approximately 715 SOEs, which form part of the broader public sector environment; hence, the second limitation of this study is to look at the applicability of all SOEs, but more emphasis

was placed on urgent management zone SOEs while excluding other SOEs. Future research can extend the investigation to other Schedule 2 entities, and there is also a greater opportunity to apply the developed framework for validation.

1.12 OUTLINE OF CHAPTERS

This research consists of seven chapters.

Chapter 1: Introduction

The chapter introduces the research problem, questions, objectives, and methodology, outlining the study's scope and limitations.

Chapter 2: Lean Manufacturing in State-Owned Entities

A comprehensive view of the research context is given, examining South African public sector organisations and offering a global perspective on public entities.

Chapter 3: Theoretical Review of Lean Manufacturing

A literature review on lean principles and their application in SOE was conducted, and the implementation frameworks, critical success factors, and strategies used to address public sector waste were explored.

Chapter 4: Research Design and Methodology

The research design, methodology, and approaches for data collection, including phases, sampling methods, and data interpretation strategies, were described.

Chapter 5: Presentation of Qualitative Data

The chapter presents and interprets the qualitative findings gathered from the research**.**

Chapter 6: Summary of Findings and Discussion

The chapter summarises the research findings, initiates discussions, and provides recommendations stemming from the study’s outcomes to address the initial research problem.

Chapter 7: Conclusion

The final chapter provides a concise overview of the findings of the study and presents a conclusion based on the findings. Subsequently, a framework for implementing lean principles is introduced. Ultimately, the chapter concludes by outlining the constraints faced during the study and proposing recommendations for future investigations.

1.13 DEFINITIONS OF KEY TERMS

There are some key terms used in the study, that are as follows:

- **Lean Manufacturing**: A production practice that considers the expenditure of resources in any aspect other than the direct creation of value for the end customer to be wasteful, and thus a target for elimination (Bhamu & Sangwan, 2014).
- **Value Stream**: The series of steps required to design, produce, and deliver a product or service to the customer. It includes all the actions (value-creating and non-value-creating) involved in getting a product from concept to customer (Singh, Garg, & Sharma, 2011).
- **Value Stream Mapping**: A visual tool used to analyze and design the flow of materials and information required to bring a product or service to the customer. It helps identify areas of waste and opportunities for improvement. (Singh et al., 2011).
- **Kaizen**: A Japanese term meaning "continuous improvement." It refers to activities that continuously improve all functions and involve all employees from the CEO to the assembly line workers (Singh & Singh, 2009)
- **5S**: A methodology for organizing, cleaning, developing, and sustaining a productive work environment. The five steps are Sort, Set in Order, Shine, Standardize, and Sustain (Anand & Kodali, 2010).
- **Just-In-Time (JIT)**: An inventory management strategy that aligns raw-material orders from suppliers directly with production schedules. It aims to reduce inventory costs and improve cash flow (Fei, 2014)
- **Kanban**: A scheduling system for lean and just-in-time production. It uses visual signals (cards or boards) to control the flow of work in a production process and manage inventory levels (Chay et al.,2015).

- **Root Cause Analysis**: A method used to identify the underlying causes of defects or problems in a process. Techniques such as the "5 Whys" or fishbone diagrams (Ishikawa diagrams) are often employed.
- **Total Productive Maintenance (TPM)**: An approach to maintaining equipment that involves all employees in preventive maintenance, aiming to increase equipment availability and reduce downtime (Kodali,2016)

1.14 SUMMARY

This chapter aims to present an overview of the study's context, the research problem, primary and specific objectives, research inquiries, the significance of this thesis, and the clarification of key terminologies. It delves into the background of the problem, specifically examining lean manufacturing frameworks. With this groundwork established, the subsequent chapter focuses on examining the literature related to the application of lean manufacturing principles within SOEs.

CHAPTER TWO

LEAN MANUFACUTING IN STATE-OWNED ENTITIES

2.1 INTRODUCTION

The previous chapter introduced the study, the context, research problem, research objectives, relevant concepts and constructs, and a brief outline of the research design and methodology. This chapter presents the literature review which included background on state-owned entities (SOEs) from a global and South African perspective. The major categorisation of SOEs and their importance are provided, and the role that SOEs play in the economy is discussed. Furthermore, challenges affecting SOEs from a global and South African perspective are explored, followed by existing measures that are in place and why they are inadequate. This chapter further explores lean manufacturing concepts within the context of the public sector environment, building on the different aspects of the lean public sector highlighted in Chapter 1 of the study.

2.2 BACKGROUND ON STATE-OWNED ENTITIES

Over the last decade (2010-2020), several studies have been presented on SOEs from a South African and global perspective (Belfeltah, 2016; Giliana, 2018; Kanyane & Sausi, 2015; Kwiatkowski, 2015; Sandhya & Raju, 2018; Setino, 2018; Surty, 2016). These studies reveal the common thread among SOEs as public sector organisations, partially or wholly owned by the government to implement government policy and for the advancement of socioeconomic development of the state.

Spencer (2008) also describes SOEs as enterprises in which the state has significant control through the full majority or ownership. The state's control of SOEs is likely to be linked to the pivotal role played by SOEs in implementing the developmental agenda of the state and implementing service delivery projects. Similarly, the collective view from other researchers points to the overall mandate of SOEs as "instruments of socioeconomic growth" worldwide (Mbele, 2015; McGregor, 2014:30; Ngonini, 2012; Sausi & Kanayane 2015; Thomas, 2016).

Evidence from the reviewed literature indicates the significant growth of SOEs in the global economy. For example, growth from 9% in 2005 to 23% in 2014 was driven by the growth of Chinese SOEs (McIntyre & Jones, 2015). SOEs in the global economy have a stake of $1.2

trillion and account for 15% of the aggregate GDP (World Bank group, 2014:4), a joint sales value of $3.6 trillion in 2011 (Kowalski, Büge, Sztajerowska & Egeland, 2013). Kowalski et al. (2013) investigate the extent of state ownership among the Forbes Global 2,000 and their 330,000 subsidiaries worldwide. The authors attempted to characterise their influence on global markets. Using firm-level ownership data, they find that more than 10% of the world's largest firms were state owned (204), and these entities came from 37 different countries with a joint sales value of $3.6 trillion in 2011. Figure 3 illustrates that the SOEs have combined sales that are equivalent to 6% of the world GDP, exceeding the GDPs of countries such as Germany, France, and the UK. The extent of SOEs' contributions is discussed in the next section.

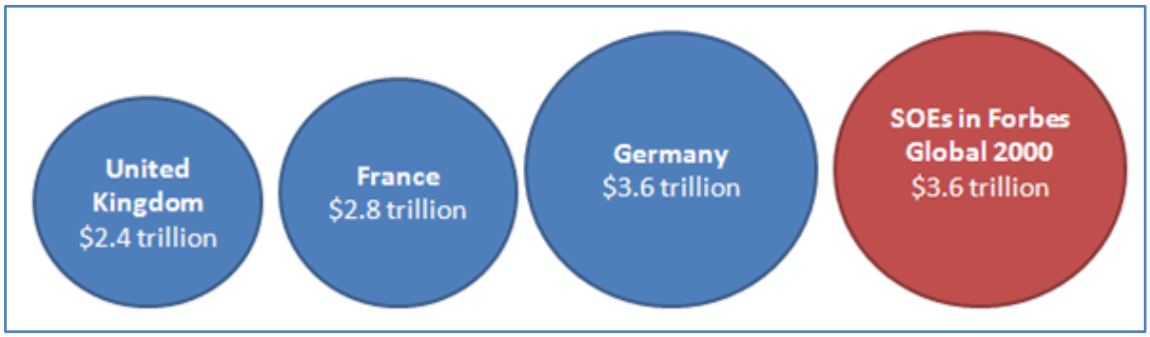


Figure 3: The GDP to the total sales of SOEs (**Source:** Kowalski et al 2013).

While these entities are typically created to advance the developmental goals of their respective states, their significant impact on the global economy necessitates a fair evaluation that considers not only their contributions but also potential drawbacks or inefficiencies that may impede optimal value creation (Kowalski et al., 2013). By closely examining SOEs using a detailed and methodical approach, policymakers and researchers can gain a deeper understanding of their influence. This approach can help identify specific improvement areas where changes can be made to maximise a positive impact while minimising any negative effects on market dynamics and competition (Mbele, 2015; McGregor, 2014).

2.2.1 Sectoral contribution of State-Owned Entities

The prevalence of SOEs spans different industries and sectors. SOE involvement in these sectors of the economy is dominated by airlines, financial services, telecommunications, energy, mail packages and freight delivery, and aerospace and defence (Fikelepi, 2010; Sturesson et al 2015). Kowalski et al. (2013) find that the sectors with the highest ratios of SOEs are related to the extraction or treatment of natural resources, energy, and heavy industries.

These findings are supported by Szarzec, Dombi and Matuszak (2021), who investigate the effect of SOEs on economic growth in 30 European countries. The results of their study suggest that the industry aggregate of SOE shares is concentrated in the manufacturing, energy, and transportation sectors. Furthermore, the researchers argue that SOEs in these sectors, which are often listed as "strategic", might affect the developmental role of the state based on their ability to deliver on the mandate of the state. Figure 4 shows the distributions of SOEs by sector in 30 European countries between 2010 and 2018.

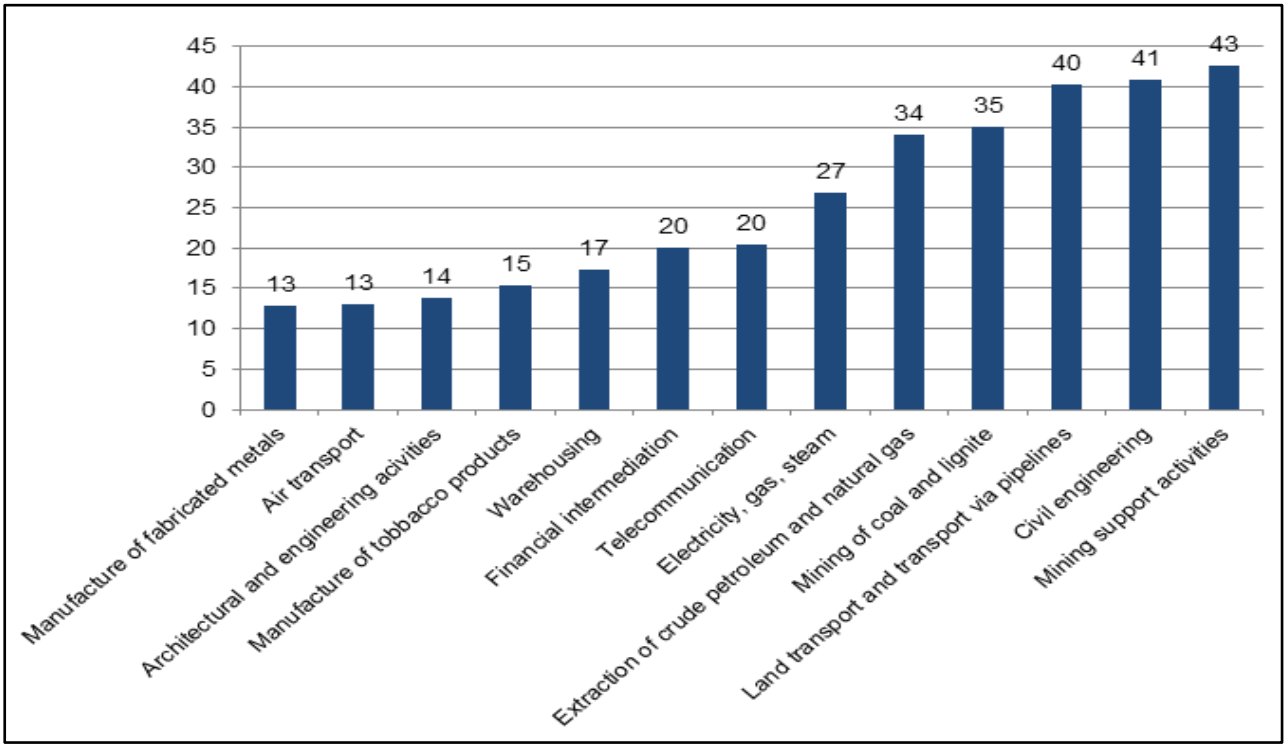


Figure 4 : State-owned entity contribution by sector (**Source:** Wisdom tree, 2014).

Figure 4 shows that, as far as broadly defined sectors are concerned, SOE shares are the highest in mining support activities (SOE share of 43%), civil engineering (41%), land transport and transport via pipelines (40%), mining of coal and lignite (35%), and extraction of crude petroleum and gas (34%). Therefore, because of the strong contributions of state-owned entities in the sectors listed above, any inefficiencies in the operation of SOEs would certainly have adverse impacts on the economic growth of the country and impact the service delivery objectives of SOEs (Szarzec et al., 2020).

The concentration of SOEs in pivotal sectors, as highlighted in the preceding discussion, emphasises their significant impact on economic growth and service delivery objectives

(Fikelepi, 2010; Kowalski et al 2013; Sturesson et al 2015; Szarzec et al 2020, 2021). This inherent importance necessitates a focused examination of SOEs' operational efficiency to avoid potential waste of resources and ensure optimal contributions to the state's developmental goals (Fikelepi, 2010; Szarzec et al 2020). Consequently, a critical evaluation of these entities becomes imperative to harness their full potential in driving economic progress and fulfilling essential service delivery commitments, a topic that will be explored in depth in the following sections (Kowalski et al 2013; Sturesson et al 2015; Szarzec et al 2021).

2.2.2 Importance of state-owned entities

SOEs play a crucial role in shaping global economies, contributing significantly to economic development in sectors such as infrastructure and strategic industries. However, their effectiveness in sustaining growth requires thorough assessment (Mbele, 2015; Matuszak & Kabaciński, 2021; Taghizahed-Hesary, Yoshion, Kim & Mortha, 2019). Moreover, SOEs have always been an important element of many economies, including advanced economies, contributing to economic growth. For example, public goods and funding could be provided for key infrastructure projects (Bator, 1958; Telegdy, 2016). According to Heo (2018), SOEs are also central to the delivery of essential public services to citizens in important sectors, such as energy, transport, finance, aviation, and natural resources.

In the context of delivering public services such as healthcare, postal services, and fundamental nutrition, SOEs hold significant importance in facilitating access to these services through payment mechanisms and the non-exclusionary nature of consumption (Ter-Minassian, 2017). Conversely, private entities often offer limited services at higher costs, prompting intervention from the public sector to provide these services at reduced rates or without charge. Hence, this indicates the government's potential decision to utilise SOEs to furnish such services (Baum, Hackney & Sy, 2019). Similarly, Richmond, Benedek, Cabezon, Cegar, Dohlman and Hassine (2019) confirm the importance of state-owned entities in the global economy for the following diverse set of policy goals (Figure 5).

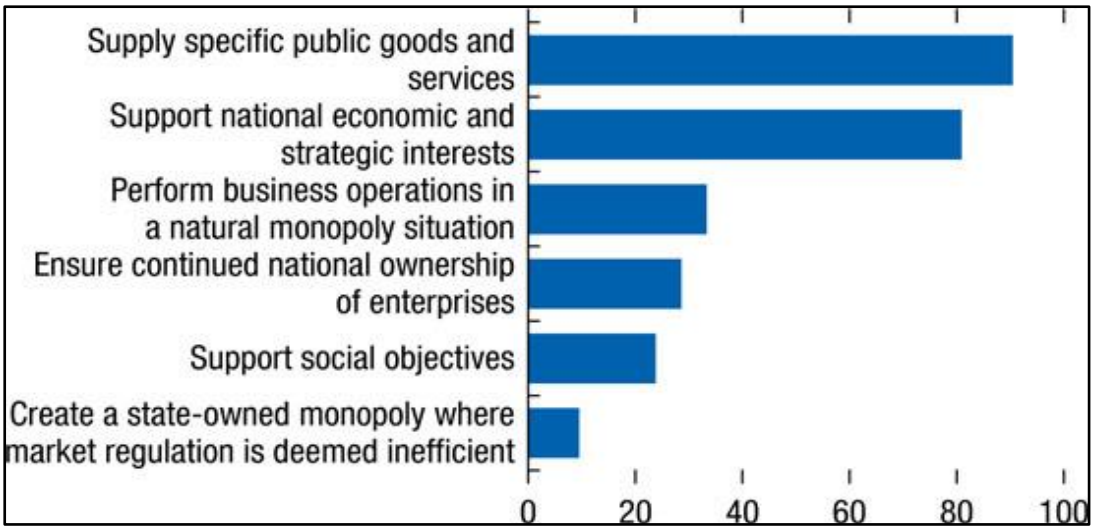


Figure 5: Policy objectives of SOEs (**Source:** Richmond et al., 2019).

Figure 5 shows that a high percentage of SOEs in Central, Eastern and South-eastern European countries are engaged in the supply of public goods and services as well as in support of national economic and strategic interest. Researchers argue that SOEs have been the most efficient solution in many countries where monopolistic sectors are legal. One example of these natural monopolies is in the electricity sector (Kowalski et al., 2013). Supporters of SOE agree that optimal efficiency is reached when output is supplied by a single monopolistic producer in industries with substantial economies of scale, such as electricity, transport, and railways (Andres et al., 2011). They consider that private monopolists may produce and price at levels that are not socially optimum, whereas SOEs may deliver socially optimum outcomes when compared to private ownership (Szarzec, Dombi & Matuszak & Kabaciński, 2021).

Another important aspect of SOEs is highlighted by MacCarthaigh (2011), who links state ownership presence to economic development, even in areas of research and development. This line of argument is supported by Kowalski et al. (2013), who note that entities might, for example, be reluctant to invest in research if the gains for research do not yield enough capitalisation. Together, these studies suggest that state-owned research institutions might then yield long-term benefits for the economy.

Considering the importance of state-owned entities, one may infer that when SOEs are dominant in a particular sector, as indicated in section 2.2.1 of this research, any challenges in the efficiency and effectiveness of SOEs with respect to service delivery may carry significant costs for the entire economy. Along with this growth of state-owned entities, however, there is

increasing debate over the optimum provision of public services aimed at seeking ways to improve the efficiency of SOEs and reduce unnecessary costs of production or service provision (Matuszak & Kabaciński , 2021). The following section offers some important insights into these debates.

2.2.3 Research focus on SOEs

Over the past three decades (1994-2023), there has been a significant increase in studies regarding improvements in critical performance measures for SOEs, such as creating value for the users of public services and stakeholders and improving the quality and efficiency of services (Antonelli, Amidei & Fassio, 2014; Barton & Barton, 2011; Bognetti, 2020; Matuszak et al 2021; Hammer & Champy, 2001). The research dates as far back as 1980 when significant privatisation programmes took place both in developed and underdeveloped countries (Mickiewicz, 2010). The wave of privatisation in the past three decades (1994-2023), was driven by the belief that only private ownership could guarantee efficient corporate governance and service delivery (Bozec, Breton & Cote, 2002). Moreover, this expanded with studies that have aimed to establish a correlation between privatisation and SOE performance in certain parts of the global economy (Robinett, 2006; Kim & Chung, 2008; Musacchio & Lazzarini, 2014).

Despite the privatisation wave, researchers have found that SOEs around the world continue to face similar trends, opportunities and threats stemming from the unique challenges facing SOEs, including poor processes, large-scale waste of state resources, budget overruns, and the need to balance commercial and other objectives (Wong, 2018). To support this argument, Balbekova (2018) reviews the efficiency models of state-owned entities and concludes that SOEs should develop and maintain sound internal management systems to maximise efficiency and to improve the quality of services. Recent studies on SOEs have highlighted the need for cost reduction with improvement goals, such as boosting outcomes and improving the pace and quality of service delivery (Allas, 2018). In addition, the issue of public sector efficiency has received considerable critical attention from other researchers, who show the importance of encouraging SOEs to contribute to a more sustainable economy by building waste reduction into design and offering alternative business models for delivering improved services and creating customer value (Rogerson, 2013). Although much of the current literature on SOEs pays particular attention to urgently finding ways to do more and better for less, much

uncertainty still exists concerning the success of current existing models in terms of helping them achieve the desired improvement.

For example, Nurgozhayeva (2021) note that the privatisation model does not present an answer that guarantees waste reduction and better performance when budget constraints and political interference still exist. To support this argument, other researchers have also challenged the widely held view that privatisation is necessary for improving SOE performance, pointing to other less radical methods and models that can be applied in the process of SOE transformation (Kim & Chung, 2008; Massarutto, Garlatti, Miani, Cassetta & Iacuzzi, 2020; Moushibahou, 2010). One such method noted by researchers is that of corporatisation without privatisation. In a study set out to determine whether reform programmes dealing with corporatisation without privatisation can effectively improve performance, Aivazian, Ge and Qiu (2005) find that the sources of efficiency produced by corporatisation can be traced to the internal governance structure of SOEs. Although corporatisation offered an alternative to privatisation by shifting controlling rights from politicians to managers, it has not effectively dealt with agency problems associated with the corporatisation of SOEs (Milhaupt & Pargendler, 2017). Furthermore, some researchers have criticised the corporatisation approach as a single-minded perspective and for only focusing on the impact of existing institutional conditions (Curtis, Milhaupt & Zheng, 2014).

In view of these studies, although the research focus of state-owned entities is growing, the leading approach in the literature for productive and effective SOEs is privatisation and corporatisation. However, the studies presented thus far provide evidence that corporatisation does not necessarily guarantee better performance when soft budget constraints, political interference, wasteful expenditure, and insufficient governance systems still exist. Furthermore, these studies do not provide a precise picture of research into other approaches that can be implemented to improve challenges within SOE systems accompanied by a focus on waste reduction. Although previous research provides insight into state-owned entities' reforms and improvement initiatives, most journals reflected in Table 2. tend to focus on improving the performance of SOEs by applying the lens of good corporate governance. However, the models (privatisation, corporatisation) do not pay sufficient attention to whether those models are relevant to the nature of SOE problems such as agency problems, wasteful expenditures, conflicting objectives, or overall quality of the SOE institutions in a particular

country or sector. To avoid the "one-size-fits-all" approach, the choice of an applicable framework depends on the context of an individual SOE (World Bank Group 2014). Therefore, the best approaches should adapt to the existing socioeconomic context of the SOE organisations; otherwise, the adverse effect of ignoring this context can disrupt SOEs' performance and bring about a significant risk for the sustainability of state-driven economies.

Table 2: Findings of studies carried out on state-owned entities (**Source**: Own)

Author	Year	Country	Title	Findings and discussions
Bozec et al.	2002	United Kingdom	The performance of state-owned enterprise revisited	The conclusion made by the researchers is that the performance of an entity whether state-owned or privately owned is not a question of ownership but rather the goal pursued by the organisation. However, the effect of the type of ownership of the delivering value to the public remains an open question.
Aivazian et al.	2005	Canada	Can corporatisation improve the performance of SOEs without privatisation	The researchers conclude that even without full privatisation, corporate governance reform of SOEs can effectively improve performance.
Sturesson et al.	2014	United Kingdom	SOEs catalyst for public value creation	Although state-owned ownership fosters some advantages in some there is a risk that state ownership can destroy value if best practices in ownership and management are not applied.
Bantugnmm	2014	Philippines	A Critique of recent governance reforms of state-owned entities in the Philippines and their proposed improvements	The authors argue for the adoption of reforms in SOE policies and practices which may result in the significant improvements in the performance of SOEs and the delivery of public good and services.

Mbo and Adjasi	2015	South Africa	Drivers for organisational performance: An SOE perspective	Good performance in SOEs is a result of good management who can make the right choices.
Kwiatkowski	2015	Italy	State-owned enterprises in the global economy. Analysis based on Fortune Global 500 list	SOEs today differ significantly from those of the 70 s or 80s of the past centuries and their operation is much closer to their private competitors than their national counterparts from several years ago.
Arzobispado	2016	Mexico	Global knowledge sharing on corporate governance of state-owned enterprise	Governments could aim to develop similar disclosure requirements as well as controls and processes to ensure effectives.
Massarutto et al	2020	Italy	Evaluating the performance of local SOEs as output-maximising entities: The case of Friuli Venezia Giulia	The study's findings aimed to develop an evaluative methodology that offers a straightforward and adaptable approach, beginning with the clear articulation of the public mission.
Kanyane and Sambo	2021	South Africa	SOE governance in BRICS countries issues for consideration	The inadequacy of SOEs in BRICS countries, necessitates the need to have mechanisms that clearly define how SOEs should function effectively and efficiently.
Szarzec et al	2021	Hungary	State-owned-entities and economic growth: Evidence from the post-Lehman period	The impact of SOEs on economic growth hinges on institutional quality which ultimately favours growth.

2.3 STATE-OWNED ENTITIES IN SOUTH AFRICA

In South Africa, SOEs are expected to assist the government in driving national developmental objectives, such as service delivery (McGregor, 2014). Therefore, the performance of SOEs is deemed critical to the national developmental goals and the efficiency and effectiveness of SOE service delivery (PRC, 2013; Raseala, 2018). There are approximately 715 SOEs across

all levels of government in South Africa (Accenture, 2010:1; PRC, 2013:53). The starting point in categorising these state-owned entities is the legislative framework that is applicable to SOEs in South Africa, namely, the New Companies Act, the Public Finance Management Act (PFMA) 1 of 1999, and the King III Code and Report on Governance for South Africa. In addition to this legislative framework, SOEs in South Africa fall within the meaning of a "state-owned enterprise" in terms of the PFMA, or they are owned by a municipality in the local government sphere in terms of Municipal Systems Act No. 32 of 2000. The PFMA offers a classification of SOEs in South Africa into schedules 1, 2, 3B, 3C and 3D, as expanded in the following section of the research.

2.3.1 Classification of SOEs in South Africa into strategic sectors

South African SOEs are classified under two broad categories, namely, for-profit and not-for-profit SOEs (RSA, 2015). Furthermore, SOEs are classified into different schedules, which are listed in the Public Financial Management Act of 1999 (PFMA) as follows:

- Schedule 1: Constitutional,
- Schedule 2: Major Public Entities,
- Schedule 3A: National Public entities,
- Schedule 3B: National Government Business Enterprises,
- Schedule 3C: Provincial Public Entities and
- Schedule 3D: Provincial Government Business Enterprises

Figure 6 illustrates the intricate network of governance structures encompassing parliamentary oversight institutions, general government entities, statutory corporations, and government business enterprises. Each of these main headings represents a distinct facet of governance within the overarching framework of governmental operations. Parliamentary oversight institutions signify the pivotal role of legislative bodies in ensuring accountability and scrutiny over governmental actions. General government institutions encapsulate the core administrative bodies responsible for policy formulation and implementation. Statutory corporations portray specialised entities functioning within legal frameworks to serve specific mandates, while government business enterprises denote commercial ventures operating under government ownership. This figure delineates the interconnectedness and diverse functions of these key governance components within the broader governmental landscape.

Figure 6 highlights that constitutional institutions are listed as Schedule 1 organisations, major public entities as Schedule 2 organisations, and the remainder as Schedule 3 organisations (Fourie, 2014). In addition, Schedule 2 lists major public entities, while schedules 3A and 3D list national and provincial SOEs (Bronstein, 2011).

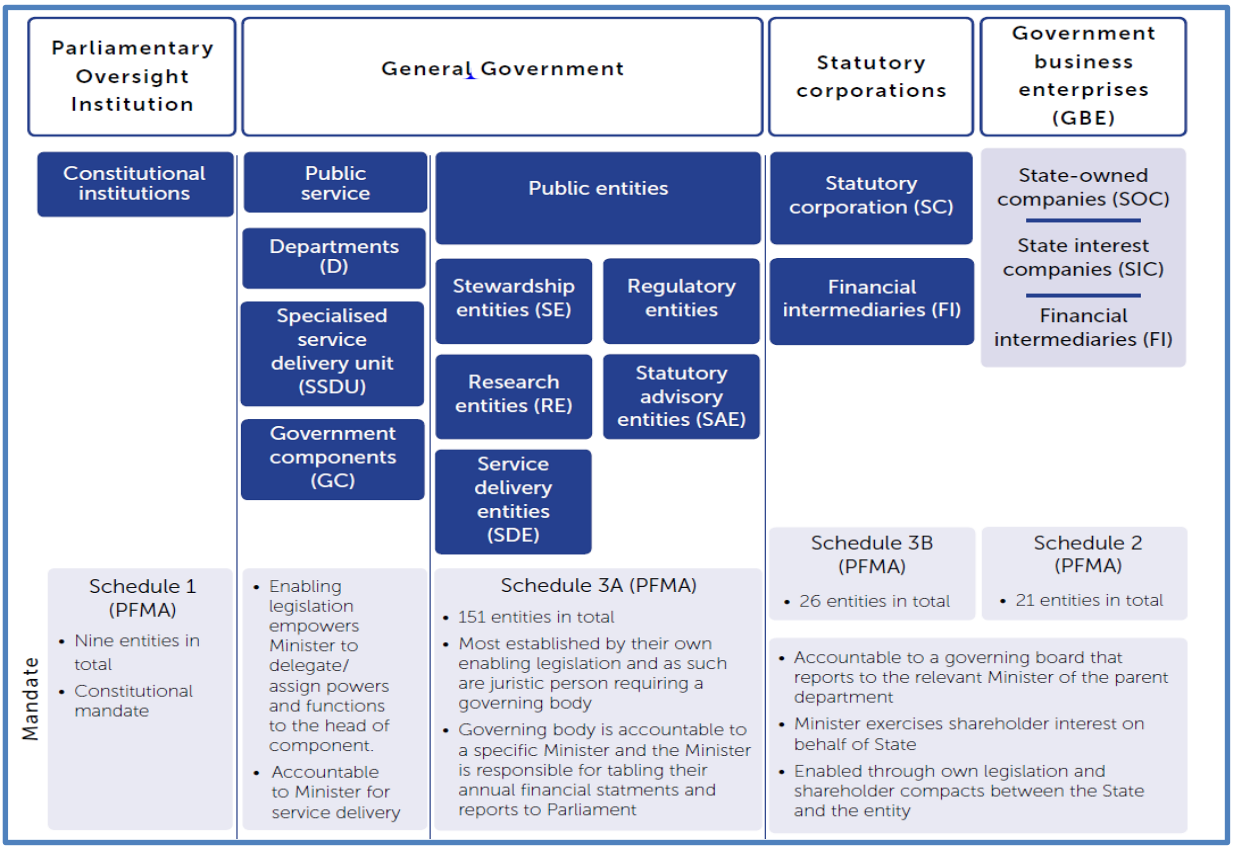


Figure 6: SOE classification framework (**Source:** PRC, 2013).

2.3.2 Contribution of state-owned entities to economic growth in South Africa

In line with international benchmarking with other SOEs, SOEs in South Africa confirm the need to boost the national economy, as well as fiscal, political, and social positions, to improve efficiency and the delivery of services (Capobianco & Christiansen, 2011; PRC, 2013). In addition, the importance of the role played by SOEs in South Africa is further compounded by their concentration in key "strategic" sectors of the economy, including energy, transport, and aviation (Balbuena, 2014:33). Therefore, the size of the state-owned entity sector in South Africa makes good governance of these organisations critical. As mentioned in the preceding

section of this research, these SOEs play a pivotal role in the economy by contributing more than 8.5% of the gross domestic product of South Africa (Kikeri, 2015). On a sectoral basis, the contributions to GDP are as follows: transport (28.8%), energy (27.3%), communications (16.2%), financial services (8.03%), and water (3.61%) (OECD, 2015). Furthermore, the entities are said to be the principal drivers of the formal sector of the economy, providing an estimated total employment of approximately 150 000 people and having combined assets of R175 billion (PRC-KPMG, 2010).

Table 3 classifies the SOEs according to the responsible line ministry, the rationale for their existence, and the level of government ownership. The PFMA lists approximately 300 public organisations consisting of nine constitutional institutions, 21 major public entities, 153 national public entities, 26 national government business enterprises, 72 provincial public entities, and 18 provincial government business enterprises. Constitutional institutions are listed as Schedule 1 organisations, major public entities as Schedule 2 organisations, and the remainder as Schedule 3 organisations. SOE measures of performance are then used with respect to the delivery of these national developmental goals and the delivery of value to customers, citizens, taxpayers and other government organs (Atkins & Maroun, 2014). Therefore, SOEs need to deliver on their crucial mandates, considering that some SOEs have profit and financial returns as their primary motive (Transnet, Eskom), while the primary motive of others is service delivery, and they are wholly dependent on the state for funding (Setino, 2018). However, Ngonini (2012) has shown that a significant part of the SOE sector has experienced major governance failures due to weak accountability, excessive politicisation, and unclear objectives. These challenges will be discussed in the next section of the paper.

Table 1: Challenges facing SOEs globally and in South Africa (**Source:** Own)

Schedule	Description	Operation/and funding characteristics	Number of SOEs
1	Constitutional entities: Institution listed under Schedule 1	Fully funded by Government	9
2	Major public entities	Operate under business principles	21
3A	National Public Entities and SETAs	Fully or substantially funded under the NRF (National Research Foundation, tax levy imposed through legislation)	153
3B	National Government Business Enterprises	Operate under business principles with limited borrowing	26
3C	Provincial Public Entities	Fully or substantially funded under NRF, tax levy imposed through legislation	72
3D	Provincial Government Business Enterprises	Operate under business systems with limited borrowing	18

With the emergence of global economic developments in technology and increasing demands from consumers of public services, efforts have increased to improve the performance of SOEs and their overall service delivery (Khanyane & Sambo, 2021). Although the demand for good governance and improvement has led to a growing body of knowledge, as explored in section 2.2.3 of this research, there is increasing concern that SOEs in South Africa are still marred by underperformance, loss-making and inefficiencies that burden fiscal performance and scarce resources (Marimuthu, 2020). Similarly, in South Africa, the implementation of national developmental goals and the provision of essential infrastructure, economic development and service delivery occur through SOEs (Ovens, 2014; Setino & Ambe, 2016). Therefore, SOEs are under pressure to improve their performance and reduce their growing financial burden (Presidency, 2021). Although the demand for good governance and improvement has led to a growing body of knowledge, as explored in section 2.2.3 of this research, there is increasing concern that SOEs in South Africa are still marred by underperformance, loss-making and inefficiencies that burden fiscal performance and scarce resources (Marimuthu, 2020).

Notwithstanding political interference, mismanagement of funds, corruption and liabilities to taxpayers, there is a risk of further disruption to the effectiveness of SOEs due to the disruptive effects of the COVID-19 pandemic on the economy and its growing financial burden (PWC,

2019). Recent studies have produced contradictory findings on strategies for improving the financial performance of SOEs from the African perspective (Bonney, 2010; Khanyane & Sambo, 2021; OECD, 2017). Debate continues about the best strategies that consider the unique context within which SOEs operate and function in South Africa (Bronstein, 2021; McGregor, 2014; Ngonini, 2012). Despite considerable progress that has been made toward improving service delivery in some state-owned entities, National Treasury (2012) reports a declining trend in the contribution of SOEs to South African GDP (from 9.3% in 2006 to 8% in 2010). This, despite increased bailouts by the government to SOEs, illustrates the declining impact of SOEs in stimulating economic growth.

More recently, the Economic and Development Review Committee conducted a survey of South Africa in 2020. The main findings of the survey indicated a significant risk imposed by government exposure to SOEs regarding debt sustainability and public finance. The considerable compensation of government employees, constituting approximately 12% of the GDP, particularly stands out. Previous studies attributed this phenomenon to the substantial number of civil servants and their corresponding remuneration levels (Chatterji, Mumford & Peter, 2010; Depalo & Giordano, 2011). Figure 7 offers a snapshot of the compensation of SOE employees as a percentage of GDP for the year 2019.

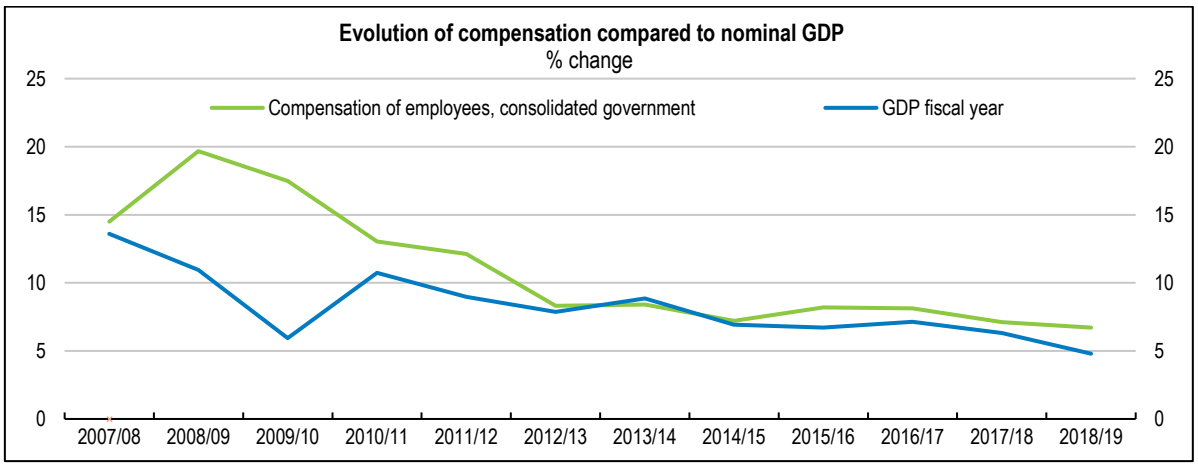


Figure 7: Compensation of SOE employees (**Source:** National Treasury, 2020).

The results obtained from the National Treasury (2020) indicate that public sector wage increases are the main driver of government spending rather than increases in employment. Moreover, compared with those in emerging economies, the number of employees in SOEs in South Africa is relatively high. Previous studies suggest an effective governance framework for SOEs setting clear organisational objectives in terms of profitability expectations, capital

structure and nonfinancial objectives that SOEs are expected to deliver (Giliana, 2017; Modimowabarwa et al 2015; OEDC, 2015; Sturesson et al 2015), which appears not to be working satisfactorily. For example, there are setbacks on the progress of the suggested restructuring of SOE to ensure their financial sustainability, including staff reduction and the incorporation of private sector participation. (Auditor General's Report, 2019). However, examining the effects of the suggested restructuring is beyond the scope of this study.

Improving government spending efficiency and reducing waste are additional challenges highlighted in the 2020 Budget Review. One example of waste in SOEs is highlighted in the consolidated national report on national and provincial outcomes, where irregular expenditures in state-owned entities increased significantly to R58 billion in 2020 from R30 billion in the year 2018 (PFMA, 2019). Furthermore, these irregular expenditures corroborate those of Mungovan (2009), who defined "waste" as occurring in the public sector.

Another example is the slow turnaround times of procurement processes in the electricity sector (Martins, 2015; Setino, 2016). In addition, from 2009 to 2019, SOEs have increasingly been marred with other wastes, such as prolonged periods of load shedding, which created uncertainty and disrupted production processes in many industries, resulting in long customer waiting times and other types of waste (OECD, 2020).

Some of the waste related to the financial losses of SOEs includes the SAA group, which experienced a loss of R1.168 billion, reflecting losses in its international operations. Irregular expenditures of R128 million were also incurred for the purpose of business continuity due to nonadherence to supply chain management processes (Fourie, 2014). During the 2011/2012 financial year, Transnet (2012) reported fruitless and wasteful expenditure totalling R89,6 million. For Transnet, issues that impede optimal performance currently include delays and cost escalations in construction ventures, the performance of board members, the performance of Transnet freight rail and the need to revive unused railway lines for passenger trains (RSA 2013). Eskom is the largest state institution, factoring R700 billion worth of assets. However, this state-owned entity has experienced several operational shortcomings, such as load shedding, corruption, and major failure in its capital project execution (Eskom, 2017).

The findings from studies of SOEs around the world point out similar trends, opportunities and threats stemming from the unique challenges facing SOEs, including poor processes, waste, budget overruns, and the need to balance commercial and other objectives (Wong, 2018).

Kwiatkowski and Augustnowicz (2016) compare the financial indicators of the operations of SOEs listed on the Fortune Global 500 list with the privately owned entities to analyse the return on assets (ROA), return on equity (ROE), and return on sales (ROS) indictors for these entities for the period 2004–2017. Their findings showed that the ROE for SOEs remains lower than that for private entities throughout almost the whole period. Figure 8 graphically depicts the ROA, ROS, and ROE rations of SOEs to privately owned entities.

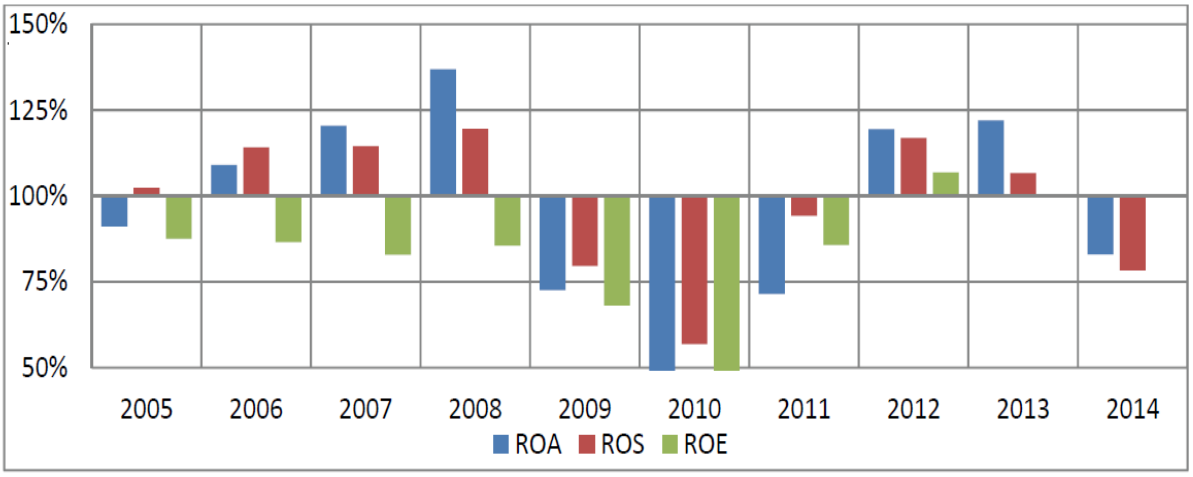


Figure 8: Ration of the ratio of SOE (**Source:** Kwiatkowski & Augustynowicz, 2015).

The negative perception that dominates the debate on SOEs resulted in the quest to improve the efficiencies of the SOEs (Mickiewcz, 2010). Several researchers have addressed the demand to improve productivity and efficiency in SOEs by improving internal systems and processes to combat the performance challenges faced by most SOEs in South Africa and globally (Adjansi & Mbo, 2013; Gewfoe, 214; Mbele, 2015; OECD, 2018 PRC, 2013; Sanusi, 2016). Their work has produced several theories and frameworks, such as integrating corporate governance and fiscal management into broader SOE reform efforts (World Bank Group, 2013), SOE reforms (Batung, 2012; Fikelepi, 2014; Mukithi, 2015; Vermooten, 2018) and corporate governance frameworks (Heo, 2018; McGregor, 2014; Nyewe, 2011; Okeahalam & Akinboade, 2018; Ristovska, 2013).

Despite some positive findings in some countries, such as Norway (Novick, 2015), other studies continue to show a negative trend regarding SOE performance, asserting that these organisations are faced with a dark history of poor performance, high operating costs, fraudulent activities, and poor service delivery (Boko & YuanJan, 2011). Table 4 provides an overall consolidation of the challenges that SOEs face. These challenges range from high

production costs, poor efficiency, and the disclosure of irregular, fruitless, and wasteful expenditures. The next section explores weaknesses in existing measures for overcoming the SOE challenges that we discussed in this section.

Table 4: Challenges Facing State-owned entities (**Source**: Own)

Source	Challenges of state-owned entities
OECD (2020)	High production costs continue to weigh on economic activity.
Naqvi (2020)	SOE underperformance is more pronounced in countries like Kazakhstan where the industry sector ROE is approximately 33.7 percentage points lower than private companies.
Mashele & Motubatse (2019)	State-owned entities lack adequate systems for identifying and disclosing irregular, fruitless, and wasteful expenditure.
Ionia (2016)	State efficiency is very low. In terms of revenue per employee, the state is surpassed by domestic private companies by 1.7 times and by foreign companies by 3.4 times.
World Bank Group (2014b)	Lack of proper oversight and management by the relevant government agencies has hindered SOE performance efficiency in Tajikistan.
(National Treasury, 2013)	Citizens and taxpayers do not get full value for money and service delivery because SOEs are vulnerable to waste and corruption.

2.4 WEAKNESSES IN EXISTING MEASURES TO OVERCOME SOE CHALLENGES

Although the strategies of individual countries for leveraging the performance of SOEs vary, there are some common elements across all countries (Kweka, 2019). These commonalities include the establishment of frameworks to guide decision-making that balances societal value with commercial profitability as well as the re-engineering of operations to reduce or prevent non-value-adding activities (Martorano, Sanfilippo & Haraguchi, 2017). Several researchers have addressed the demand to reduce wasteful expenditures and improve the efficiency of

SOEs by improving internal systems and processes to combat the performance challenges faced by most SOEs in South Africa and globally (Adjansi & Mbo, 2013; Gewfoe, 214; Mbele, 2015; OECD, 2018 PRC, 2013; Sanusi, 2016). However, some studies argue that in many cases, changes to regulations, structures, and processes have not led to the expected results due to the increasingly unstable environment that is situated within traditional public bureaucracies (Gumede, 2019).

One area of weakness associated with the existing measure of SOE performance improvement is cross-country relevance, often referred to as memetic isomorphism, which results in factors that shape policy transfer; leadership attitudes toward institutional receptivity to change have also been highlighted by previous researchers (Cole & Jones, 2005; Osborne, 2007). Furthermore, despite the increase in expectations for government action and output, the existing models still lack a focus on the relevance to "public value" (Tria & Valotti, 2016). Research regarding public value conflicts has shown that specific values repeatedly come into conflict with one another due to multiple outputs that may result from public reform and the value created by government through changes in legal regulations and other actions (De Graaf, Huberts & Smulders, 2016).

Recent findings suggest that strategies for implementing corporate governance systems can prevent SOEs from failing (Estrin & Pelletier, 2018; Mutize & Tefera, 2020). These findings have led to research interest in the most effective and efficient global operation strategies and a plethora of new management practices encapsulated under themes such as total quality management and lean philosophy. These practices have often been advocated as universally applicable to different organisations and contexts and therefore overcome some of the limitations of the existing measures. Hence, there is a need to look at lean manufacturing principles and their application to SOEs.

2.5 LEAN MANUFACTURING CONCEPTS AND PRINCIPLES

Lean manufacturing is an integrated sociotechnical system that comprises principles, practices, tools, and techniques that improve the speed, cost, and quality of any process by eliminating waste, synchronising workflows, and managing service flows (Ingvaldsen & Benders, 2016; McCann, Hassard, Granter & Hyde, 2015; Wittrock, 2015). The reduction of waste is the cornerstone of the lean approach, where waste is all non-value-adding activities (Mungovan, 2009). Lean has been a topical issue of discussion over the last decade across different fields

of application, which has resulted in a plethora of lean concepts with different objectives and scopes (Bhamu & Sangwam, 2013:87). The lean government is part of a growing trend of management tools designed to lower costs and improve the efficiency of government operations (Scorsone, 2008). In Chapter 1, a brief review of lean concepts and their application to the study were explored, namely, specifying value, identifying the value stream, making the value flow, making the customer pull from the producer, and pursuing perfection (Hines, 2010; Maarse & Janssen, 2012; Womack & Jones, 1996). Arlbjørn et al. (2010) presented a multilevel approach to conceptualising lean (Figure 9).

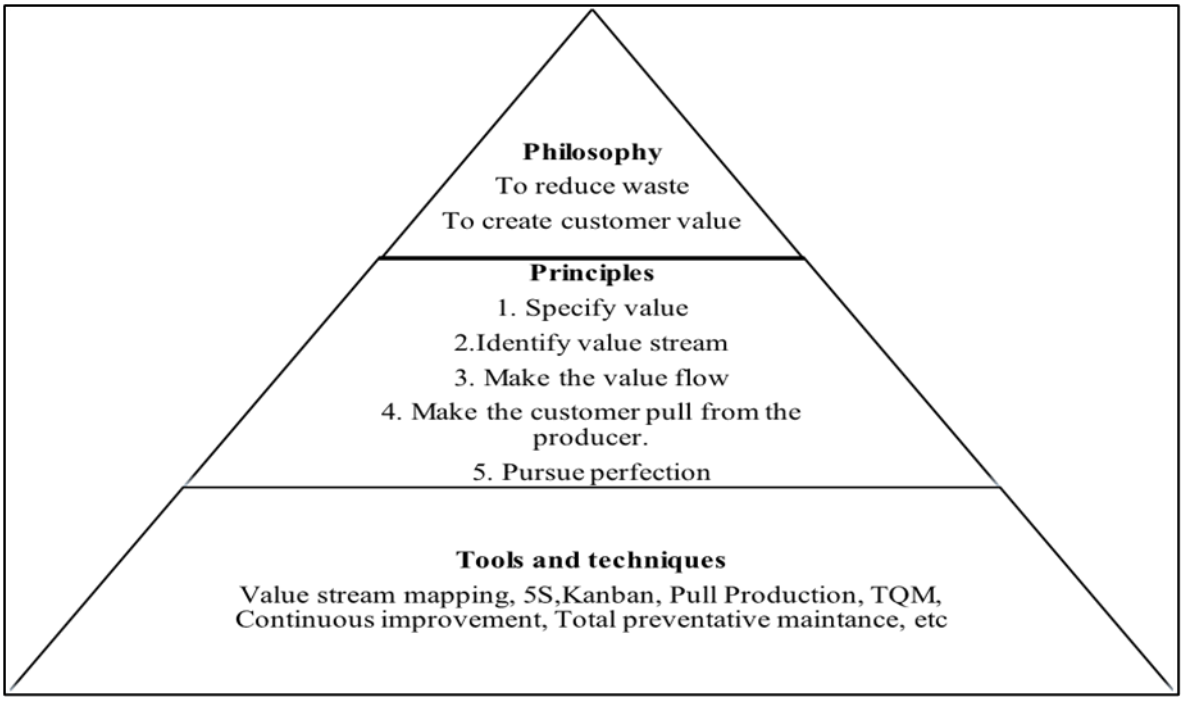


Figure 9: Three layers of lean conception (**Source:** Adapted from Arlbjørn et al., 2010).

The levels of abstraction from these researchers demonstrate that the first level of abstraction regarding lean philosophy involves balancing waste reduction and customer value. The second level comprises the five lean principles outlined by the Toyota production system (Womack & Jones, 1996), while the third level comprises the wide range of tools and techniques used to drive lean implementation. Consistent with this notion, other researchers have tried to use various tools, techniques, and principles to achieve excellence in the implementation of lean manufacturing in various sectors and processes (Anand & Kodali, 2010; Duiker, 2014; Jasti & Sharma, 2013; Nurcahyo & Kristihatmoko, 2010). Furthermore, the implementation of lean principles in different sectors demonstrates the versatility of lean principles and has attracted increasing interest from researchers over the past decade (2010-2020), (Bateman, Hines &

Davidson, 2013; Bortolotti & Romano, 2012; Browning & Sanders, 2012; Durakovic, Demir, Abat & Emek, 2018; Ericksson, 2010; Radnor et al., 2012).

However, one of the tensions highlighted by researchers arises when trying to apply lean principles and concepts to more complex and different industries, such as the public sector, due to numerous issues, such as the following:

- Different specificities of the public sector environment (Arfmaan & Barbe, 2014; Batema et al 2013; Mustapha et al 2017), for example, balancing political mandates, state-owned entity reliance on the government for bailouts, institutional receptivity to change, political bureaucracies and leadership attitudes (Igrams et al., 2020).
- Translation and re-evaluation of the lean concepts from the private sector context to the public or government sector must be considered to determine whether this substantial investment of time and resources will produce a sound payoff. (Bateman, Hines & Davidson, 2014).
- Lack of understanding of the voice of the customer across a range of public sector organisations (Rodgers & Anthony, 2018).

The subsequent issue arising from applying lean principles to different contexts where they were not previously applied may result in less favourable results than anticipated (Arlbjørn, et al., 2010). In this study, the following three levels of lean abstraction were considered, as indicated in the preceding section (philosophy, principles, tools and techniques), while the adoption of lean principles (level 2) in the public sector (SOE) was the most central issue. In the subsequent subsections, the three layers will be reviewed to ascertain which of the existing lean tools presented a "fit" into a single framework to possibly drive the adaptation of lean principles for public sector organisation.

2.5.1 First layer: Lean philosophy

Studies that have discussed lean philosophies (Carter et al 2011; Hines et al 2008; Papadopoulos et al 2011; Robinson et al 2012; Kregel & Coners, 2018); Anthony et al 2017) consider waste reduction and value creation for the customer to be the main objectives. However, in conceptualising customer value, researchers agree that the approaches remain contingent upon various operating context meanings and emphases (Al-Ashaab, Kerga, Khan & Shehab, 2015; Busacca, 2008). As such, those using Womack and Jones' (1997) first lean

principle ('specify value from the standpoint of the customer') should adapt it so that the emphasis is on specifying the public value that is to be delivered (Bharosa et al., 2008; Maarse, & Janssen, 2012 & Elias, 2014). However, the study also needs to explore what value constitutes and comprises public entities. To minimise this gap, the study provides a consolidated definition of value.

Value in terms of lean has been defined by different scholars (Elias, 2014; Mulgan, Breckon, Tarrega, Bakhshi, Davies, Khan & Finnis, 2019; Peralta, Echeveste, Lermen, Marcon & Tortorella, 2019; Sales & Castro, 2020; Shamah, 2013). Some researchers have linked the constructs of customer satisfaction and perceived quality to customer value, and often, these two constructs are used synonymously (Graf & Mass, 2008). While these studies place the customer at the centre stage of defining value, the concept of customer has recently been challenged by new lean studies indicating that the classic characteristic of "customer" (the ability to choose between different products and choice to spend money according to the most perceived value offering) requires more deliberation within the public sector context (Khan, Al-Shaab, Shehab & Kerga, 2015; Elias, 2014; Gulyaz, van der Veen, Venugopal & Solaimani, 2019; Maarse & Janssen, 2012). Unlike in the private sector, public organisations must balance economic, social and other objectives to create value for their customers, who often can also be citizens who have several roles, including those of the taxpayer, voter, and patient (Bateman, Hines, & Davidson, 2013).

These empirical reviews suggest that the primary customer in the public sector is the direct user of the public service. There is consensus among surveyed studies that, in the public context, value refers to organisations' ability to deliver social and economic outcomes that correspond with citizens' expectations (Cordella & Bonia, 2012). This approach argues that public sector organisations must be clear about the mandates for which these entities are required to meet, the services they deliver and the value they create. In support of this, Adams and Simnett (2011) state that integrated reporting (IR) provides a comprehensive analysis of what the value drivers of the public sector are and how an organisation plans to leverage this going forward. In addition, World Bank Group (2016) notes that traditional reporting frameworks that focus only on historical financial information are not fit for multidimensional public sector organisations.

On the other hand, IR provides a multidimensional representation of an entity (Owen, 2013). For example, the IR framework requires that the integrated report describe the entity's

operating strategy, objectives, stakeholder engagement, performance, and social and political imperatives, which all culminate in public sector value creation (Surty, 216). Furthermore, defining value for direct users of public services (customers) must consider social values as well as the equitable provision of services, which is included in the IR framework (Maarse & Janssen, 2012; Radnor et al 2011). Therefore, the IR framework provides a more holistic business model that enables a more favourable understanding of value; that is, value is encompassed in strategy, performance, organisational context, governance and policy objectives and stakeholder engagement (IIRC, 2013).

Reducing waste: The lean concept considers all non-value-adding activities waste (Mungovn, 2009Radnor & Walley, 2008). Following this understanding, identification of these nonvalue-adding activities is a theme followed up by most researchers, who have researched the different types of wastes that are prevalent within the public sector environment (Mungovan, 2009). As mentioned in Chapter 1 (section 1.1) of this research, the seven wastes that are targeted by the lean manufacturing philosophy are overproduction, inventory, overprocessing, motion, waiting, defects, and transportation (Mungonven, 2009). It is widely accepted in lean studies that value stream mapping is an effective tool for identifying wastes in the process, ultimately leading to waste reduction and improving the undesirable complexity within systems (Drotz, 2014; Durakovis, Demir, Abat & Emek, 2018; Sourin & Rooke, 2013). However, some researchers have focused on the limitations of value stream mapping in revealing different types of waste (Dinis-Carvalho, Morerira, Braganca, Costa, Alves & Sousa, 2014). Dinis-Carvalho (2014) argues that waste identification diagrams are more effective than value stream mapping in terms of representing more forms of waste. This argument is of particular relevance to public sector organisations due to the constraints in some public sector processes that may be identifiable as waste (Scorsone, 2008). Therefore, extending a waste reduction tool to all contexts of lean implementation may be beneficial.

Another problem with value stream mapping in the public sector is that it fails to consider the cost of wastes associated with inventory and waiting time between the processes associated with batch process types (printing, manufacturing, and information technology) (Huang & Liu, 2005). Other limitations relate to the inability of value stream mapping (VSM) to address the dynamic behaviour of production processes and to encompass their complexity (Nwanya & Oko, 2019). This is due to the complexity of applying VSM to low-volume, high-variety industries (Braglia, Carmignani & Zammori, 2006). Furthermore, customer requirements vary

so drastically in a low-volume, high-variety industry where – to meet a range of applications – there may be variety in the order of operations employed (Qudrat-Ullah, 2012). One example of a low volume and high variety is where design and development are needed in customised electricity solutions for self-built connection projects that enable the customer to connect to the power grid much faster.

Another example is the design of services for citizens, which increase quality and respond to real needs (e.g., personalised healthcare services accessible via mobile clinics). The delivery system to citizens involves technological applications, work processes, internal and external resources and complexity management in the design of the services. Another difficulty is to represent production systems with a large diversity of products and production routes (Chitturi, Glew & Paulls, 2007). To overcome some of these limitations, the waste identification diagrams proposed by Dinis-Carvalho (2015) are considered to represent different forms of waste, which overcomes some VSM limitations. These waste identification diagrams will be discussed in the next section.

2.5.1.1 Waste identification diagrams

Although the use of a VSM tool to eliminate nonvalue-adding activities (wastes) has been applied successfully in some studies (Abdulmalek & Rajgopal, 2007; Rahani & Al-ashraf, 2012), there is a need to extend the scope of application of the tool to other sectors to address these limitations, as discussed in the above section of the study. Furthermore, a clear gap exists in the analysed literature in the application of the VSM tool for public sector organisations (SOEs); hence, this is the unique aspect of this research. Therefore, an adaptation of the waste identification diagram proposed by Carvalho et al. (2015) to represent public sector waste is explored to improve the VSM tool and its application to public sector organisations (SOEs). This adaptation is necessary to answer research question 2 of this study: What waste is inherent within the public sector environment in South Africa?

The waste identification diagram proposed by Carvahlo et al. (2015) comprises three main types of icons: blocks, arrows and pie charts. In the diagram, the blocks represent workstations, the arrows represent transportation effort, and the workforce time use is graphically depicted by means of a flow chart. This visualisation method is instrumental in identifying and understanding inefficiencies, bottlenecks, and areas of improvement within operational workflows. Figure 10 illustrates these icons and their corresponding measurement parameters; it provides a practical example that elucidates how this diagram aids in dissecting and

addressing inefficiencies, providing a clear visual guide for enhancing process efficiency and productivity.

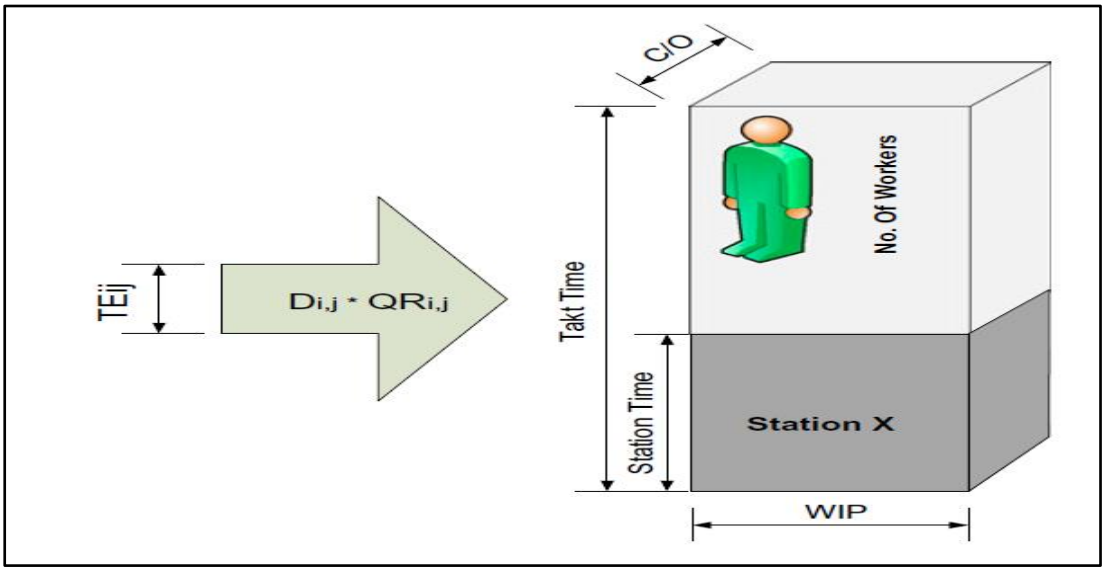


Figure 10: Waste identification diagram main icon (**Source:** Carvalho et al., 2019).

The takt time, as defined by Chen and Christy (1998), is calculated as follows:
Takt time = Operation time per day (min)/customer demand per day (units). Applying this formula to the latter literature will assist in deriving the throughput time at that station, that is, the time that products spend since the moment they arrive at the Station X waiting queue until they leave the station after being processed. Another possible approach to reduce waste is to consider waste elimination frameworks, often referred to as lean manufacturing frameworks.

2.5.2 Second layer: Lean principles

Lean principles originated in the early twentieth century at the Ford Motor Company to maximise production and eliminate waste (Womack, Jones & Roos, 1990). Although lean was associated with automotive manufacturers, lean principles have been widely applied beyond their origins in the automotive industry to various industrial, service and government sectors (Botti, Mora & Regattieri, 2017; Hines et al 2014; Qaid &Albezuirat, 2020; Radnor, 2010). To achieve the lean goal of reducing waste, Womack and Jones (2010) define five fundamental principles of lean as specifying value from the standpoint of the customer, identifying the sequence of value-adding activity, establishing flow throughout the steps that create value, and determining what is pulled by the customer and striving or perfection by removing all non-value-adding activities.

2.5.2.1 Lean principle 1: Specifying value from the standpoint of the customer.

As mentioned in section 2.5.1 of this study, value in terms of lean has been defined differently by different researchers (Elias, 2014; Mulgan et al 2019; Peralta et al 2019; Sales & Castro, 2020; Shamah, 2013). There is agreement within the lean manufacturing literature that value can be defined only by the customer (Hines, 2010; Bateman et al., 2013). The major concern raised by researchers regarding specifying customer value within the public sector context is the translation of customer value to public value. Researchers argue that when lean practices are extended to wider applications such as the public sector, customer value must be translated to public value (Bateman et al 2013; Elias, 2014; Maarse & Janssen, 2012; Radnor et al 2011). Studies that have discussed public value (Benington, 2011; Faulkner, 2017; Page, Stone, Bryson & Crosby, 2015) suggest that public value is produced by public managers who are successfully navigating the strategic triangle of an organisation, which encompasses producing valued outcomes and doing so within the constraints of available resources and capability and the authorising environment of legal frameworks and policy mandates.

However, there is a common consensus on value in terms of lean differences arising in the measurement of the value created by an organisation for the public sector. For example, Faulkner and Kaufman (2017) find that four themes capture public value measures, namely, outcome achievement, trust and legitimacy, service delivery quality, and efficiency. In contrast, other researchers such as Lukrafka, Silva and Echeveste (2020) argue that a major component of creating public value is also addressing cultural changes and the inclusion of value from the citizen's perspective. For consistency with the literature on lean practices in the public domain, the researcher of this study adopted a broader perspective of public value, which presented a summary of public value measurement dimensions: strategy, performance, organisational context, governance, policy objectives and stakeholder engagement (Benington, 2011; Bannister & Conolly, 2014; Karkin & Janssen, 2014).

2.5.2.2 Lean principle 2: Identifying the sequence of value-adding activities (value stream)

Rapcevičienė (2014) understands the value chain of an organisation as the first critical step in VSM. The concept of the "value chain" was popularised by the seminal work of Porter (1995) in his book titled "The Great Transition". Porter explained that the value chain defines the end-to-end streams of activities that deliver results for a given customer (external or internal). In line with the value chain, VSM involves identifying all the steps in the value chain and eliminating steps or processes that are not value added (Maarse & Janssen, 2012)The VSM is

regarded as a critical step in any lean transformation (Hoverstadt, 2020). However, one of the most significant barriers to VSM for public sector organisations is often identifying what constitutes customer value (Martin, 2016). As discussed in the lean philosophy section of this study, customers in the public sector include all relevant and interested parties, including citizens, taxpayers and other stakeholders. Hence, the value stream should cover all interested parties to provide value and eliminate waste (Ramly, 2020). In line with the waste elimination diagram that the researcher proposed in section 2.5.2, identifying the sequence of value-adding activities for the public sector must consider that a constant good fit can be congruent with the public sector context.

According to Hansen and Stoner (2009), for an organisation to streamline its processes appropriately, a thorough understanding of where the value lies in each step of the process must first be established. Establishing where value lies in each step of the process includes mapping out the current situation as a holistic overview of the entire production or service provision process (including the value- and nonvalue-adding activities) (Rother & Shook, 2003). A comparison of the principle of VSM between the private sector and the public sector environment demonstrated some significant differences (Bonaccorsi1, Carmignani & Zammori, 2011). For example, Rapcevičienė (2014) argues that the private sector value chain focuses on creating profit for the business, while the public sector value chain focuses on providing value to citizens, which includes overall service delivery.

Researchers have agreed on three core components of the public sector value stream, namely, citizens/customers, services and trust (Heintzman & Marson, 2003; Hietzman, 2010; Kaplinsky & Morris, 2002; Kaplinsky, 2002). Therefore, when mapping and analysing the value stream for lean manufacturing in the public sector, these three sets of value "drivers" must often be considered (Poksinska, 2010). Furthermore, increasing employee involvement is a value driver that must be considered (Shah & Ward, 2007). Employees often are the drivers of organisational processes; therefore, their involvement is closely related to continuous improvement, which consists of taking small steps to improve process waste. (Campen & Hertzberger, 2009).

2.5.2.3 Lean principle 3: Establishing flow throughout the steps that create value.

Wroblewski (2018) believes that once the value-creating steps have been identified, they should occur in sequence. This lean manufacturing principle ensures that the product or service will flow unhindered to the customers. A flow is perfect when there are no interruptions

between the order and the delivery to the customer, unless the customer requests customised products and services or other changes (Maarse & Janssen, 2012)The likelihood of interrupted production or service provision is kept low through the continuous availability of the necessary inputs while creating flow in a process (Mbo & Ajasi, 2018). In the public sector context, issues relating to the physical movement of goods (tangible products) and the related information flow and business processes are areas where additional empirical studies need to be conducted (Freytag & Haas, 2011).

Second, flow through the viable systems view involves overall cohesion and synergy of the process in an organisation (Espejo & Kuropatwa, 2011). The principle of flow may be applicable in SOE organisations through related activities (people from many different departments who may be involved in the procurement process). In this case, other employees are sometimes not aware of related issues, objectives, or strategic imperatives that may be necessary for customer satisfaction or public value. Table 5 summarises some studies related to workflow processes for the public sector.

Table 5: Summary of studies that outline flow processes for the public sector (**Source**: Own)

Description of Study	**Source**
Making the value flow: application of value stream mapping in a Brazilian public healthcare organisation.	Tortorella, Fogliatto, Anzanello, Giuliano Marodin, Garcia & Esteves (2017).
Lean manufacturing measurements; relationship between activities and lean matrix.	Duque & Cadvid (2007).
Lean thinking: planning and implementation in the public sector.	Almeida, Galina, Grande & Brum (2017).
Lean flow and pull principle.	Bert (2011)

In applying the relevant characteristics of flow in the public sector environment, Asnan (2015) argues that the lean principle of flow is not apparent because some public sector output is not able to be seen as a physical product. Therefore, obtaining cohesion from the perspective of complex SOE organisations is necessary when the lean principle of flow is explored. Even in other SOE processes, such as electricity generation, the flow of production can be interrupted by plant breakdowns, leading to several outages and load shedding. The principle of flow is

therefore applicable to SOEs. However, the conceptualisation of flow requires improvement, and the viable system model offers a functional understanding of flexible flow that can be adapted to public sector organisations.

2.5.2.4 Lean principle 4: Establish Pull

According to Slack et al. (2017), just in time (pull technique) is a paced technique aimed at improving global productivity and eliminating waste. The result of a pull system is a reduction in inventory and increased flexibility because the system can cope with constantly changing demand (Lindner & Becker, 2010). In the simplest definition, a process bottleneck is a work stage in which more work requests are received than can be processed at its maximum throughput capacity. This causes an interruption of the flow of work and delays the production or service provision process of an organisation (Kanakana, 2013). Simply put, a pull system focuses on avoiding excessive bottlenecks in the process by restricting production or service provision to what is required in downstream processes (Chay et al 2013). This process is often referred to as the Kanban method (Herrmann, 2008).

Essentially, the purpose of implementing a pull system is to build products based on actual demand and not on forecasts (Thakur, 2016). On the other hand, establishing pull is likely to lead to challenges in the public sector, as there is no direct link between demand and supply. One example of this is in the generation of electricity, where demand is most often higher than supply (Sadiki, 2015). Instead, there is more push than pull, and the supplier of services (the government) decides what is offered and when (Maarse & Janssen, 2012). From the literature reviewed, other researchers such as Barraza, Smith, and Dahlgaard-Park (2009) and Drotz (2014) argue that the implementation of a pull system is appropriate for the public sector. However, for the purposes of fit, it should be renamed ‘demand readiness’. Other scholars such as Bateman et al. (2013) are concerned with the application of the pull method to public sector organisations. Some researchers such as Maarse and Janssen (2012) suggest that a number of interdependent factors block the establishment of pull systems in the public sector context. Some of these factors are fundamental to the structure of the public sector organisation; others are related to culture, public values and a democratic system. In a pull system, customers pull value from the next upstream activity when they want it, and the allocation of resources (human, material, and finance) follows customer demand (Jones & Michelle, 2011). The last principle of lean culture is to pursue perfection until a state is reached in which perfect value is created with no waste. This principle is discussed below:

2.5.2.5 Lean principle 5: Pursue perfection.

In lean manufacturing, pursuing perfection is concerned with making improvements as a continuous effort (Arlbjørn et al., 2011). The objective of perfection is fundamental to lean to make leaps of improvement by involving everyone in the organisation to focus on improvement as a goal. According to Marzouk, Bakry and El-Said (2016), perfection is pursued by continuously applying the first four lean principles (specifying value, identifying value streams, making value flows and helping customers pull from producers) to assess new options for continual improvement (Singh, 2012). Continual improvement is delivered through several approaches, such as Kaizen (Kai – do, change; Zen – well) (Jasti & Kodali, 2014), root cause analysis (Jones, 1996; Sighn, 2016), and the Plan-Do-Check-Act cycle (Barraza, Smith & Dahlgaard-Park, 2009).

Continual improvement through root causes is achieved through different approaches, such as root cause analysis (5 WHYs). For example, in public service delivery, the 5 WHYs can be used to investigate the causes behind delays or bottlenecks in services, probing beyond surface-level problems to identify systemic issues. Similarly, within governmental agencies, employing root cause analysis can help unveil the reasons for recurring errors or lapses in processes, allowing for targeted solutions that address fundamental issues rather than merely treating symptoms. The steps followed in root cause analysis are shown in Table 6 and often lead to permanent feasible solutions and continuous improvements.

Table 6: FIVE WHY approach to root cause analysis (**Source**: Own)

5 WHY approach	**Problem Statement: Wheel mark or wheel touch**
1st WHY	Wheel touch (mark) created due to uneven gap between grinding wheel face and component face.
2nd WHY	Uneven gap arises, because the operator sets the gap between grinding wheel face and work piece face manually and by his own judgement after each wheel dressing.
3rd WHY	Because no facility of auto adjustment of this gap is provided on machine.
4th WHY	The machine is old enough and no idea of this kind of problem (on that time) could be imagined.
5th WHY	No facility on machine to measure this gap.

Root Cause	No facility provided on machine for measuring gap between grinding wheel face and work piece face after wheel dressing.

According to Singh (2016), Kaizen is implemented through incremental projects known as Kaizen events by work standardisation towards improvement. These Kaizen events can be selected for all processes in the organisation through the involvement of employees following a bottom-up approach as the suggestion for improvements. These small increment projects are known as Kaizen events and can be selected for each department of the organisation and the workers suggest these improvements. For example, each department can identify and select specific areas for improvement, encouraging workers to propose and implement enhancements. The root cause concept follows both top-down and bottom-up approaches, where the need for improvement is suggested and introduced by top management as well as by the workers of the organisation (Imai, 1986, 1997; Kumar et al., 2018). Figure 11 shows the main differences between Kaizen and the root cause approach.

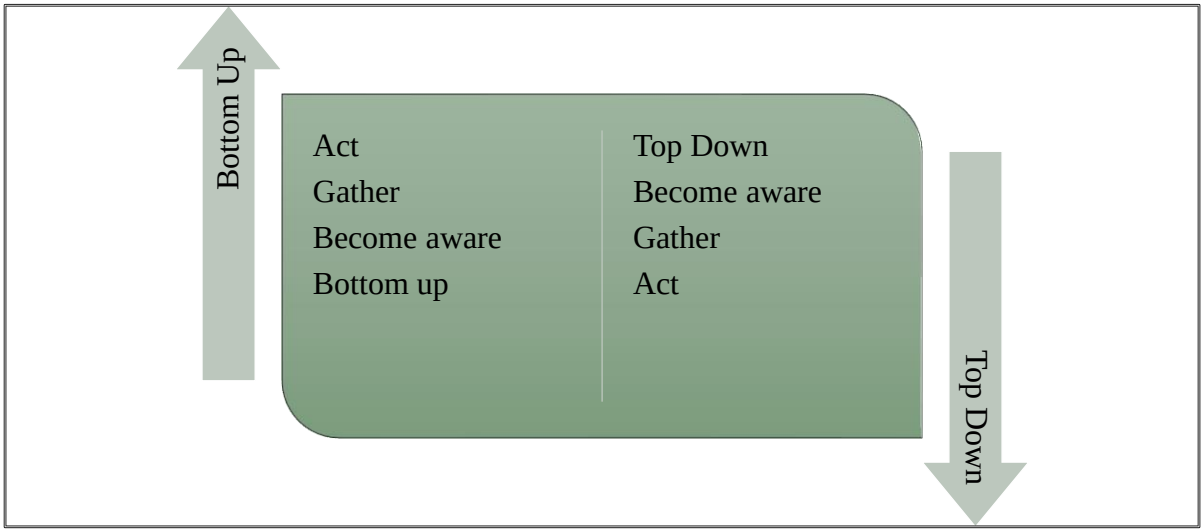


Figure 11: Differences between Kaizen and Root cause (**Source:** Own).

This study does not consider the perfection approaches, such as the Kaizen approach, discussed in the literature. The main reason for this consideration is that Kaizen goes through with systemic and long-term thinking of the whole organisation and all processes and thus minimises variety for S1 in the viable systems model (consisting of a core operational system) and S2 coordination (coordination functions for System One) and contributes to overall perfection in the organisation's process. Kaizen is even more essential in the public sector environment (SOEs), where the improvement of the level and quality of services delivered by SOEs is important, and the suggestions for this improvement are from various governmental and non-

governmental entities, as well as the employees of SOEs (PRC, 2013). It can therefore be argued that the principle of pursuing perfection is applicable to public sector organisations; however, perfection must be adopted as Kaizen's bottom-up approach.

The study's focus on a bottom-up approach aligns with the principles of Kaizen, despite not explicitly considering it. Known for its systemic and long-term thinking, Kaizen advocates for continuous improvement across an organisation's processes, mirroring the emphasis on gradual enhancements present in this study's bottom-up methodology. This alignment becomes particularly crucial in the public sector, notably in SOEs, where the improvement of service levels is paramount. Like Kaizen's approach of gathering suggestions from various sources, including governmental bodies and employees, this study's emphasis on bottom-up inputs aims to harness diverse insights for refining processes and enhancing service quality within the public sector environment. Therefore, while not directly addressing Kaizen, this study's adoption of a bottom-up approach resonates with the principles of continuous improvement advocated by Kaizen, especially in the context of fostering organisational perfection in the public sector.

2.5.3 The third layers of lean: Tools and techniques

Studies on the successful implementation of lean manufacturing suggest that, for lean practices to be implemented successfully, an organisation should have practiced lean practices at all three levels, as per the lean abstraction introduced in Figure 9 (Arlbjørn et al., 2018). Furthermore, to reduce or eliminate the above waste, researchers agree that lean implementation is not driven by lean principles; however, lean tools at organisations' disposal are needed to operationalise lean principles (Asnan et al 2015; Duque & Cadavid, 2007; Tyagi, Yang & Chambers, 2015). Almanei et al. (2017) conduct a study of lean implementation frameworks. The research findings reveal that lean tools are valuable, but that success depends on how the tools are implemented. Thus, success lies in the selection of the proper people's system, the definition of the right people, the right process and the right team for implementation. Similarly, Lodgaarda, Ingvaldsena, Gammea and Aschehouga (2016) find that training and knowledge on how to utilise chosen tools and practices (VSM, Kanban, Kaizen, root cause, 5S and others) is necessary.

In this study, lean tools such as VSM, Kanban, root cause and Kaizen have been discussed for consideration in public sector organisations. The bottom-up approach is selected because it

overcomes the limitations of complexity that can bring about some public sector specifications, such as bureaucracy, and improvement opportunities are suggested by the employees who work with the processes. The evidence outlined in this section provides background information on lean manufacturing principles and their application in the public sector context. However, several disparities have been noted in several lean implementation frameworks that have been researched and developed over the last decade. These imbalances are discussed in the next section of the research.

2.6 WASTE ELIMINATION/REDUCTION FRAMEWORKS

Several waste elimination frameworks have been developed and published (Anand & Kodali, 2010; Belhadi, Touriki & Fezazi, 2016; Karim & Arif-Uz-Zaman, 2013; Mostafa, Dumrak & Soltan, 2013; Rose, Deros & Rahman, 2010; Wolmack & Jones, 2003). These frameworks have led to an understanding of the application of lean tools and principles in different contexts as well as to compare the different contexts to develop a practical and suitable framework that includes all the components (process, tools, and success factors) that are necessary to adapt lean practices to the public sector environment. A summary of these frameworks is presented in Table 7

Table 7: Review of the main lean manufacturing frameworks (**Source:** Own).

Author	**Description of lean Framework**	**Discipline**	**Findings**	**Limitations**
Belhadi, Tourki &Fezazi, (2016:86).	Framework for lean production systems.	SME	The proposed frameworks provide an overcoming for the gap identified in existing frameworks. It also brings together a set of critical elements for lean implementation in SME's.	The study is limited by the fact that its applicability is only favourable to implementation only in SME and is not general enough to suite differing contexts.
Mostafa, Dumrak &Soltan, (2013:44-64).	Project base framework with detailed four implementation stages. Monitoring and Controlling process is integrated to all phases to ensure that the expected results toward lean transformation are completely delivered.	Generic	This study has established a conceptual association between the success of lean initiatives, initiatives elements and organisational practice through the three constructed formulae.	It requires further implementation to different contexts in order to be validated.
Karim & Arif-Uz-Zaman, (2013).	Effective framework for implementing lean. manufacturing strategies	Manufacturing Organisations	Proposed methodology is able to systematically identify manufacturing wastes, select appropriate lean tools, identify relevant performance indicators, achieve significant performance	Method developed has been demonstrated by applying it in real life assembly process and not in a continuous flow process which is a setting for some South African state -owned Enterprise (SOE).

			improvement, and establish lean culture in the organisation.	
Anvari et al. (2010)	Lean framework with 3 implementation stages (preparation, design and implementation).	Manufacturing Organisations	Framework provides a contingency approach or a dynamic lean pathway for different types of industries based on "understanding your current state and your desired future state".	Worth to note, the framework presented biased towards top-down approach and carried out on discrete project basis where the implementation initiatives are mostly from the top management (Chay et al 2015).
Arbjørn, Freytag & Haas, (2011:277).	Analysis of lean implementation in Danish municipalities through the use of two sets of questionnaire surveys from 2008 to 2009.	Government Sector	The analysis show that the lean philosophy can be used by the public sector to be more effective in terms of cost reduction and service improvements if the assumption for implementing lean exists.	From a supply chain perspective, data are collected only from a focal firm perspective (municipalities). Future research must investigate lean applications in public service supply chains from inter organisational perspectives.
Xu, Tiwari and Chay (2015:1031)	Provide an analysis of existing lean implementation frameworks	Generic	Through the analysis of different frameworks, the researchers found that, some of the lean production principles were often overlooked by the researchers hence they failed to deliver the gist of lean	The majority of the analysed frameworks were prone to top-down approach, neglecting to include shop floor workers and supervisors from the onset.

Although the reviewed frameworks offer significant contributions in different operating contexts, none of them have been implemented or validated for the public sector. Some of the frameworks, as cited above, are not flexible enough to suit the public sector context. The current gap that the researcher has identified in the literature is the lack of a lean implementation framework suitable for SOEs in South Africa.

For example, Belhadi, Touriki and Fezazi (2016:786) explored several lean implementation frameworks, including all the components required for implementing lean practices properly (Anand & Kodali, 2010; Karin & Arif-Uz-Zaman, 2013; Mostafa et al 2013; Rose et al 2010). These frameworks are usually roadmaps guiding organisations on how to implement lean manufacturing, highlighting the sequence of the lean tools to be introduced in the organisation and, in some cases, the success criteria. Against the backdrop of these frameworks, Kregel & Coners (2018), develop a framework for the implementation of lean practices in SMEs. Although the framework offers a significant contribution to lean implementation, its application, which is derived from the practical experience of SMEs, limits its use in lean implementation in the public sector.

Anvari et al. (2001:5) review lean frameworks that were presented between 1996 and 2001 and highlight the key similarities that these frameworks exhibit. They assert that three major stages can be identified when implementing a lean implementation framework: planning, designing, and executing. Mostafa et al. (2013) avert that the distinguishing factor in their proposed framework was overcoming the limitations of the existing frameworks by proposing a lean implementation framework that covers all success factors found in previous studies. Karim and Arif-Uz-Zaman (2013:169) develop a systematic framework for lean implementation in manufacturing companies and develop a new leanness evaluation metric, with an emphasis on measuring manufacturing efficiency and effectiveness. Furthermore, Karim and Arif-Uz-Zaman (2013) are critical of the framework developed by Anvari et al. (2010), indicating that it failed to establish a systematic methodology by which manufacturers could identify wastes, evaluate existing performance, remove those wastes, and recalculate the performance and use sustainable lean tools for continuous improvements.

Chay, Xu, Tiwari and Chay (2015:1031) investigate shortfalls in the current lean implementation frameworks by analysing “what” is the approach of lean implementation, that is, top-down or bottom-up. Top-down approaches introduce a level of complexity in that the approach introduces levels of resistance and lack of engagement of staff (Heath & Heath, 2010), while a bottom-up approach enhances ownership and communication between

employees (Drotz, 2014). Second, Chay et al. (2015) analysed “how” to implement lean (description of steps or sequences of lean implementation during the lean journey); third, they analysed “why” is the reason for adopting the proposed lean tools, techniques or practices (hereafter TTPs) in each phase of lean implementation. Lastly, they analysed “who” are the targeted internal stakeholders for using or applying the lean practices proposed in the frameworks.

Chay et al. (2015) found that most of the currently available lean frameworks are prone to a top-down approach rather than a bottom-up approach. Researchers often overlook improvement initiatives from shop floor employees. In proposing their frameworks, most of the researchers have neglected the importance of the “why” aspect in the adoption of the framework itself without giving the “reason” for each of the elements in lean implementation. In addition to the “what” and “how” aspects, the “why” aspect is important for contributing to capability building among shop floor employees through improvements, problem solving or waste elimination activities (Chay et al 2015:1032).

Almanei et al. (2017:755) review the “enterprise-level roadmap” that was developed for lean aerospace initiatives in 2011 and found that this roadmap is composed of three main stages: the “entry”, the “long-term” and the “short-term” cycle. The roadmap provides requirements for all three stages. A description of the top-level flow of primary activities is provided as a starting point. Descriptions of the key tasks required within each primary activity ultimately lead to a discussion of the issues, enablers, barriers, case studies and reference material relevant to each task in a common structured framework. This roadmap provides a holistic approach to the whole enterprise.

Wright (2015:17) describes a framework for the implementation of lean principles in the form of a roadmap and sequences the various lean tools in a logical manner. Indicatively, the process starts with the formation of a team, and then several lean tools are implemented, including 5S and VSM, for the identification of the various types and sources of waste. According to Wright (2015:17), the idea behind the framework is to allow the introduction of line balancing (a process line refers to the equitable distribution of workload or tasks among various workstations or stages within the production process), the process line, the introduction of pull (one-piece flow), and cellular manufacturing. Obviously, the framework must be adapted to the specific needs of the organisation. Xu, Tiwar and Chay (2015:1031) report that one of the reasons for inefficient lean transformation is a shortage of lean implementation frameworks or plans for implementing lean practices. Furthermore, Xu et al. (2015) analyse shortfalls in

several lean implementation frameworks and found that most of the currently available lean frameworks were prone to a top-down but not bottom-up approach.

1. The improvement initiatives of shop floor employees were often overlooked by researchers.
2. In proposing their frameworks, most of the researchers had neglected the importance of the "why" aspect in the adoption of tools, techniques, and practices (TTPs).
3. The framework itself does not provide "reason" for each of the elements of lean implementation.
4. The current frameworks were prone to a "one-best-way" approach with lacking contingency, which is one of the common criticisms against a lean.

2.7 CONCLUSION

This chapter provides an overview of SOEs on a global scale and from a South African perspective. The global perspective of SOEs provided insight from other countries into the South African context. SOEs are central to the delivery of essential goods and services. Therefore, the way they deliver on their mandates has direct implications for the value they are creating. This chapter further discusses the reasons for the negative perceptions that dominate research regarding SOEs throughout the 1980s and 2000s, resulting in large-scale privatisations in developed countries (Bortolotti et al 2004; Kim & Chung, 2008; Musacchio & Lazzarini, 2014; Robinett, 2006).

This research argues that privatisation does not necessitate the improvement of SOEs in the delivery of their outcomes or increasing value for the users of their services or products. Furthermore, one aim of the research was to review what constitutes value within the public sector context and to determine the effects and causes of non-value-adding processes within public sector organisations. Activities that can be referred to as nonvalue adding, which often culminates in waste, are prevalent within the public sector environment (Cheung et al., 2012; Mungoven, 2009). Waste can cause performance issues related to public sector organisations.

South African public sector organisations are marred by underperformance, loss-making and inefficiencies that burden fiscal performance and scarce resources (Marimuthu, 2020). A further investigation was conducted into existing measures that are undertaken by state-owned entities in the global context and in South Africa to address the rising challenges within the SOE landscape. Against this backdrop, the lean concept has been drawn to form an

understanding of creating value for SOE customers, reducing waste and improving efficiency. The exploration of lean practices has led to several lean implementation frameworks, which have been limited by their focus on private sector organisations. As such, the argument brought forward by the researcher is that it may be beneficial to develop a coherent public sector-focused framework to improve waste in SOEs. A further investigation into the theories that can that underpin lean is required and will be discussed in Chapter 3 of the study to find a relevant theory that can aid the understanding of lean manufacturing within the SOE environment. A synopsis of the literature in Chapter 2 is presented in Table 8.

Table 8: Synopsis of literature on state-owned entities (Chapter 2)

	Topic	Context	Issue/Problem	References
2.2	Background on state- owned entities	-Global overview of State-owned entities. -Market share -Sectoral contribution -Economic benefits -Previous findings and gaps	-Poor Performance -Service delivery issues -Waste in SOEs -Studies show a need for the reform that can lead to the improvement of the performance or service delivery models of SOEs	Mbele, 2015; McGregor, 2014:30; Ngonini, 2012; Sausi & Kanayane 2015; Thomas, 2016
2.2.1	Sectoral contribution of State-Owned Entities			
2.2.2	Importance of State-Owned Entities			
2.2.3	Research focus on SOEs			
2.3	State-Owned entities in South Africa	-SOE mandates in South Africa -Where are SOEs situated and which sector or schedule of governance - Sectoral basis of the contribution to GDP -Consolidation of challenges for both global and South African SOEs	How are the issues further highlighted in South Africa?	Atkins & Maroun, 2014 PRC, 2013; Capobianco & Christiansen, 2011
2.3.1	Classification of SOEs in South Africa into strategic sectors			
2.3.2	The role and significance of			

	SOEs in South Africa			
2.3.3	Challenges facing SOE in South Africa and Globally			
2.4	Weaknesses in existing measures to overcome SOE challenges	- Strategies of individual countries in leveraging SOEs -Weaknesses of present reform or improvement practices. -The need for an improvement framework for SOE to tackle the challenges.	Strategies of individual countries in leveraging SOEs have focused on changes to regulations, structures, and processes. This study found that these strategies have not led to the expected results due to the increasingly unstable environment that is situated within traditional public burecracies (Gumede, 2019). Furthermore, despite the increase in expectations for government action and output the existing models still lack the focus on the relevance to "public value (Tria & Valotti, 2016). The lean concept has been drawn to form an understanding of creating value.	Ovens, 2014; Setino & Ambe, 2016 Chatterji, Mumford & Peter, 2010; Depalo & Giordano, 2011 Kweka, 2019
2.5	Lean manufacturing concepts and principles	-Definitions - Lean abstractions -Lean principles -Lean tools -Lean waste elimination models -Lean manufacturing frameworks	The issue with lean principles is their focus on the private sector organisation and the lack of contingency.	Ingvaldsen & Benders, 2016; McCann, Hassard, Granter & Hyde, 2015; Wittrock, 2015
2.6	Research gap and conceptual framework	-Indicating a knowledge gap in the field of study leading to a need for a theory to apply lean to SOEs	Existing lean implementation frameworks are also rigid, and in their current form cannot be applied to the SOEs without adapting some of the lean principles to the	

			context and dynamism of the SOE environment. The researcher thus, argues for an adaptable framework to improve waste in SOEs	

CHAPTER THREE

THEORETICAL REVIEW OF LEAN MANUFACTURING

3.1 INTRODUCTION

Chapter three of this study extend the literature review and sets out the theoretical foundation and underpinnings that serve as a lens for the main parameters of the study. It explores several theories with the aim of motivating a suitable theoretical lens upon which to investigate lean. Further, it sets the conceptual framework for this study, which leads to the focal literature from the field of study known as lean manufacturing.

3.2 THEORETICAL FRAMEWORK OF THE STUDY

Lean manufacturing concepts have evolved over the years, and their application has been widespread in different sectors, contexts, and processes by several lean researchers (Danese et al 2018; Radnor et al 2012; Ramesh & Kodali, 2012; Bhamu & Sangwan, 2014; Danese et al 2018;). This evolution of lean results in a heterogeneous body of literature with different theoretical perspectives and constructs. These theories are crucial for analysing lean issues and an understanding of the dynamics occurring and disentangling the complexity underlying the application of lean practices in different contexts (Mkhomazi & Iyamu, 2013). To select an underpinning theory for this study, the researcher explored major theoretical lenses used to view organisations. The exploration of the different theories closes the gap that was pointed out by Carter and Easton (2011), who state that researchers tend to employ a few popular theories, while other lenses could provide new insights into the field being researched. Furthermore, to select an underpinning theory for this study, the researcher needed to map the theory to the research objectives and decide which of the existing theories was suitable for best explaining the key constructs for the study.

Although some of the theories presented many similarities in their focus and coverage, the researcher also observed uniformity among the elements of the research guided by the framework outlined by Danese, Manfe and Romano (2018). The framework presents a model that represents the assumptions, definitions, and propositions on the main features of recent lean literature and theories that are explicitly relevant to the research question and research

problem and are useful for extracting data for analysis and further consideration in this research. Figure 12 presents the rationale for the selection of an appropriate theory or theories to underpin this study.

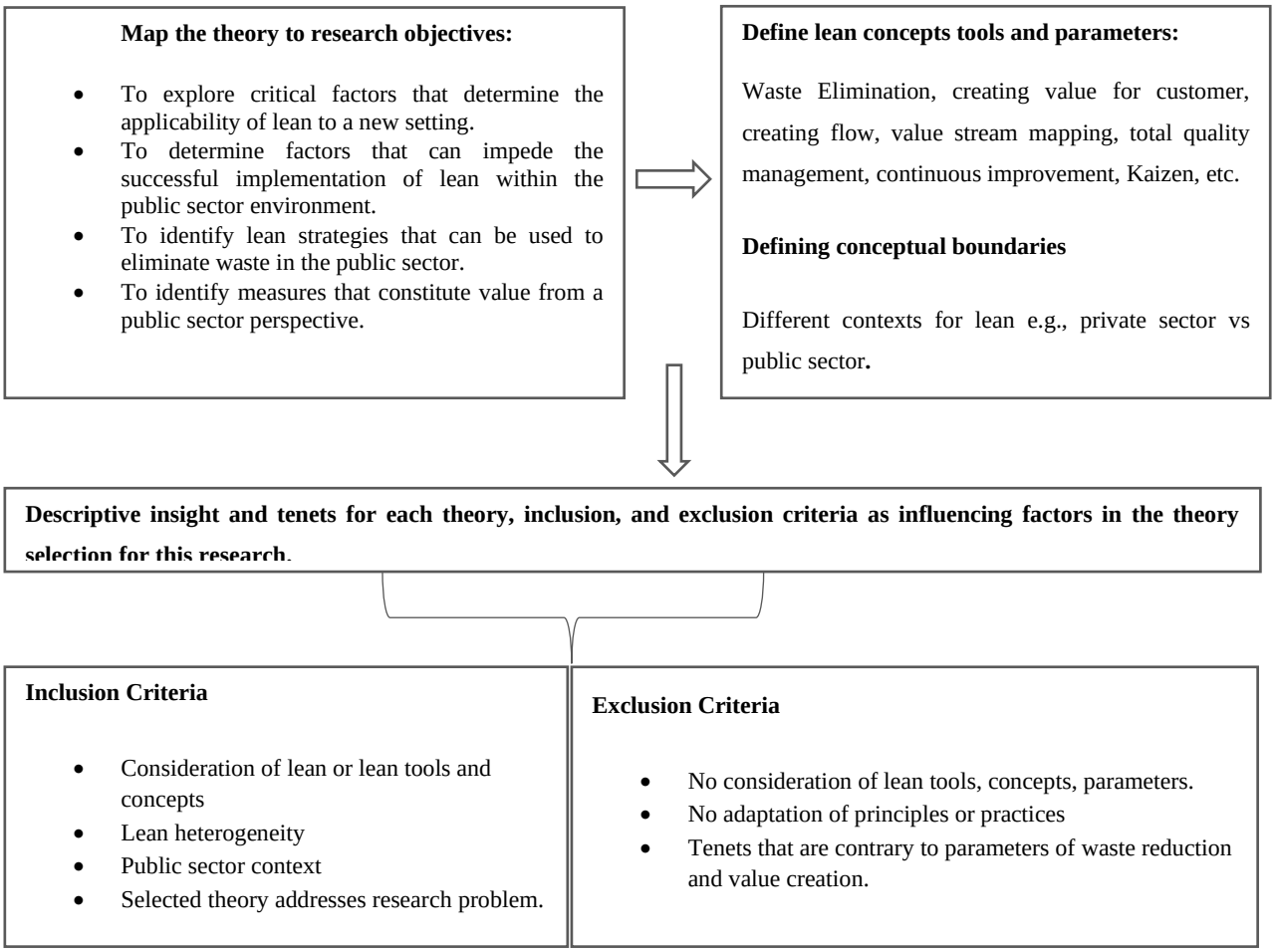


Figure 12: Selection of the theory (**Source:** Adapted from Danese, Manfe and Romano, 2018)

The emergence of theories to underpin studies of organisational operation in different disciplines has made research more focused on providing boundaries and understanding of the context (Mkhmazi & Iyamu, 2013). For this study, lean practices within the public sector must be understood with theoretical guidelines to provide deeper reflection on the principles and practices that should be adopted and the best ways to implement them (Saurin et al., 2013). Several studies have provided different theories for use as lenses for management research, including institutional theory, agency theory, the resource-based view, general systems theory, and contingency theory. These theories are summarised in Table 9 by means of a SWOT analysis to delineate which theory would be more useful or valuable to the current study.

Table 9: SWOT analysis of management theories (**Source**: Own).

Theory	Description	Strength	Weakness	Opportunities	Threats	References
Institutional theory	According to institutional theory, the institutional environment exerts strong influences on an organisation's strategies. Organisations can be seen as coordinating mechanisms that synchronise the actions of different economic and social agents.	More adaptive to environmental uncertainty. Organisational isomorphism.	Isomorphism or normative legitimisation and adoption of behaviours (mimicking of behaviours of superior models) that are perceived to be more successful poses a weakness due to the specificities between the private and public sector, isomorphism may be inappropriate on contextual basis. Hypotheses for Institutional drivers for lean manufacturing implementation has not been tested using longitudinal data.	Theory could be considered to examine how various isomorphic pressures result in firms having similar management practices over time.	Pressure to coercive isomorphism.	Weinmann, 2002; Zsidisin, Melnyk & Ragatz, 2005; Ketchen & Hult, 2007; Greenwood, Oliver, Sahlin, & Suddaby, 2008). Tolbert, 2008; Ball & Craig, 2010

Agency theory	The agency theory holds the view that in organisations there exists an agent-principal problem, this being caused by the agents (managers of the organisations) focusing on their own interest to the detriment of organisational goals.	Designing governance and controls in organisations.	The principal-agent perspective highlights the possibility of contractual failures; hence, risk mitigation strategies are sought in order to control the agent. The theory provides generalised guidelines to examine the relationship between board composition and lean outcomes. Agency theory is unable to provide adequate understanding on issues related to key concepts in the research questions of the current study.	Agency theory to investigate the differences in mechanisms (e.g., incentives). Analyse the relationships between the different stakeholders i.e., Board and executive management.	The overall argument is that Information asymmetry (Corruption) is bound, as the principal and the agent have access to different levels of information.	Alchian & Demsetz, 1972; Jensen & Meckling ,1976; Denis & Kruse, 2000; Liu, 2006; Van Westen, 2017.
Resource based view	(RBV) explains how organisations achieves sustainable competitive advantage by using firm specific resources.	Organisation's resources. Relationship between resources and	Assumptions of organisational heterogeneity. Misappropriation of resources.	Could be employed to develop theoretical constructs in explaining how lean implementation can create strategic resources to support	Mobility in resources. Market trends.	Wernerfelt,1984; Truijens, 2003; Parry, 2005; Ekeledo & Sivakumar, 2004; Mkansi, Qi &

		performance is the key outcome. Value creating strategies and competitive advantage.	Circular reasoning in the specification of the relationship between rents and resources. No definition of customer value that can be processed within the firm.	sustainable competitive advantage.	Economic trends.	Green, 2011; Anderson, 2011
Contingency theory	Contingency theory refers to the consistency between an organisation's structure and the strategy it pursues in its external environment (Drazin & Van de Ven, 1985:516) Organisations are not closed systems, but they are continually exposed to contingency factors, then no universal set of	It helps in understanding the complex organisations as it focuses on multivariate nature of organisations. It provides insight into organisation's adaptability to both internal and external environment. It is an integration of different schools of thought; classical,	Conflicting findings observed across some of the contingency studies, due to contextual variables. It does not follow the concept of 'universality of principles' which often apply to specific management situations. Regards the organisation as an integrated whole	Use CT to deeply understand the influence of multiple dimensions on lean practices implementation. Employ research designs, which control for as many relevant factors as possible besides the contextual factors under examination. The ability to mediate performance based on the	Increasing the generalizability of a measure to encompass different contexts may reduce its validity.	Donaldson 2001; Sousa & Voss 2001; Bozarth & McDermott, 1998; Boyer et al., 2000; Ketokivi, 2006;Apell, 2011; Netland, 2015; Romero-Silvaa , Santosb & Hurtadoa, 2017.

	strategies can be applied to every business situation.	behavioural and systems approach. It follows the technique of multivariate analysis	instead of as a sum of its parts.	'fit' of the factors under the control of the organisation may be beneficial when applying lean to the public sector context.		
Theory of constraints (TOC)	Developed by Eliyahu Goldratt, TOC is a management philosophy that focuses on identifying and alleviating constraints or bottlenecks that limit an organization's ability to achieve its goals.	Clear focus on identifying and resolving the most critical constraints, leading to significant improvements in performance.	May oversimplify complex systems by focusing too narrowly on individual constraints, potentially ignoring broader systemic issues.	Can drive substantial efficiency gains and productivity improvements when applied correctly; applicable across various industries, including manufacturing and service sectors.	Risk of sub-optimization if not integrated with broader organizational strategies; potential resistance to change from employees.	Goldratt, 1990; Dettmer, 1997; Cox & Schleier, 2010.

Table 9 summarises the strengths, weaknesses, opportunities, and threats (SWOT) of each theory explored in this study. Institutional theory offers a lens through which to understand the pressure that organisations exert on each other in a drive towards adopting more sustainable practices (Hirsch, 1975; Lai, Wong, & Cheng, 2006). The institutional view offers a lens to understand three types of pressures that an organisation faces, namely, coercive pressure (which comes from its partner organisation or other relevant stakeholders), mimetic pressure (which is exerted on the organisation by other successful organisations to replicate the methods used for their success) and normative pressures (which are pressures that come for professional orientation) (Ball & Craig, 2010; Tolbert, 2008). One of the strengths of this theory is that it adds to the collective definition of the isomorphic drivers that shape the adoption of lean practices in organisations (Hofer, Barker & Eroglu, 2021). Although the theory provides an opportunity to investigate the effects of various institutional forces on the adoption of a variety of lean practices (Muda, 2017; Waller et al 2018), it has two major weaknesses in relation to this current study. First, most of the studies that have adopted the institutional view (Aerts, Cormier & Magnan, 2006; Muda, 2017; Zhu & Liu, 2010) agree that imitation plays a significant role in the successful adoption of lean principles by organisations from the institutional view.

The key problem with this explanation is that the rationale to simply follow the processes of another organisation to replicate or mimic their successful path may be inappropriate due to the different organisational contexts. Thus, it does not consider the public sector versus the private sector dynamics, which are the main argument of this current study. The other weakness presented by this view is the focus of the adoption of the principles driven by the isomeric drivers instead of adapting the principles to a particular context.

Agency theory focuses on the principal–agent relationship between parties where one delegates some decision-making authority to the other (Ambrosini, Jenkins & Collier, 2015). The theory centres on determining the most efficient contract governing the principal–agent relationship (Eisenhardt, 1989:58). In these relationships, one party (the ‘principal’) delegates responsibility to another party (the ‘agent’) to make decisions on their behalf (Ambrosini et al., 2015). Agency theory is based on an inherent conflict of interest brought about by the separation of ownership and management (Mbele, 2015). Although the key strength of agency theory is designing governance and controls in organisations, which may be beneficial in

implementing lean manufacturing, the main weakness of this theory is that the principal–agent relationship, as expressed by agency theory, may act as a constraint in implementing lean practices (Van Westen, 2017).

The resource-based view (RBV) explains how organisations achieve a sustainable competitive advantage by using firm-specific resources (Kraaijenbrink, Spender & Groen, 2009; Lysons & Farrington, 2012). According to resource-based theory, organisations differentiate themselves from their competitors by the effective utilisation of their resources and capabilities to gain a competitive advantage (Khanchanapong et al., 2014). Although one strength of the RBV in lean manufacturing may be identifying the key resources needed to achieve the expected organisational outcomes (Danese, 2018), this theory is weakened by the indeterminate nature of two concepts that are fundamental to the RBV – resources and value. Although some studies have expanded value and resources in terms of the RBV (Fahy, 2001; Mkansi, Qi & Green, 2011), such exploration falls outside the boundaries of the current study.

Contingency theory, rooted in the premise that organisations adapt their structures and strategies based on external factors, offers crucial insights into the dynamic relationship between an organisation and its environment (Donaldson, 2001; Sousa & Voss, 2001). This theory posits that there is no single universal approach to managing organisations effectively; instead, it emphasises that different situations may require different responses (Bozarth & McDermott, 1998; Ketokivi, 2006). By acknowledging the significance of contextual factors, contingency theory helps to unravel the complex interplay between an organisation's internal structure and its external environment (Apell, 2011; Netland, 2015). Understanding how these factors align or misalign with an organisation's strategies can offer valuable insights into lean implementation. While the theory's adaptability to diverse scenarios is its strength, the absence of universally applicable principles poses both challenges and opportunities for understanding how lean principles might suitably integrate within the context of the public sector (Romero-Silva, Santos & Hurtadoa, 2017).

Viable systems theory (VST) offers a holistic perspective, emphasising the interdependence and coherence of various organisational components (Ball & Craig, 2010; Tolbert, 2008). The VST posits that an organisation is an integrated system composed of interacting subsystems, each serving specific functions to maintain overall viability (Truijens, 2003; Wernerfelt, 1984).

This theory focuses on the functional viability of an organisation in its environment and offers a lens through which to view the systemic integration required for lean implementation. The VST's emphasis on systemic coherence within an organisation and its environment aligns with the need to understand the comprehensive nature of lean practices in the public sector (Anderson, 2011). However, while VST offers a comprehensive view, its complexity can present challenges in practical application, requiring a nuanced understanding of how VSTs align with lean methodologies within the public sector (Ekeledo & Sivakumar, 2004; Mkansi, Qi & Green, 2011).

The Theory of Constraints (TOC), while valuable for its focus on identifying and mitigating bottlenecks within organisational processes, was not considered for this study due to its focus on singular constraints may oversimplify the multifaceted nature of public sector challenges, where multiple interrelated factors influence performance (Womack & Jones, 2010). This complexity necessitates a theoretical framework that can integrate various elements of organizational dynamics, such as contingency theory and systems theory, which provide insights into the interactions between different subsystems and their environments (Anderson, 2011).

While TOC remains a valuable methodology for operational enhancement, its applicability in a study aimed at understanding the systemic integration required for lean implementation in the public sector is limited. The need for a comprehensive theoretical foundation that addresses the intricacies of public sector dynamics ultimately guided the decision to exclude TOC from this research.

From the above discussion, it is evident that institutional theory, agency theory, theory of constraints and the RBV are not appropriate lenses for the current study, whereas contingency theory and general systems theory have by far proven to be the most suitable theories for use as methodological lenses for this study. Contingency theory encourages a systematic analysis of various factors influencing organisational outcomes. It enables researchers to explore how different contextual factors, such as organisational size, structure, and environment, interact with and influence the effectiveness of lean practices (Apell, 2011). This systematic approach helps in identifying the most suitable lean principles that can be adapted within the public sector while considering these contextual nuances. This theory also emphasises the need for alignment

between an organisation's strategy and its structure. When applied to lean implementation in the public sector, this approach helps in understanding how lean principles need to be tailored to fit the specific structures and strategies of public sector organisations (Netland, 2015). It assists in identifying the right fit between the principles of lean manufacturing and the organisational structure to ensure smoother adoption.

A commonality that the researcher found during the review of these theories is that most of the failures in lean application were a result of the organisational systems and its design rather than from employees in the organisation (Gulyaz, van der Veen & Solaimani, 2019; Schmidt et al., 2014). Therefore, the complimentary approaches in systems theory and contingency theory were considered valid for understanding the level of integration required for complex systems and the fit in the organisational structure that this level of integration demands. Furthermore, these theories are most suitable due to their ability to address the research objectives as well as their descriptive insights and tenet research. In the next section, the researcher extends the SWOT analysis and explores the two theoretical lenses that were selected for this study. The use of these two theories recognises that one theory is not sufficient by itself for explaining the complex nature of lean practices in the public sector environment.

3.2.1 Contingency theory

While several studies have found support for the positive association between lean manufacturing and improving efficiency and overall performance of an organisation (Durkovic et al 2018; Kumar & Vausha, 2018; Vinodh & Joy, 2012), other studies fail to support this positive association (e.g., Boscari et al 2015; Chavez et al 2015; Danese et al 2017). For example, Chavez et al. (2015) assert that no universal set of strategies can be applied to every business situation. Similarly, for Jim´enez, Romero, Dom´ınguez and Espinosa (2015), successful lean implementation must complement the intensive context of an organisation. Other researchers have recognised that the transfer of lean knowledge is a complex task affected by several problems, often related to differences between plants (Boscari et al. 2016). Collectively, these studies generally conclude that the adoption of lean manufacturing principles is heterogeneous and factored on different issues and contexts; hence, contingency theory is used to explain these inconsistencies.

According to Chavez, Jacobs, Fynes, Wiengarten, and Lecuna (2015), contingency theory treats organisations as open systems that are continually exposed to contingency factors; as such, no universal set of strategies can be applied to every business situation. Contingency theory holds that there is no best way to lead an organisation or a process; instead, the best solution is contingent on the situation (Donaldson 2001; Sousa & Voss 2001). Several of the earlier theorists, including Lawrence and Lorsch (1967), compared successful organisational structures by observing the interaction of internal divisions and the factors derived from the external environment. Lawrence and Lorsch (2009) found that the crucial factor for success is not only in management but also in the environment or context in which organisations are embedded. In recent years, there has been a growing body of research using contingency theory, which shares the common view that organisational structures are contingent upon contextual factors such as the environment, technology, and organisational size (Chavez et al 2015; Donaldson, 2001; Simons & Taylor, 2007; Sousa & Voss, 2008; Walker et al 2015). Similarly, the field of lean has developed a significant body of research using contingency theory (Apell, 2011; Chicksand, Radnor & Watson, 2015; Walker & Netland, 2015).

In a study conducted by Apell (2011) investigating the contingency theory approach to the deployment of lean principles, the research findings offer insights into how contingency theory aids cross-functional team development and problem solving through value stream mapping, a common lean tool. The research findings also support the key lean tenant that there is no right way to implement lean tools and that the tools chosen should take the context into consideration; since every organisation is different, there can be no one universal road map for becoming lean (Liker & Meier, 2006). In another study, Netland (2015) investigated how contingency variables influence what practitioners see as critical success factors for lean implementation.

Although the researcher's analysis acknowledges the different contingencies in an organisation, it found only a few statistically significant differences among the four investigated contingencies – corporation, size, lean implementation stage and location and thus argues that contingencies do seem to have a radical effect on which factors are critical for the success of lean implementation. However, even though the researcher acknowledges the limitation of the research findings, other contingency variables that are considered in public sector organisations, such as an organisation's strategy (Brown & Iverson, 2004) and

complexity (Romero-Silva et al 2018), were not included in the research. Nevertheless, contingency theory offers a valuable theoretical lens through which to analyse lean manufacturing studies and theoretical perspective in lean (Ahmad, Schroeder & Sinha, 2003; Buttermann, Germain & Iyer, 2008; Apell, 2011; Chavez et al 2015; Chea, 2009).

Research using contingency theory (Apell, 2011; Boyer et al 2005; Flynn & Saladin, 2006; Ketokivi & Schroeder, 2004; Romero-Silva et al 2018; Shah & Ward, 2003; Sila, 2007; Sousa & Voss, 2008;) has used broad categories of contingency variables such as contextual factors, the size of the organisations, organisational strategy, and the adoption of information and communication technology. This study does not consider all the variables; rather, it considers contextual factors, size of the organisation and organisational strategy, and sets out the extent to which these variables are compatible with the nature of lean.

3.2.2 Limitation of contingency theory

Although contingency theory enjoys unprecedented support in lean research, it is not free from criticism. In its most rudimentary form, the notion of "fit" held in the contingency view regards adaptation as necessary to maintain fit with changing contextual factors. This fit is achieved by identifying important contingency variables that distinguish between contexts, grouping different contexts based on these contingency variables and determining the most effective internal organisational designs or responses in each major group. According to contingency, effective organisations have a "goodness of fit" between their structure, the technology, and their external environment (Abba, Yahaya & Suleiman, 2018; Daft 2004; Pasmore et al 1982).

According to Romero-Silva et al. (2015), studies investigating the fit between an organisation and lean practices have considered three conceptualisations of fit: selection, interaction, and system approaches. The selection and interaction approaches consider the presence of certain contextual factors along with specific organisational practices. First, in the selection approach, organisations are effective when they adapt to the characterisation of their organisational context (Hurtado & Santos, 2016). However, the limitation of the selection approach is that most contingency research studies that have adopted this approach have examined links between organisational context and design but have not analysed organisational performance or intended outcomes (Perrow, 1970; Romero-Silva, Santos & Hurtado, 2018; Sousa & Voss, 2008; Thompson, 1967). Second, the assumption that an organisation adopts an approach due

to a logical fit with specific contextual factors raises a problem. This implies that organisations achieve fit, reach equilibrium, and remain static, as highlighted by Donaldson (2006). Lastly, these studies did not provide evidence on whether the adoption of the lean approach was effective for organisations that operate with different contextual factors.

On the other hand, the interaction approach incorporates the aspect of performance or desired outcomes in the notion of fit (Rodrigo Romero-Silva et al 2019). However, studies that employed the interaction approach in low- and high-performing organisations showed insignificant differences in the correlation between the interaction approach employed and the performance or the desired outcome in the organisation (Chavez et al 2015; Devaraj, Hollingworth & Schroeder, 2001). Furthermore, in these studies, the evidence for this relationship did not show whether the interactions between context and the approach employed were effective.

Researchers have not used the systems approach with the contingency view in much detail (Islam & Hu, 2012; Leomos & Junior, 2013; Van de Ven & Drazin 1984; Zandi, 2000). However, two studies indicated that the main difficulty in using the systems approach is the complexity inherent in the operational processes of the business unit (Tenhiala, 2011; Yin, 2008). Although Tehniala (2011) investigated the fit between capacity planning levels and process types using the organisational system (technical systems), the researcher ignored the complexity of the organisation and states that elaborate planning methods are not always necessary. However, one of the distinguishing features of the organisation, based on the seminal work of Ackoff (1981), is highly complex systems where each part affects the whole organisation and other parts. Furthermore, there is a unique context for each lean implementation, which occurs in a complex sociotechnical system (Soliman et al 2018); thus, studies that look at lean practices cannot ignore the complex sociotechnical aspects of lean systems.

Research using contingency theory regards fit in the systems approach and has focused only on contextual variables interacting in isolation and not on those interacting in conjunction; moreover, it seldom considers the scale of complexity (Lemos & Junior, 2013). Furthermore, the research to date has tended to focus on the use of two approaches, selection and interaction,

and has failed to resolve the issue of complexity related to the systems approach (Chea, 2009; Chay et al 2014; Chavez et al 2015; Simons & Taylor, 2007).

To advance this argument, studies that have used the contingency view have resulted in several valuable conclusions regarding the fit between certain 'best practices', such as lean manufacturing, when applied to a certain contextual factor (Chea, 2009:20; Chay et al 2014:25). However, the combination of several contextual factors can make practices such as lean practices a better fit for an organisation when the selection and fit of a certain best practise (lean manufacturing) are based on interactions with not only the context of the organisation but also a more holistic approach. This approach is commonly called the systems approach (Van de Ven & Drazin, 1984). Overall, according to Helkio and Tehiala (2013), the limitations of the theory outlined above can be summarised as discussed in the next paragraph.

The contingency view provides a lens through which to view organisations as open systems that are continually exposed to contingency factors (Chavez et al., 2015). Open systems are associated with complexities that include high-level interrelationships among individual systems and their components (Jaradat, 2015; Joosten, Bongers & Janssen, 2009). Complexity also entails environmental and contextual issues specific to external influences and constraints (Behdani, 2012; Jaradat, 2015). Although dealing with certain contextual factors through the contingency view produces what is called a 'good fit' (Romero-Silva et al 2018), the conceptualisation of fit in contingency theory through the selection, interaction and system approaches does not take into consideration the fourth level of complexity that is presented on an environmental level. Therefore, to overcome this limitation, systems theory is helpful in closing the gap as a lens through which to holistically explore the interaction and complexity between the parts that make up an organisational sociotechnical system. The use of the two theoretical lenses recognises than one theory is not sufficient by itself in explaining the complex nature of lean practices in the public sector environment. The merits of systems theory in overcoming the limitations presented by the contingency view are presented in the next section of the research.

3.2.3 Systems theory

A system is defined as an entity that is a coherent whole that allows a boundary to be perceived around it to distinguish internal and external elements relating to an entity (Mull & Yip, 2009).

Several concepts of systems theory have emerged over the years, with their roots in biology beginning from the classic work of von Bertalanffy (1951); cybernetics (Ashbby, 1954; Beer, 1972; Barile, 2009; Golinelli, 2008); structural functionalism (Parsons, 1951); and organisational communication (Farace, Monge & Russell, 1977; Goldhaber, 1974; Monge, 1973; Thayer, 1968). The systems theory approach is strongly focused on the relationship that an organisation has with its external environment (Shararah, 2016).

By drawing on the concept of systems theory, Keating and Bradley (2016) show that open systems can interact with suppliers and customers through the development of the control, communication, coordination, and integration functions necessary to produce and sustain desirable levels of organisational performance. Furthermore, this view is supported by Mele (2010), who argues that organisations are not closed systems due to their material exchanges with the environment but are open systems that are dependent on the exchange between internal systems, personnel, and resources to allow the value creation process in an organisation.

In addition, there are other broader perspectives of systems theory that have resulted in interdisciplinary contributions from scholars applying systems theories; these scholars include West (1968), Emery and Trist (1960), Kast, Fremont and Rosenzweig (1970), Dowling (1983), Jackson (2000), Mele, Pels and Polese (2010), Barlie, Pels, Polse and Saviano (2012), and Lai and Lin (2017). Each systems theory uses its own concepts (see Table 10), and the most used in operations management, among others, are general systems theory (GST), cybernetics (VST) and dynamical systems theory (Mele et al., 2010).

Table 10: Systems theories, their focus, and key concepts **(Source:** Verhoeff, Knippels, Melde, Gilissen & Boersma, 2018)

Systems Theory	Focus	Key Concepts
General systems theory	Hierarchical (nested) open systems.	Identity, system boundary, level of organisation, components, in- and output.
Viable systems theory (also known as Cybernetics)	Self-regulating closed networks.	Feedback, self-regulation, equilibrium. Complexity
Dynamical systems theory	Self-organising systems.	Self-organisation, emergence, nonlinearity, equilibrium states.

GST considers the relationships between the organisation and the environment in which they are involved (Boulding, 1956; Katz & Kahn, 1978). This theory assumes that organisations that can process information about their specific environment show more adaptation skills to changes in contextual environments. The viable systems model outlines that there is more complexity in the environment than the process can handle, and a viable system is adaptable to survive change in any environment (Beer, 1972). Dynamic systems theory, also referred to as nonlinear systems theory, asserts that there is direct proportionality between the input and the output. In nonlinear systems, small inputs can have large impacts and vice versa (Mele et al., 2010). The VST view is adopted in this study mainly due to its comprehensive approach to understanding complex systems within organisations.

The viable systems model outlines that there is more complexity in the environment than the process can handle, and a viable system is adaptable to survive change in any environment (Beer, 1972). Furthermore, due to the complexity presented in the different value chains (division, departments, shareholders, and policy frameworks from the governance of state-owned entities), further support exists for a systems approach from within state-owned entities and operations management studies (Beck, Kasper & Ingeman, 2021). According to Rios (2010), an organisation's viability is not only critical but also complex owing to numerous

factors that affect viability. To respond to the complexity or variety of the environment, VST can provide guidance on how the complexity of an organisation should be readjusted by redesigning the organisational structure and flows of information (Cardoso, 2019). Furthermore, there is agreement among researchers regarding the capabilities of the viable system model to address complexity and variability in a wide range of organisations, for example, in production systems (Dominici & Palumbo, 2013; Herrmann, Bergmann, Halubek & Thiede, 2008), technology (Rozenkranz & Holten, 2011), marketing (Barlie, Pels, Polese & Saviano, 2012) and administration (Christopher, 2011), among others. This approach is chosen to explore the complexity of the systematic interactions of lean manufacturing systems with the external environment of public sector organisations. On the other hand, other theories are abstract in explaining how organisations operate and adapt in response to the complexity of the environment.

The viable systems model is marked with five main functions (Dominici & Palumbo, 2010). As a result of these functions, in terms of the view of viable systems, lean adopts principles and practices that can interact with complexity and influence a system toward a desired state (Hollnagel, 2014). These main attributes are implementation, coordinating, control, intelligence, and policy. Below is a detailed diagram of the five functions of the variable system model.

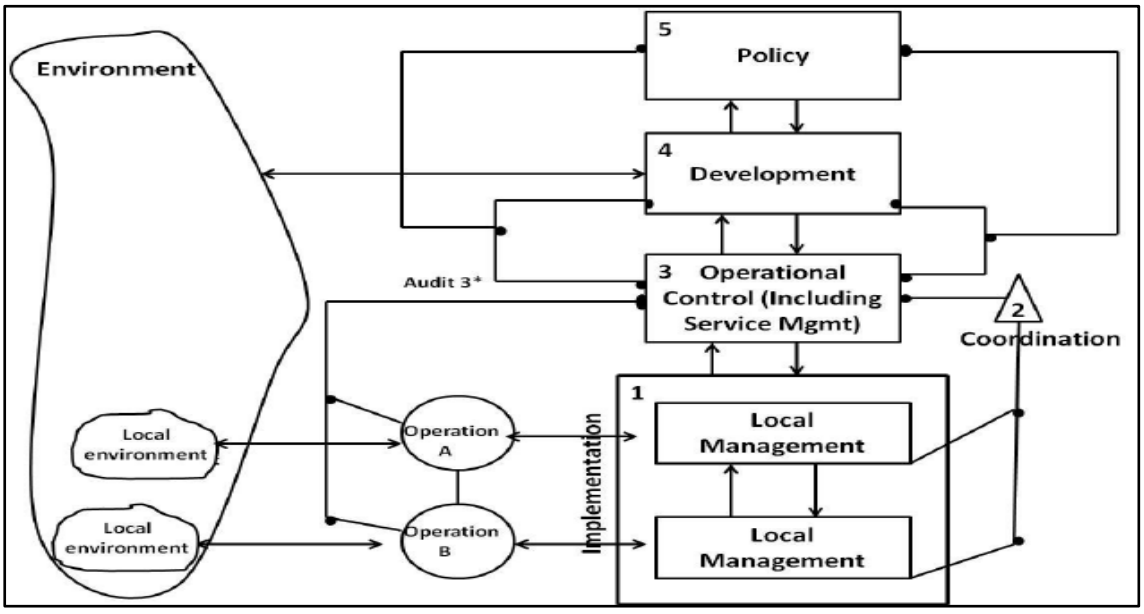


Figure 13: The Viable System Model (**Source:** Adapted from Jokonya, 2014).

The attributes of complexity depicted in Figure 13 are better understood through the five subsystems that compose a viable system (Hendrick & Kleiner, 2000; Poole, 2014). System 1 (S1) comprises “operating units” under the supervision of their own management to achieve operations, production, and services (Beer, 1972; Dominic & Pulumbo, 2010). These operating units execute and control their tasks autonomously within defined limits (Brecher et al., 2011). System 2 (S2) is a coordination function for different operations, activities and resources through interaction and communication between operative units (Herrmann, 2008). System 3 (S3) is a central control function that interprets the system’s policies according to its internal data. It also performs the control and analysis of current operations and the viability of strategic inputs from the system, converting them into strategic operations (Brecher et al., 2011; Espejo 1990).

System 4 (S4) is the strategic system that gathers external information on political, economic, social, technological, environmental, and legal levels and evaluates its relevance to the organisation before translating it into strategic and operational plans for future activities (Brecher et al., 2011). System 5 (S5) is responsible for the direction of the whole organisation, setting strategic intentions that direct and lead the organisation (Beer, 1972; Nhlabathi, 2014). The attributes of complexity depicted in Figure 13 are better understood through the five subsystems that compose a viable system (Hendrick & Kleiner, 2000; Poole, 2014). System 1 (S1) comprises “operating units” under the supervision of their own management to achieve operations, production, and services (Beer, 1972; Dominic & Pulumbo, 2010). These operating units execute and control their tasks autonomously within defined limits (Brecher et al., 2011).

System 2 (S2) is a coordination function for different operations, activities, and resources through interaction and communication between the operative units (Herrmann, 2008). System 3 (S3) is a central control function that interprets the system’s policies according to its internal data. It also performs the control and analysis of current operations and the viability of strategic inputs from the system, converting them into strategic operations (Brecher et al., 2011; Espejo 1990).

Therefore, in this research, the systematic interaction of an organisation with lean manufacturing principles in a specific organisational context, such as the public sector, is investigated through the contingency view. Although the contingency view addresses the

notion of “fit” of lean philosophy to a new operational context, the theoretical lens does not engage with the level of complexity that is inherent to the organisation or in lean philosophy as a complex sociotechnical system. To fill this gap, the researcher explores systematic interaction through VST. This approach is chosen to explore the complexity of the systematic interactions of lean manufacturing systems with the external environment, hence integrating contingency theory with VSM. The next section will explore how these theories will be applied to this study.

3.4 HOW CONTINGENCY AND VIABLE SYSTEMS THEORY WILL BE USED AS A LENS FOR THE STUDY

Lean manufacturing is widely recognised for its philosophical focus on eliminating waste through the value stream (Liker, 1997) and its ability to increase value to customers (Thanki & Thakkar, 2011). Most applications of lean practices have been to private sector organisations, and very scant literature is available regarding lean practices represented within public sector organisation (Carter, Danford, Howcroft, Richardson, Smith & Taylor, 2016; Procter & Radnor, 2016). Furthermore, the extent of lean application in the public sector revealed some gaps that were explored in Chapter 1 section 1.3 of this research. This gap prompted exploration of some of the existing lean manufacturing frameworks and examination of how lean practices are applied to other studies in different contexts. According to Anand and Kodali (2010), Chay et al. (2015), Xu (2017), and Anvari et al. (2017), there is a need to create a framework for the adoption of lean manufacturing principles within public sector organisations. The frameworks proposed by the researchers are questionable regarding the issues that bear application to the public sector context, such as the following:

- lack of contingency (Chay et al., 2015).
- only one best approach offered to only manufacturing activities (Bohan & Accorti, 2008; Sayer & Williams, 2007; Scrimshire, 2009); and
- no consideration for shop floor owners (Asnan, Nordin & Othman 2015).

Overall, these studies laid out an argument for the development of an effective bottom-up lean framework that is tailored to the public sector environment, as the different frameworks make the lean manufacturing attributes incoherent and do not adequately translate the lean attributes to the unique nature of the public sector environment. In section 3.2.1, the researcher presented

an argument for the use of contingency theory as a lens through which to view organisations as open systems that are continually exposed to contingency factors (Chavezet et al 2015) and VST to view systematic complexity that is present in the organisational context. The use of these two theoretical lenses proceeds from the viewpoint that contingency theory provides a model that is consistent with concepts of VST.

Through the contingency lens, Chavez et al. (2015) mentioned that organisations are viewed as open systems that are continually exposed to contingency factors. The literature suggests three main contingencies of the organisation as discussed in section 2.2.1, namely, contextual factors, the size of the organisations and organisational strategy. Early studies on lean implementation have been criticised for not considering the internal and external factors that influence an organisational context (Mostafa et al., 2013). Researchers confirm factors from the context of the organisation that are likely to influence all dimensions of lean implementation within an organisation (Punnakitikashem et al 2009; Seidel & Saurin, 2019). The contingency view suggests that to be effective, lean principles must be consistent with other aspects of the organisation and/or its external environment (Harney, 2018). This approach provides an understanding and analysis of the contextual factors and notations of fit for further exploration of the influence that the context or the organisation has on internal strategic planning processes, creating value for the customer and improving the existing processes to reduce complexity (waste).

However, as highlighted in the previous sections, the contingency lens excludes complexities that are associated with the organisation (Joosten, Bongers & Janssen, 2009; Jaradat, 2015). However, complexity is the nature of the public sector organisation. Equally so, the viable system theory excludes issues of fit (Ahmad & Schroeder, 2002; Romero-Silva, Hurtado, & Santos, 2016; Safizadeh, Ritzman, & Mallick, 2000), hence the use of contingency theory. The application of a VST to this study seeks to explicate the dynamic relationships and interdependence between components presented by the public sector environment, such as the legal framework, governance, heavy bureaucratic processes, and communities that interact with SOEs on a regular basis. Clawson (2008) noted that an organisation must react to changes in the environment from which it takes its inputs (resources, raw material, people, equipment, suppliers) and to changes in the environment in which it delivers outputs (i.e., to customers, shareholders, citizens). Additionally, the viable systems view asks whether lean principles are

compatible with complex systems (Saurin et al 2013); as such, both theories were selected for use in this research because they together best explain the key constructs of this research.

In this study, each of the two theories offers a unique focus on an integrated sociotechnical system of principles, practices, tools, and techniques of lean (Ingvaldsen & Benders, 2016; McCann, Hassard, Granter & Hyde, 2015; Wittrock, 2015). To answer the research questions with regard to how lean principles and tools can be adapted for application to the unique nature of public sector organisations, the researcher needed to explore the notion of fit, sociotechnical systems and differing contexts through the lenses of contingency theory and VST; this integration will be discussed in detail in section 3.6 of the research. The two theoretical lenses employed in this study, contingency theory and VST, are outlined in the next section of the research (Figure 14), which details their main concepts and associated attributes as well as the various constructs that help to explain the concepts that underpin the study. Figure 14 presents the conceptual framework that serves as a representation of the integration between the two theoretical lenses that have been adopted for this research, namely, VST and contingency theory. The conceptual framework delineates key concepts and constructs derived from each theory, namely, the context of the organisation, notions of fit or adaptability, complexity, and viability. It also provides a visual guide to elucidate how these theoretical components interplay in an organisational context. Furthermore, the essential constructs that contribute to the study's overarching framework are presented.

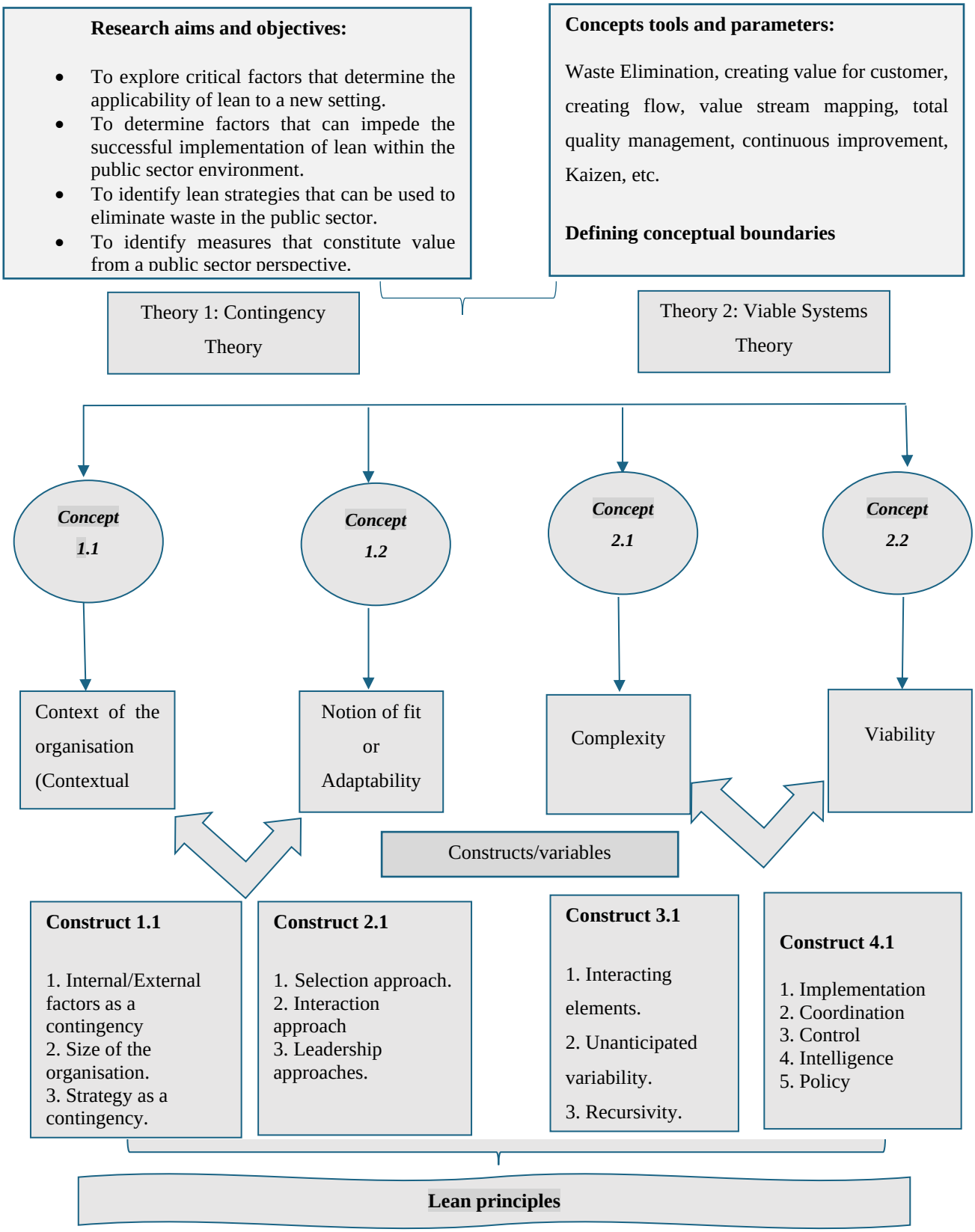


Figure 14: Integration of the two theoretical lenses used in this research (**Source:** Own).

3.5 A CONTINGENCY AND VIABLE SYSTEMS VIEW OF LEAN

A multilevel approach to conceptualising lean practices adopted from Arlbjorn et al. (2012) was presented in Chapter 2 (Figure 9). The first level presented the lean philosophy that addresses creating customer value and reducing waste. The second level included the five lean principles (specifying value, identifying value stream, making the value flow, customer pull and perfection). The third level included the tools that accompany the application of the lean principles. Section 3.6 examines how contingency theory and systems theory support the implementation of lean manufacturing principles in state-owned entities. The focus of applying the theoretical lenses is to understand how different organisational contexts and the characteristics of complexity fit with lean implementation. This research builds upon studies that encourage the use of various theories in lean areas to understand the level of interaction and to disentangle the complexity underlying the integrated sociotechnical system that encompasses lean (Defee, Williams, Randall & Thomas, 2010; Danese et al 2018).

3.5.1 Contextual factors in customer value creation

Introducing lean principles to improve performance and reduce waste is a common approach adopted by public sector organisations (Fletcher, 2018; Janssen, 2014; Rodgers & Anthony, 2023). One fundamental question asked in the literature is the universal applicability of lean principles (Chavez et al 2015; Netland, 2015). To answer this question, contingent theory suggests that contextual factors affect how a business is organised and ultimately its performance (Donaldson, 2001). For example, public sector organisations must create or improve value for customers by considering external and internal issues that are relevant to their purpose and strategic direction and that affect their ability to create customer value and improve its efficiency and effectiveness (Salimian, Rashidirad & Soltani 2017). One external issue within state-owned entities is the multiple and quite fragmented stakeholder groups that each place different demands on SOEs and can affect their intended results. Early studies regarding lean implementation have been criticised for not considering the factors that influence an organisational context (Mostafa et al., 2013). An important tenant within the contingency view is the notion of fit highlighted by Romero-Silva (2019), who states that if an organisation has decided to adopt lean practices, it is because the practices have a logical fit with certain contextual factors.

Factors that contextualise information or knowledge to a specific environment influence the work and management of organisations, leading to different organisational behaviours (Punnakitikashem, Somsuk, Adebanjo & Laosirihngthong, 2009). The context of the organisation has long been recognised as a critical contingent factor in management research (Projago, Mena & Nair, 2017). This is because, in the context of an organisation, there are also driving forces that are outside the control of organisations; however, they could provide both opportunities and threats that could have a significant impact on the outcomes of the organisation (Sousa &Voss, 2008).

In state-owned entities, the context includes a set of functions, processes, inputs, outputs, conditions, and limitations that create the business environment of the organisation (Wolniak, 2019). Studies that have discussed organisational context suggest that contextual factors in an organisation are determined by four main factors influencing the organisation: political, economic, social, and technological factors(Abuhav, 2017; Madeira, Gębczyńska & Wolniac, 2018). Other factors include internal factors such as organisational culture, a lean implementation climate (e.g., the degree to which SOE employees are prone to change management and readiness for lean implementation), leadership engagement, resource management and other personal attributes such as employee morale and values (Carvalho & Madeira, 2019). Therefore, considering value from a contingency theory perspective, one must consider the culture of the organisation and a willingness to adopt lean practices (Bortolottiet al., 2015). The presence of a culture supportive of lean culture has frequently been studied. Marse and Jansen (2016) found that creativity, leadership engagement, attention to detail, and teamwork were positively correlated with lean success, and too many procedures, multiple objectives, and legislation (i.e., public procurement laws and lack of cost-efficient and cost-effective awareness and behaviours) were negatively correlated with creating public value and lean success.

The central argument of this research in applying the contingency view to creating customer value by state-owned entities is that SOE management is expected to impact what factors (contextual) are deemed critical for creating public value. However, as mentioned previously in this research, one of the limitations of the contingency view is the focus on single contextual factors that interact with the organisation' structure or lean sociotechnical system. According to Romero-Silva et al. (2019), more useful conclusions can be drawn by considering a holistic

approach where an organisation's context is seen as a holistic system characterised by a high degree of integration and complexity between the factors intervening in the process of value creation (Grant, Shani & Krishnan, 1994). Several studies thus far have linked the viable systems perspective to the potential to deliver an accurate and dynamic interpretation of how lean principles interact with the elements of an organisation and its external environment (Abollado & Shehab, 2018; Barile et al 2012; Dominici & Palumbo, 2012). The supra system (external environment) has several elements that are also viable systems that interact directly with the environment (Medina, 2006). Using the VSM view to explore the lean tenant of creating public or customer value interfaces value-adding functions from both the external and internal environment and the operations of its primary subunit creation of the two basic value flows:

- The internal environment includes service concept design, physical resource procurement, human resource selection and management, and service creation and delivery; and
- The external environment includes economic factors, political factors, technological factors, market factors, and political factors (Rapcevičienė, 2014).

Customer value in lean can therefore be created through an analysis of the environment since there are multiple stakeholders who may have practically overlapping and conflicting requirements (Bishop et al 2014; Johansson & Osternab, 2017). Several relevant environmental forces may impact the adoption of lean practices among state-owned entities in South Africa. First, SOEs must balance social, economic, and political imperatives to effectively create value (PRC, 2013). Therefore, contextual variables for SOEs might be classified based on the level at which the system operates according to the five key systems in a viable system model, namely, implementation, coordination, control, intelligence and policy (Espejo, 2013). In this model, the implementation system (S1) is concerned with producing the organisation's products or services and delivering these products or services to the environment as part of creating value for the customers of these services or products (Schmidt1, Elezi, Tommelein, Berghede & Lindemann, 2014).

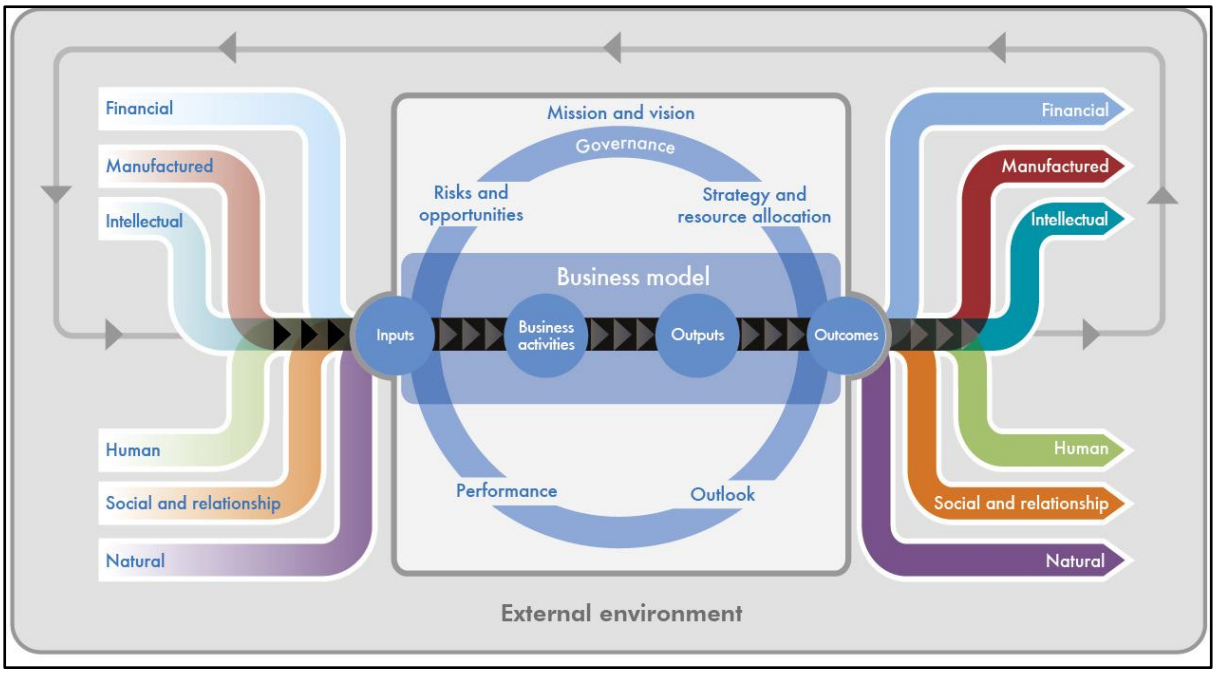


Figure 15: Organisational system through the VSM (**Source:** Adapted from Bodhanya, 2015).

Figure 15 depicts the implementation system phase of the through the viable system model, which comprises various operational units or an organisation (Flood & Zambuni, 1990). These units are autonomous within the limits of maintaining systemic coherence. They interact directly with the environment (Medina, 2006) and interface with subsystems that are responsible for carrying out the value-adding tasks of the system-in-focus (Espejo, 2013).

3.5.2 Size of the organisation in customer value creation

Studies that have discussed the size of an organisation as a contingency variable (Carroll, 2012; Netland et al 2015; Theodore, 2009; Torbjørn et al 2015) have correlated this variable with the number of employees and managers employed in the organisation. The size of the organisation may affect the implementation of lean programmes in an organisation due to the scale of the implementation effort (Netland et al 2015). Similarly, large organisations tend to have more specialisation, departmentalisation, centralisation, rules and regulations than small organisations (Robins & Coulter, 2005). The influence of contingency variables has been documented by authors such as Shah and Ward (2003), who stated that plant size, unionisation, and plant age are important for the implementation of lean practices. They found that, for example, larger plants were more prone to implement most lean practices. This may be due to the argument presented by Kleszcz and Ule-wicz (2010) that large production facilities

(organisations) have adequate resources (financial, material, human, information), allowing them to undertake activities related to the implementation of lean principles. However, in the case of small organisations, there are barriers such as limited personnel resources, instability and variability of employment, and problems with planning, especially strategic planning and implementation costs.

The viable systems view suggests that complexity in an organisation often accumulates due to the size of the organisation (various organisational functions, processes, systems) (Ahmad & Yusoff, 2006;). Furthermore, using the viable systems view overcomes the reductionist limitation by considering the whole organisation because of its interactions. Considering the size of the organisation helps to understand how to effectively apply lean principles through the analysis of the features of lean practices with the systematic levels of the organisation (Dominici & Pulambo, 2012). Complexity can be reduced by analysing the process at each systematic level (Fedotova & Bocharova, 2020). For example, the analysis of system one, which comprises core operational systems, may consider the core departments of a given state-owned entity. The departments consist of main activities that support the SOE's mandate. An important insight into a viable system highlighted by Golinelli's (2010) study is that the adoption of lean allows openness, flexibility, self-regulation and systemic resonance with the environment. Figure 16 depicts the recursive relationship that exists between each systemic level of a state-owned entity:

System 1 perceives the whole organisation as one large autonomous unit, an "operative structure", where the main units adopt lean manufacturing techniques. This systematic level (S1) interacts directly with the environment (Medina, 2006; Schmidt et al 2014). Regarding electricity production, S1 may represent the power utility as an organisation or a specific SOE at the corporate level. Some researchers agree that the units within system 1 are autonomous (they are coordinated and controlled) (Hildbrand & Bodhanya, 2015), while other researchers believe that the organisation's cohesion sets limits on system 1's autonomy (Rios, 2012). To overcome this limitation, the lean principle of pull, which will be discussed later in this research, seeks to provide systematic resonance with the environment (Dominici & Pulambo, 2010). Furthermore, system 1 may also comprise primary activities that are complex or consist of too many processes — in this case, subunits or autonomous units — that may be contained

inside systemic level S. These systems interact with each other and with coordinating and controlling systems 2 and 3, respectively (Schmidt et al., 2014).

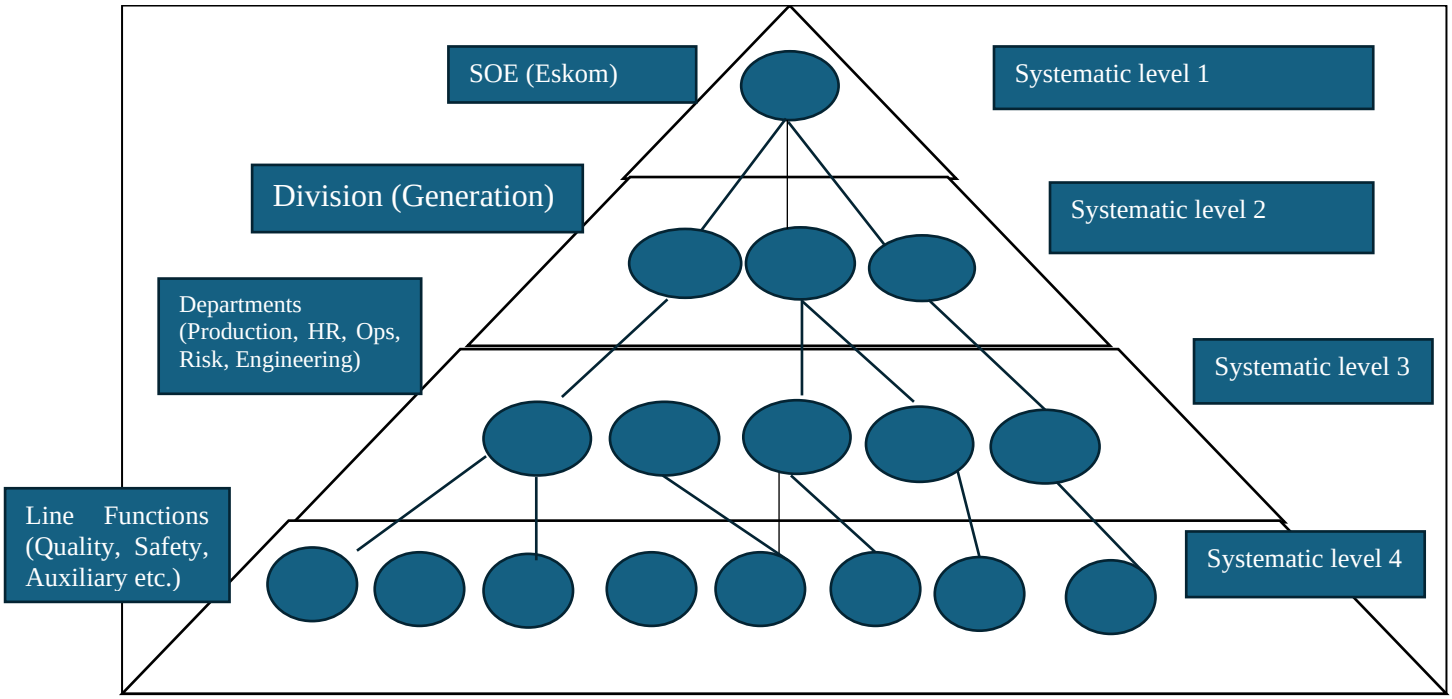


Figure 16: An example of a pyramid diagram that shows size as the recursive relationship in an SOE (**Source**: Own).

3.5.3 Strategy of the organisation in customer value creation

Additionally, in the interest of lean from a contingency view is the question of how an organisation can adapt its strategy to contingencies presented by the business environment. Several definitions of strategy have been presented in the literature. According to Peppard and Ward (2016), an organisation's strategy is the coordination of the organisation's major goals and actions in time and space that continuously co-align the organisation with its environment. Porter (2008) defines strategy as the set of activities in which an organisation stands out to establish a sustainable difference in the market. For Chandler (1962), strategy is the definition of the long-term goals and objectives of the organisation, the adoption of actions, and the allocation of necessary resources for the achievement of the objectives.

Therefore, when the contingency perspective is applied, it has been argued that the value created by the application of lean manufacturing principles depends on the approach used to fit (selection, interaction, and system) (Romero-Silva et al., 2018). The implication is that through managerial decisions, the organisation analyses how each of the lean principles and their interactions with the organisation's strategies are related to creating value for the customer. In addition, the implication that the fit between an organisation's strategy and lean principles largely impacts customer value creation processes has been acknowledged in other studies (Poppendieck, 2018; Vinodh, Arvind & Somanaathan, 2011; Wong, 2014). These findings support the assertion that management involvement in developing a formal strategic approach is necessary to focus lean implementation within a particular environment/organisation and thus lead to creating value for the customer (Veiga, Lima, Angelis, Eduardo & Costa, 2011). However, in finding the correct fit, an organisation also needs to review the impact of these decisions in the larger ecosystem/value chain in terms of the systems view.

In state-owned entities, strategic planning involves components and decisions that largely impact the delivery of mandates from the state in the long or short term (PRC, 2013). Unfortunately, studies reveal that although strategy and planning are conducted for some SOEs, many of the strategies lack an emphasis on using foresight methodologies for planning, such as systems thinking (Nyewe, 2011). One of the advantages of applying systems thinking is that it seeks to decrease the complexity surrounding public sector organisations. For example, SOEs have been viewed traditionally as hierarchical organisations that operate according to a top-down command structure (Mutize &Tefera, 2020).

Similarly, a major criticism of lean approaches is that they are prone to a top-down approach (Anvari et al 2011; Bortolotti & Romano, 2012; Karim & Arif-Uz-Zaman, 2013; Rose et al 2010). To overcome this criticism, the viable systems model offers a systems thinking framework with five key systems in place if it is to operate effectively in its environment. These systems are discussed in section 3.3 of this research. Specific to the strategy of the organisation, the intelligence system of the viable systems model provides a two-way link between the primary activities of the organisation (i.e., viable system) and its external environment (Espejo & Kuropatwa, 2011). This strategic subsystem gathers external data and information (about technologies, markets, competition, public values, etc.) and evaluates the relevance of these

data and information to the organisation; then, the data and information are translated into action plans for future activities (Dominici & Palumbo, 2012).

3.5.4 Understanding the differences between contexts of application.

A direct comparison between public and private organisations reveals major differences between them (Knight et al 2007; Mungovan, 2009). These sectors are not interchangeable (Mihaiu, Opreana & Cristescu, 2010). Public sector organisations work under different conditions than private organisations do, and when considering lean philosophy, a balance in these interests is required (Maarse & Janssen, 2012). The private sector is the segment of a national economy that is owned, controlled, and managed by private individuals or enterprises, while the public sector comprises various business enterprises owned and managed by the government (Rashed & Shah, 2021). The private sector aims for profit, while the public sector seeks economic and social benefits that are funded by taxes (Agha & Muhammad, 2012). Furthermore, the impact of bureaucracy in driving organisational culture in the public sector environment cannot be overstated (Sreedharan, Sandhya & Raju, 2018). Arlbjorn et al. (2010) distinguish between the private and public sectors, where the public sector

- users are citizens rather than customers.
- target groups are identified by rights, not by segmentation.
- changes are more politically driven than demand driven; and
- services are mostly defined by experts and politicians and less by users.

The reviewed lean literature also highlights differences between the private and public sector contexts (Pedersen & Huniche, 2011; Suarez-Barraza, Smith & Dahlgaard-Park, 2009). These differences include political influences (Pedersen & Huniche, 2011; Suarez-Barraza, et al 2009), equal access and rights, lack of competitors, transparency and accountability, fragmented decision-making, and customer value (Bharosa, Feenstra, Gortmaker, Klievink & Janssen, 2008). Therefore, it is not surprising that the application of lean practices across the two sectors has major differences. There is agreement among lean researchers that the most common differences in applying lean practices between the two sectors are summarised as follows: management commitment (principal–agent problems); employee participation and empowerment; and organisational culture and ownership (Marodin & Saurin, 2013; Netland, 2016; Salonitisa & Tsinopoulosb, 2016).

Following the contingency argument for public sector organisations, although managers must commit to and involve themselves in activities for successful lean implementation, different environments require different managerial actions (Netland, 2015). State-owned entities must address the agency problems associated with public ownership for lean approaches to gain the support of management (Scorsone, 2008; Landoni, 2017).

In support of the claims highlighted by the researcher regarding employee engagement, an empirical study conducted in large numbers of Greek manufacturing companies revealed that workforce participation and engagement are critical for the successful implementation of lean practices (Salonitis & Tsinopoulosb, 2016). This finding is consistent with the systems view of the level of interaction between humans and the human level, with the many characteristics of complex communications and components that may affect workers' roles. Similarly, customer value is one of the key principles of lean that apply to both the public and private sectors (Calbirg, Kingstorm & Kowalkowski, 2013; Damrath 2012; Drotz, 2014), although the phenomenon of customers in the public sector is more complex (Maarse & Janssen, 2012). Therefore, the concept of lean, with its focus on customer (citizens) value, should complement public values (Maarse & Janssen, 2012). This concept will be addressed in the next section of this review.

Table 11: Differences between public and private sector organisation (**Source:** Own).

Private sector	**Public sector**	**References**
Part of the country's economy where control is in the hands of individuals or companies.	Part of the country's economy where control is the hands of the government.	Castro and Janssen (2011).
Controlled by market forces	Controlled by political forces	Kotler & Lee (2008:18).
More flexible, easier to manage due to decision taken by a single leader.	More rigid due to the process of decision making and implementation.	Drotz (2014)
Are more flexible, easier to manage because the	Public sector organisations are more rigid due to the	Kotler & Lee (2008).

decision is taken by a single leader	process of decision making and implementation.	

3.6 SELECTION AND INTERACTION APPROACHES TO A LEAN ORGANISATIONAL CULTURE

A large number of published studies suggest that approaches to lean implementation may differ according to national culture and organisational culture (Boscari, Danese & Romano 2016; Gambi et al 2015; Hasle et al 2012; Kull et al 2014). These studies build upon seminal studies that confirm that the culture of organisations established in a single country setting differs in terms of value orientation and that these differences affect the ability of the organisation to maximise value for the customer (Lau & Ngo, 1996). For example, Foster (2007) highlights a view held by international marketers that holds that Mexican food sold in the U.S. by major restaurant chains is very different from the food sold in Mexico. This may be attributed to American customers' preference for the Americanised version of these foods. Although it may be somewhat obvious that differences in taste and preferences differ according to culture, extending this understanding to the application of Japanese manufacturing principles to other countries presents major challenges.

In one study, Taherimashhadi and Ribasf (2017) aimed to develop a model to align organisational culture with lean culture. The interviews with the employees who participated in the semi structured interviews indicated that they were attached to their experience during the process of transferring to lean to their organisation. The researcher also considered success factors that enable lean adoption considering the national context and respective local organisational cultures. The researchers concluded that organisational culture could affect successful lean implementation, and managers must assess organisational culture in five dimensions: authority, sense of belonging to the organisation, courage to accept changes, performance orientation, time perspective orientation and lively spirit orientation.

In their review of the impact of organisational culture and inhibitors of lean implementation, Alkhoraif and McLaughlin (2017) reported similar findings about the factors that should exist in a lean culture. However, the findings are not unequivocal. Rather, organisational culture differs in many aspects, for example, according to its content, leadership style, knowledge

management, employee commitment and organisational policies (Bhasin, 2012; Angelis, Couti & Gill, 2011); however, recent research in lean manufacturing has highlighted the need to focus on the culture of the organisation as a critical success factor for lean implementation (Cagliano et al. 2011; Dora, Kumar & Gellynck 2016). One of the limitations of these studies is that they do not provide an in-depth analysis of the relationship between organisational culture and lean success; in particular, the misfit that has appeared to be a prevailing challenge for lean implementation (Alves & Alves, 2015; Cagliano et al., 2011).

The findings of these studies might have been more persuasive if the authors had considered contingency and systems lenses to investigate in greater depth the cultural tensions in an organisation when implementing lean practices as well as how such tensions are resolved. Netland (2016) has convincingly applied four contingency variables, corporation, factory size, stage of lean implementation and national culture, to test for differences in lean adoption. The researcher found that the use of rewards and recognition seems to be a factor that is sensitive to contingencies. This is certainly true in the case of state-owned entities where the government mandates cost cutting (OECD, 2013), which may prevent an effective reward and recognition strategy. In this case, SOE managers may adapt their strategy to look at alternative nonfinancial ways of recognition that employees may still value.

Additionally, the use of rewards and recognition may be considered a function of the managerial system in a viable systems model that is established in a particular context and supported by a social system (organisational culture) (Dominici & Palumbo, 2010). Therefore, examining the interactions between subsystems and culture ensures the survival of lean plants as a viable system. For example, with regard to managerial systems (System 5: Policy), planning and policy makers are in a position to allocate resources and to facilitate radical change, which emerges at the SOE level (Espinsosa & Walker, 2011). Espserjo (2011) explains that viable systems are adaptable, flexible, and capable of innovating and inducing change in other systems in pursuit of their own purpose.

The implementation of lean principles has gained significant importance in fostering an organisational culture that encourages employee involvement and engagement and can improve value creation for clients. However, as Ehlers (2013) noted, each aspect of organisational culture can be seen as an important environmental condition affecting the system and its subsystems and thus requires the need for a quick response dependent upon (S5)

functions that involve turning around strategies, training, enhancing teamwork and other tools for developing a culture of problem solving (Radnor & Walley, 2008). According to Maarse and Janssen (2012), an organisational aspect of culture such as both employee and management commitment is crucial; much attention must be given to the establishment of a culture that recognises the potential for lean, improvement and joint value creation.

3.7 LEAN MANUFACTURING SYSTEMS AS VIABLE SYSTEMS

Lean manufacturing can be considered a viable system, as shown by Schimidt (2014), who analysed lean principles from the perspective of viable systems and obtained an elevated understanding of previous research. Durakovic et al (2018) findings also showed that the greatest threat in implementing lean practices is the lack of understanding of the concept. Supporters of VST agree that the reason for the low level of success in transferring lean principles to other sectors that are outside of their native origins (Japan) is the lack of understanding of the strong interactions that hold between organisational systems and lean as a sociotechnical system.

Toyota's fulfilment of lean manufacturing principles confirms lean to be an effective methodology for improving a business enterprise (Bateman et al., 2013). However, the problem of imitating Toyota's lean principles and tools for implementation in other contexts usually produces a lean system that is not integrated into the whole organisation (Dominici & Palumbo, 2013). In large public sector organisations, there are diverse stakeholders (such as shareholders, legislators, investors, media, suppliers, employees, and customers), and aligning lean principles without understanding the relational dynamics between the organisation and the individual/consumer or communities of consumers is associated with additional difficulties (Dominici, Basile & Palumbo, 2013). Therefore, integrating the viable systems approach with lean principles seems promising for fostering sustainable lean adoption, which is presented in the following section of the research.

3.7.1 The viable systematic structure of the organisation

Various factors and environmental conditions influence the viability of an organisation (Aliahmadi, 2019; Mcdermott, 2016). The ability of an organisation to coordinate its activities, achieve its goals and update faster than competitors is equated with viability (Fedotova, 2020). According to Golinelli (2010), an organisation is an open system that is not independent of its

environment but can survive only if it is able to contextualise its activities and create exchange processes with the external environment. This means that the ability of the lean system to survive depends on its ability to establish congruence with the relevant organisation in the context within which it operates. Studies that have discussed the viability of organisations (Dominic & Palumbo, 2010; Dominici & Palumbo, 2012; Schimidit et al 2014; Fedotova & Bocharova, 2020) recognise two main areas in every organisation (kaisha): the metasystem or decision-making system (subsystems 2-3-3-4-5) and the operative structure (subsystem 1).

Subsystem 1: Lean production operations - Subsystem 1 (S1) represents the basic operational processes in an organisation (Fedotova & Bocharova, 2020). This system adopts the main lean manufacturing principles, which may help to eliminate waste (Dominici & Palumbo, 2012). This raises the question of how the dynamics of lean principles can be seen in viable systems perspectives and support the viability of the organisation. Recent research has suggested that organisations are considered viable systems if they are able to survive in a particular context due to continual dynamic processes and several kinds of internal changes (adaptation) (Mele et al., 2019). In this dynamic process, external factors from the environment influence decisions about how lean principles can be tailored to a context given the objective of creating customer value (Abollado & Shehab, 2018). Consequently, collaborative connections with suppliers, consumers, distributives, financial and institutional systems identified by Espejo (2013) create conditions that support the dynamic that lean principles can be seen from the perspective of viable systems. Considering the characteristics of viable systems, the organisation that adopts lean manufacturing principles is then open to interactions between S1 and the environment, as illustrated in Figure 16.

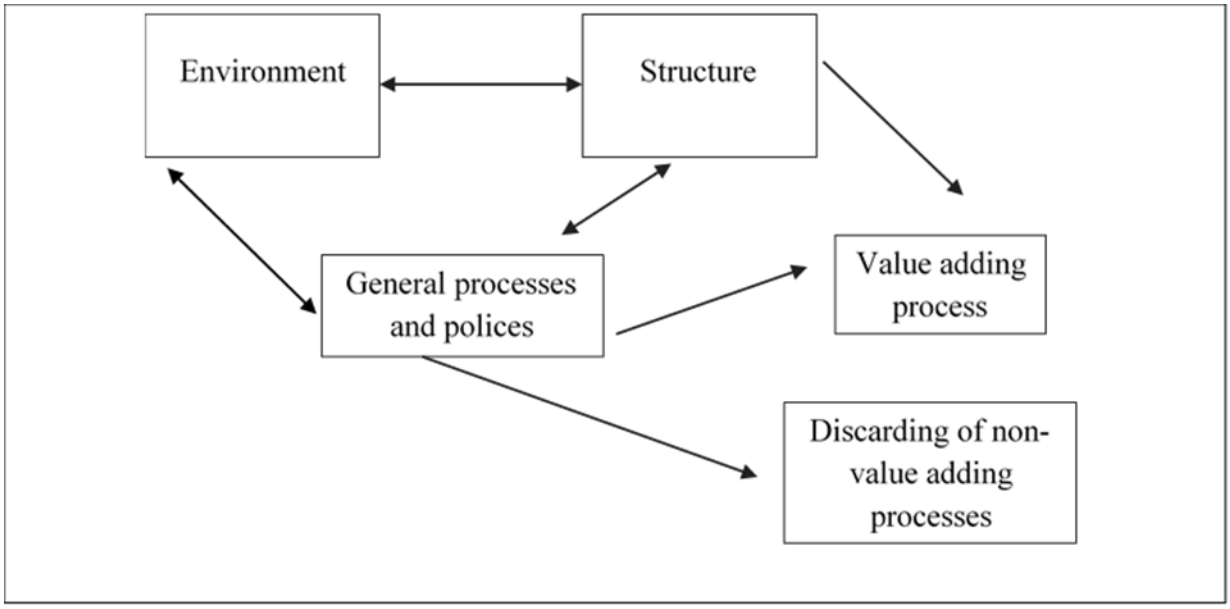


Figure 17: Dynamic process for value creation **(Source:** Own)

According to Figure 17, links between the environment and the structure of the organisation are not symmetrical. The first is a two-way linkage, and the second is a two-way linkage between the environment and general processes and policies. These links are essential for maintaining the viability of the system through the exchange of information, resources, and raw materials. This is a key point because it helps to advance the understanding of these relationships in how value is created in the public sector. In addition, lean manufacturing systems are also pull systems: the flow of information emanating from the environment conducts and continuously redefines the processes and objectives of the organisation (Abdulmalek, 2007). Dominici and Palumbo attributed the pull and flow of information to two characteristics of the organisation: the structures of the organisation, which have a high level of flexibility, and the lean principles, which enable the organisation to self-regulate in line with changes in the environment by improving standardised activities and processes.

For example, in S1 of the organisation, the lean principle of value stream mapping (VSM) involves identifying all the steps in the value chain and eliminating steps or processes that are nonvalue-adding (Maarse & Janssen, 2012)To put value stream mapping into perspective, Ejef (2018) identifies organisational and production management actions in subsystem 1 (S1) as activities that describe the value chain of an organisation. Drawing on the concept of the value chain from the seminal work of Porter (1985). Ejef (2018) identifies five main primary activities concerned with creating value for the customer: inbound logistics, operations,

outbound logistics, marketing, sales and services. These links are essential for maintaining the viability of the system through the exchange of information, resources, and raw materials. The viable systems view of the process for identifying value-adding activities is an autonomous view that recognises constant changes in the business context and constraints (Romero-Silva, 2018; Espejo, 2013; Mele & Polese, 2011; Spohrer, James, Paul Maglio, Bailey & Gruhl, 2008). Unfortunately, some researchers have acknowledged the limitations of value stream mapping for the public sector while also developing an adaptation to traditional tools. The next section describes the appropriate design of organisations systems for the implementation of lean tools.

3.8 REDESIGNING THE ORGANISATION FOR THE IMPLEMENTATION OF LEAN MANUFACTURING

Thus far, researchers have explored adaptation and fit as the major challenge for the implementation of Japanese lean manufacturing principles from manufacturing sectors to other sectors in different countries (Arlbjorn, 2011; Durakovic et al., 2018; Danese, 2018; Lukrafka, 2020; Vinodh & Joy, 2012). These studies underline the belief that there are contingencies in different organisations that determine suitable lean principles or strategies that can be successfully implemented to maximise customer value. Therefore, an approach for the redesign of the organisation and its interaction with the environment is necessary for the effective implementation of lean principles in different environments. The redesign of organisations for effective lean implementation has been supported by researchers. For example, Herrmann et al. (2009) found that the viable systems model (S1 to S5) provides structural design and segmentation of production systems according to the principles of cohesion and autonomy and thus may offer support for the implementation of lean principles in organisations. This view is supported by other researchers (Rahman and Ibrahim, 2013) who applied the viable systems approach to strengthening business process modelling.

According to the researchers, the viable systems model, as depicted in the five organisational systems of the VST, is critical in managing the fit of the organisation with its environment. Regarding managing the fit of organisation, the central question in this research is which critical factors determine the fit of lean manufacturing principles of state-owned entities. To answer this question, Schimidt et al. (2014) state that, for lean practices to be successfully implemented in an organisation, system 4 of the viable systems model must diagnose the

environment and the organisation to anticipate possible changes needed for the implementation of lean practices. This implies that the organisation must account for critical aspects of the environment by analysing systemic interaction according to the VST to cater to the redesign of the systems in the organisation for a better fit with the lean manufacturing principles (Dominici & Palumbo, 2010). In addition, critical contingencies in state-owned entities (size, culture, management oversight roles, agency factors, conflicting objectives, and time-lagged decision-making) that would ultimately threaten the fit of lean principles to the organisation must be considered when redesigning organisational systems. Hence, in this research, the redesign of an organisation for implementation of lean is done through the viable lens and contingency lens as expanded on the following section of the study.

3.8.1 Redesign of value stream mapping for state-owned entities

A comparison of the principle of VSM between the private sector and the public sector environment demonstrates some significant differences (Bonaccorsi1, Carmignani & Zammori, 2011). For example, Rapcevičienė (2014) argues that the private sector value chain focuses on creating profit for the business, while the public sector value chain focuses on providing value to citizens, which includes overall service delivery, among other things. Researchers have agreed on three core components: the public sector value stream consists of citizens/customers, services, and trust (Heintzman & Marson, 2003; Hietzman, 2010; Kaplinsky & Morris, 2002; Kaplinsky, 2002). Therefore, when mapping and analysing the value stream for lean manufacturing in the public sector, these three sets of value "drivers" must be considered (Poksinska, 2010). Furthermore, increasing employee involvement is one of the value drivers that must be considered (Shah & Ward, 2007). Employees most often than not are the drivers of organisational processes; therefore, their involvement is closely related to continuous improvement, which consists of taking small steps to improve process waste. (Campen & Hertzberger, 2009).

In section 3.8.1 of this research, the researcher argued for the adaptation of the lean principle of value stream mapping when applied to state-owned entities. According to Teichgraber and de Bucourt (2012), one limitation of value stream mapping as a tool for waste elimination is that the tool is drawn from a manufacturing environment and may pose adaptation challenges to other environments, such as the public sector, hospitals and healthcare (flow of patients, waiting times). One researcher argues that, in terms of the value stream maps drawn in the

literature, it is common to find diagrams that are not exact maps but are associated with problem solving (Garcia, Vidal-Carreras & Garcia-Sabater, 2021). This aspect leads one to conclude that the design of the map of the future state is based on the design of management tools that must be adapted in some way for state-owned entities once contingency issues have been identified through the redesign of the process.

Contingency theory proposes that value stream mapping cannot be generalised to all types of contexts but must fit system features with the unique aspects of the organisation's environment (Betts, 2011). These environmental contingencies are further understood by applying the viable systems model, where the organisation is transformed into an autonomous system capable of adapting to constant environmental changes (Beer, 1959). Perhaps for SOEs, applying the lean principle of value stream mapping using the structure of the viable systems model will be able to react faster to environmental changes; therefore, its application will have a positive impact on reducing waste and creating value for the customer.

System 4 (outside and future) of the viable systems model observes and collects essential information from the external environment of the organisation (Ejef, 2018). For SOEs, the environment is represented mainly by customer demands but also by other factors, such as shareholder compactness, government mandates, and technological, legal and other requirements (PRC, 2013). Therefore, with the information that the organisation solicits from the external environment and information from system 5 (policy), system 4 creates a vision from which to develop a value stream map for the organisation. Therefore, SOEs, based on the specific situation, should identify (predict) the most significant factors of external and internal influences and develop a suitable value stream map. The system of external and internal factors influencing the viability of the organisation is shown in Figure 18.

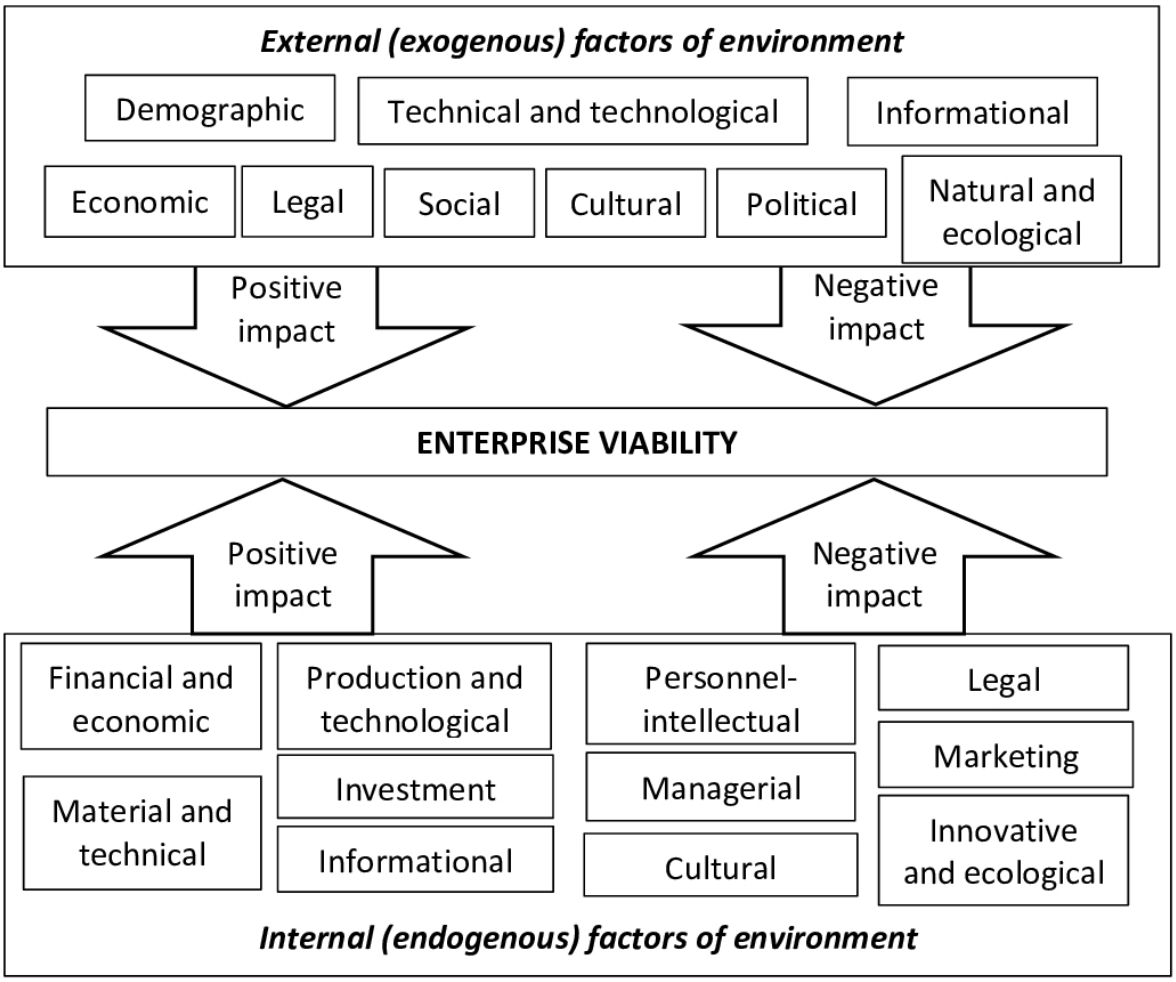


Figure 18: System of external and external factors (**Source:** Adapted from Mohamed, 2016)

Figure 18 illustrates how ensuring the viability of an organisation requires careful consideration of both external and internal factors. These factors interact and shape the organisation's ability to adapt, survive, and thrive in a dynamic environment. The next section will discuss the redesign of the lean principles for SOEs.

3.8.2 Redesigning of the flow principle for state-owned entities

In Chapter 2, section 2.5 of this study, the researcher argued that relevant characteristics of the public sector environment may hinder flow (culture, communication, laws, and policies). Therefore, obtaining cohesion within the whole system from the perspective of complex SOE organisations is necessary insofar as the lean principle of flow is concerned. Dominici and Palumbi (2017) investigated the systemic interaction between lean people and organisations through VST. The study revealed that the Kanban (subsystem 2 – Kanban coordination system) is a coordination and information system that pulls the "flow" of materials during the

production process. The flow principle was perceived as operations and information flow from the environment to the organisation and ultimately the customer (Schemenner, 2015). Flow within a state-owned entity environment was viewed from two perspectives: the operation flow and the information flow.

The operation flow within a production unit comprises tangible flows (flows that produce and deliver a product) and intangible flows (flows that do not produce flow but are still considered important for production and service provision). Information flow is needed to exchange flows of energy, resources, raw materials, and information with the environment for an organisation to survive and be "viable" (Golinelli, 2018). There appears to be some agreement among researchers within the viable system view that the flow of information coming from the environment redefines the activities and objectives of the organisation (Briones-Juarez et al., 2010). Achieving lean flow is possible through two distinct characteristics of viable systems: the lean structure of the organisation, which has a high level of flexibility, and the kaizen (continual improvement strategy), which means that the organisation can self-regulate according to environmental changes and by improving standardised activities and processes.

Unfortunately, within the SOE environment, there are several scenarios in which operations flow is disrupted, such as leadership style (Bronstein, 2011) and public financial management, which controls the allocation of financial resources for critical projects (Sambo, 2017); this leads to disruption of the SOE's operations; dysfunction of the use of technical plans, which leads to undelivered mandates (Corrigan, 2014); and regulatory frameworks that SOEs operate under, among others (Kanyane & Sausi, 2015). The application of viable system theory to the attainment of flows from these scenarios suggests that the process of flow is a result of management decision-making (System 2 – the coordination system that enables the units of system 1 to solve their own problems, enabling decentralised decision-making) (Ejef, 2018) and the working practices of the operating teams (Briones-Juare, 2010).

Redesigning lean flow for state-owned entities may consider key functions of system 2 of the VST (Fedotova & Bocharova, 2020). These functions perform the coordinating role for other subsystems, which encompass the following:

- Control through system 3. The system needs to be under appropriate control to achieve flow. An example could be production planning and control of resources and equipment; forecasting; and plant maintenance, which together turn inputs to process

and output. The system also establishes a clear understanding of the environment in which an SOE operates as well as the external forces influencing its operations. The environment represents all the external factors that influence the production system in the organisation.

- Coordination through system 2. This system receives all the information about the different production plants and acts as a filter so that only the necessary information reaches system 3. Nonvalue-adding activities should be removed from the system to ensure that the activities flow through the systems.
- Information transparency through system 1. Each department or division within the SOE is an operational unit that includes the management of the SOE and the resources or employees that perform the operational activities. The implication is that, to achieve flow, frequently updated information must be available and accessible to employees and other systems without delay, i.e., in real time. These relationships are further depicted in Figure 19.

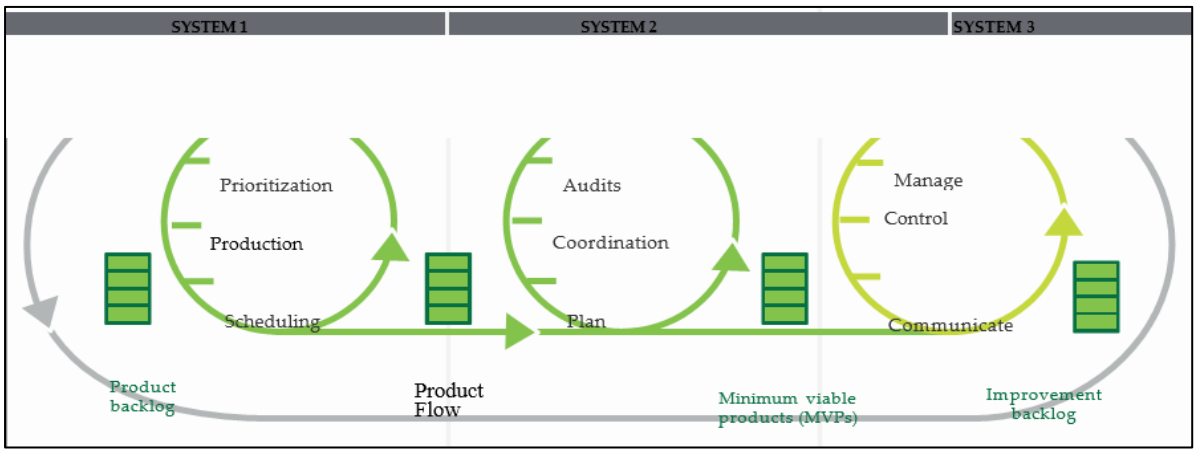


Figure 19: Viable Systematic relationships to created flow (**Source**: Own)

3.8.3 Employee involvement in lean processes and systems

In addition to redesigning or adapting lean principles, as discussed in the previous sections of this research, the total involvement of employees is crucial for successful lean outcomes according to Roslin, Ahamat, Bahrom and Ibrahim (2019). One criticism in much of the literature on lean practices is the lack of understanding of lean principles and poor buy-in from employees (Netland, 2016; Demeter & Jenei, 2011). Therefore, managers need to ensure that

everyone knows what and how to implement lean practices and encourage employees to participate as members of lean improvement teams (ISO 9001:2015).

Figure 20 was constructed by the researcher as a conceptualisation of how the two theories coexist in this study. The relationships among the concepts, theories and variables in the framework were established from a review of the literature and existing lean manufacturing frameworks that have been developed for the application of lean principles in different organisations and industries. According to the critical review of the existing lean manufacturing frameworks, there are similar approaches to implementing lean; however, the growing complexity and variability of the SOE environment require an understanding of the strong interactions among organisational systems and lean principles. The conceptual framework indicates the conceptualisation of lean manufacturing principles through the adoption of the model of Albjorn et al. (2010), which includes three layers of lean conception, namely, lean philosophy, lean principles and lean tools. The lean layers are explored through contingency theory and VST and integrated into the analysis of the organisation.

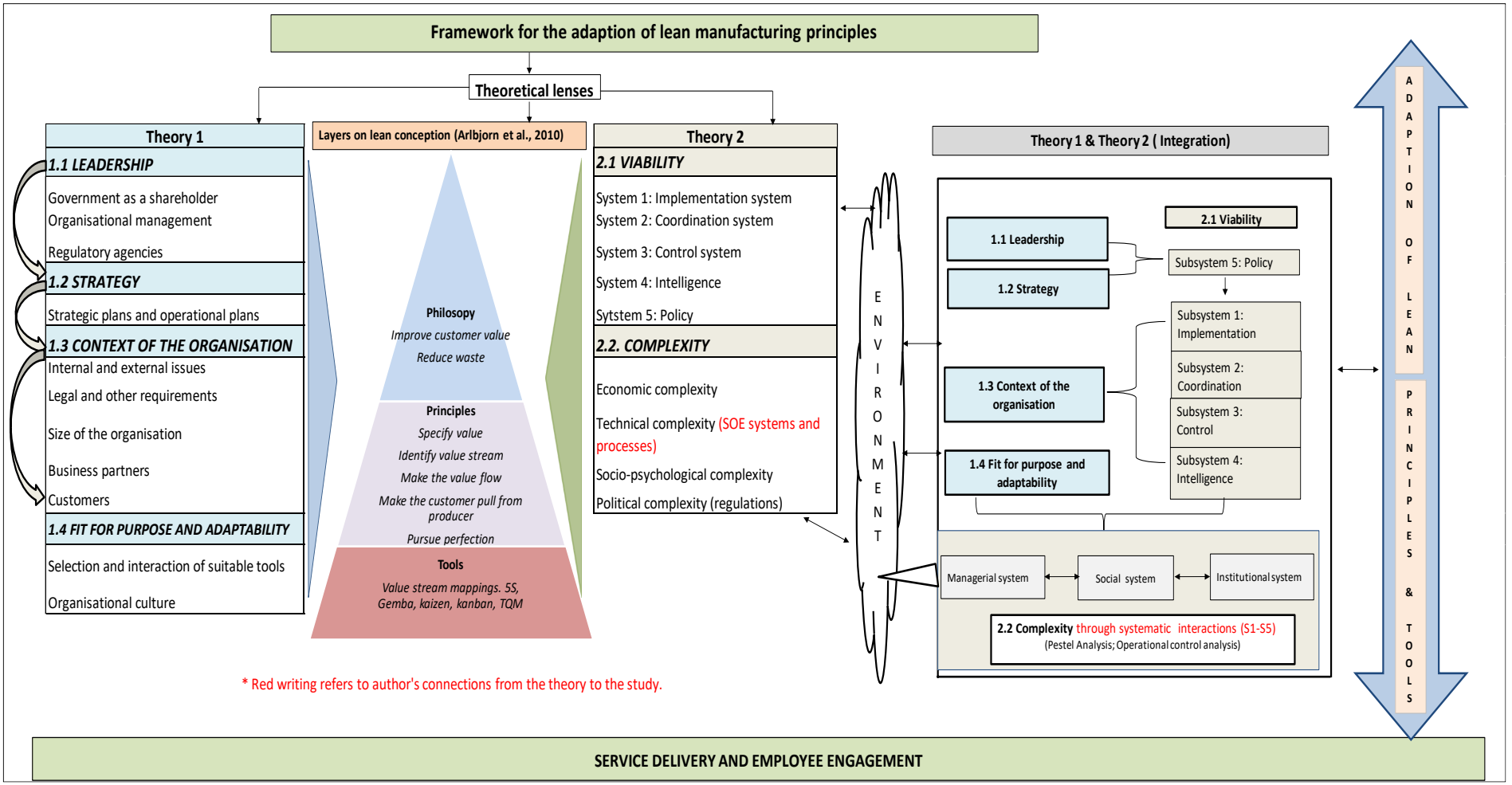


Figure 20: Conceptual Framework (**Source:** Own)

3.8.4 Theory 1: Contingency view

i. Leadership

First, the model indicates that organisational leadership is an important aspect of adapting lean manufacturing principles to an organisation, and without committed leadership, those who understand and translate lean to strategy lean programmes will likely fail (Liker and Franz 2011). Among such leaders of state-owned entities are the government as the main shareholder and the organisation's management, which translates the requirements for the shareholder into organisational comapacts and objectives and regulatory agencies that provide guidance for the operation of the state-owned entities.

ii. Strategy

Second, the proposition of contigency theory includes the design of organisational inputs and processes to meet the requirements of customers or citizens for the successful development of a lean implementation strategy for the organisaton. The basic tenant of contigency theory is that creating customer value and ultimately reducing nonvalue-adding activities results in a superior "fit" of a lean strategy with key and unique aspects of the SOE environment. A complete review of the SOE strategy is needed to ensure that value creation is aligned with stakeholder and customer requirements and that value creation steps are built in the processes that produce customer value while reducing waste and other non-value-adding activities. This strategy delivers and evaluates lean and the possibility of adapting and fitting to business operations.

iii. Context of the organisation

Third, the context of the organisation entails the analysis of internal and external issues (ISO 9001:2015). The context of the orgnisation considers internal and external issues that play a role in improving customser value. The internal issues consider the size of the organisation, resources, and skills, while the external issues include the specific SOE, external stakeholders, constitutional institutions, policies and laws, and shareholding minstries that provide shareholder requirements (KPIs) to SOE chief executives.

iv. Fit or adaptability.

Finally, the tools are selected for the specifics of the organisation and may enable employee participation in fault finding, waste reduction, process improvement and organisation-wide learning. For example, gemba walks can be implemented in one organisaton for process improvement, whereas another organisation may find the 5S tool for sorting more effective.

3.8.5 Theory 2 viable systems view

i. Viability

First, viability considers the lean philosophy and the lean manufacturing principles and their application to the environment through the five systems of the viable systems model (System 1 to 5).

System1: Implementation (which carries out operations such as production and services; SOE management, which controls them to optimise daily business operations).

Sytem 2: Coordination: this is the ‘‘internal eye’’ that coordinates different operations carried out in primary units and ensures that they interact through information and communication to serve the whole organisation and avoid process bottlenecks, ineffective production planning, contradictory communication being sent to clients (internal or external), and other conflicts.

System 3: Control: In this subsystem, the operations and processes of the other subsystems are optimised, harmonised, and enhanced through internal guidance that allocates resources, creates synergies, and competes to optimise the overall performance of the primary units.

System 4: Intelligence: This is the strategic subsystem: it gathers external data and information (about technologies, markets, competition, society, etc.) and, having evaluating their relevance to the organisation, translates it into strategies and action plans for future activities.

System 5: Policy: This subsystem defines the policy of the organisation according to the objectives planned by the owners, the shareholders, and/or the stakeholders. The strategic decision-making process arises from the comparison between the elements of current reality described by subsystem 3 (cohesion management) and the future needs and objectives established by subsystem 4 (intelligence).

i. Complexity

Third, the SOE environment where lean principles are adapted has increased complexity, which has led to SOE organisational systems and processes. The systemic interactions that may influence lean adaptation were analysed through PESTEL analysis. Additionally, there is a relationship between production or operational control and planning processes, which introduces a level of complexity, such overproduction – resulting in an excess of products, products being made too early and increased inventory; waiting – any idle time or period of inactivity (because an upstream activity has not been delivered on time); unclear communication – use of incorrect information or an unclear workflow, which can result in defects; and underutilisation of people – also referred to as 'a waste of talent', which happens when people are not 'used' to their full talent, skills or knowledge.

3.8.6 Integration of the two theories

Finally, the model concludes that in an attempt to reduce waste and deliver value to the customer, the identified variables and contrustructs in theories 1 and 2 should be unified into a framework of a variable systems model where the environment interacts with the managerial system, social system and institutional system. The next step demonstrates the control of information and the flow of material coming through the environment to the five levels of recursivity that are inherent in the organisation. Every arrow or communication channel that is graphically depicted in the integration represents the variety that applies to all control systems of the SOE. The subsequent subsytems provide the operation (S1) that delivers value in use to the customer.

Lean philosophy: The model proposes that improving customer value and reducing waste is a function of leadership commitment and strategising for lean processes. The strategic decision-making process arises from the comparison between the elements of current reality described by system viability (S1-S5) and should be defined in the policy according to the objectives planned by the leaderiship, the shareholders, and/or the stakeholders of the SOE.

Lean principles: The model proposed that lean principles may be adapted to specific state-owned entities by first understanding the context in which the SOE operates. Value creation is possible when the risk and opportunities that are presented in the context of the organisation are considered and addressed. Determining external and interal issues that may impact the effectiveness of an organisation may arise from organisational culture, the size of the

organisation, the skills of the employees, changes in technologies, etc.; thus, organisations must analyse and coordinate how the context of the organisation interacts through information and communication to serve the whole organisation and avoid process bottlenecks, ineffective production planning, contradictory communication being sent to clients (internal or external), and other conflicts. Thi is a function of systems 2, 3 and 4.

Lean tools: The model posits that lean tools can be adapted to different operational processes by assessing which tools are the right tools to fit a specific process in an organisation. For example, one process may employ the Kanban tool as a coordination and information system that pulls the flow of materials during the production process. The right fit of tools is also considered through system 1, which is located at the lowest level of the system. These tools are the primary units that are composed of basic units (which carry out operations such as production and services) and of their own local management, which controls them to optimise their daily business. The right tools can be discussed at work team functions, production meetings, and planning meetings, and then the affected processes can be rolled out. Finally, the adaptation of the lean principles for state-owned entities is based on how the organisation deals with the complexity that is presented in its environmental analysis, mainly autonomy and cohesion. The lean principles are then capable of adapting to changes in the environment that could not be forseen in the design of the organisation.

3.9 CONCLUSION

This chapter extended the lean manufacturing principles presented in Chapter 2. The main goal of this chapter was to explore the characteristics of lean manufacturing principles within the ambit of contingency theory and VST. The literature reviewed suggested that, in general, the adoption of lean manufacturing principles in other countries outside the Japanese business environment tends to be challenging. Through the contingency lens, the researcher has argued that the environmental contingencies of state-owned entities determine the specific strategies, policies, and resources that can interact with the lean sociotechnical system to reduce waste and improve the processes within SOEs. The evidence from VST has confirmed that state-owned entities can be analysed through the five levels presented in the viable systems model and that lean principles are adopted through systematic interaction with the environment.

The study showed that cultural misfits can occur through interactions among communication systems, leadership, policies, training, and certain factors that act as barriers to effective lean

implementation. The investigation of the fit of lean practices with the environment from a viable systematic perspective has shown that an approach for the redesign of an organisation and its interaction with the environment is necessary for the effective implementation of lean principles in different environments. As such, the processes and structure of the organisation must be redesigned to accommodate lean operation within the organisation.

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

In the previous chapter, a review of the literature on lean manufacturing from the perspective of viable systems and contingency was presented, which sets the context of this research and reveals some gaps in the current application of lean manufacturing principles, particularly for SOEs. From the viable systems approach, research has identified five subsystems that compose a viable system (Poole, 2014) and argued that the adoption of lean practices should be viewed from the interaction with the five subsystems considering the sociotechnical nature of lean principles. Using the contingency lens prompted a quest to explore some of the existing lean manufacturing frameworks and examine their applicability to the unique context of state-owned entities. The purpose of this chapter is to outline the methodology employed for this research, expanding on the summary of the research design and methodology presented in Chapter 1. The chapter begins by highlighting the paradigm, research design and methodology, followed by the data collection and analysis methods and techniques adopted for this research. This chapter explains why the paradigm is appropriate for the research problem and for achieving the purpose of the research. The last section discussed the ethical considerations for this research.

4.1.1 Research aim

The aim of this study is to develop a framework for the adoption of lean manufacturing principles for state-owned entities in South Africa.

4.1.2 Research questions

To achieve the aim of the study, the following research questions were constructed and answered by the research participants:

- What factors determine the applicability of lean principles such as customer value, value stream, flow, pull and perfection to a new setting or environment?
- What can impede the successful elimination of waste within the public sector environment and thus hinder lean application?
- What constitutes customer value from a public sector perspective?

4.2 RESEARCH METHODOLOGY

Research methodology is a strategy of enquiry in which the logic and flow of the systematic processes followed in conducting research are articulated to gain knowledge about a research problem (Kivunja & Kuyini, 2017). It includes the assumptions made, limitations encountered and how they were mitigated or minimised. To this extent, several research methodologies have been discussed in the literature, namely, qualitative (naturalist inquiry involving textual or verbal data), quantitative (which employs the use of statistical analysis in displaying research data), mixed (which involves a combination of or research methods, mainly qualitative and quantitative), and experimental (which involve a scientific enquiry, including experimental groups) (Creswell, 2016; Myers, 2009; Creswell 2009). These methodologies are concerned mainly with how knowledge is understood, described, explained, verified, judged, evaluated, tested, explored, investigated, and interpreted (Pandey & Pandey, 2021).

4.2.1 Research paradigm and philosophies

According to Guba (1990), research paradigms can be characterised by the way the researcher responds to three basic questions: ontological, epistemological, and methodological questions. Similarly, other researchers use the term paradigm to describe the researcher's worldview (Mackenzie & Knipe, 2006). As explained by Lather (1986), the worldview reflects the researcher's beliefs about the world in which s/he lives and wants to live. Therefore, in developing a framework for the adoption of lean manufacturing principles for SOEs, the researcher had to locate the research in a particular research paradigm, guided by a specific worldview or philosophical stance. A paradigm is thus a shared worldview that represents the thinking patterns, imagination, beliefs, and values shared in a discipline and that guides how problems are solved within that specific discipline (Tichapondwa, 2013). Much of the current literature on research paradigms pays particular attention to four elements, namely, epistemology, ontology, methodology and axiology, that compose a paradigm (Lincoln & Guba, 1985).

Epistemology is concerned with describing how knowledge is attained or what counts as knowledge within the world (McDonald, 2011). For Patton (2014), epistemology is a way of knowing what is; how do we know what we know? According to Scotland (2012), ontology examines the researcher's belief systems about the nature of being and existence. Every researcher holds views on how the world is structured and what constitutes the social world

(Bryman, 2012). Axiology addresses the nature of ethical behaviour (Visagie, 2017). Figure 21 draws upon the research paradigms as explained by Lincoln and Guba (1985).

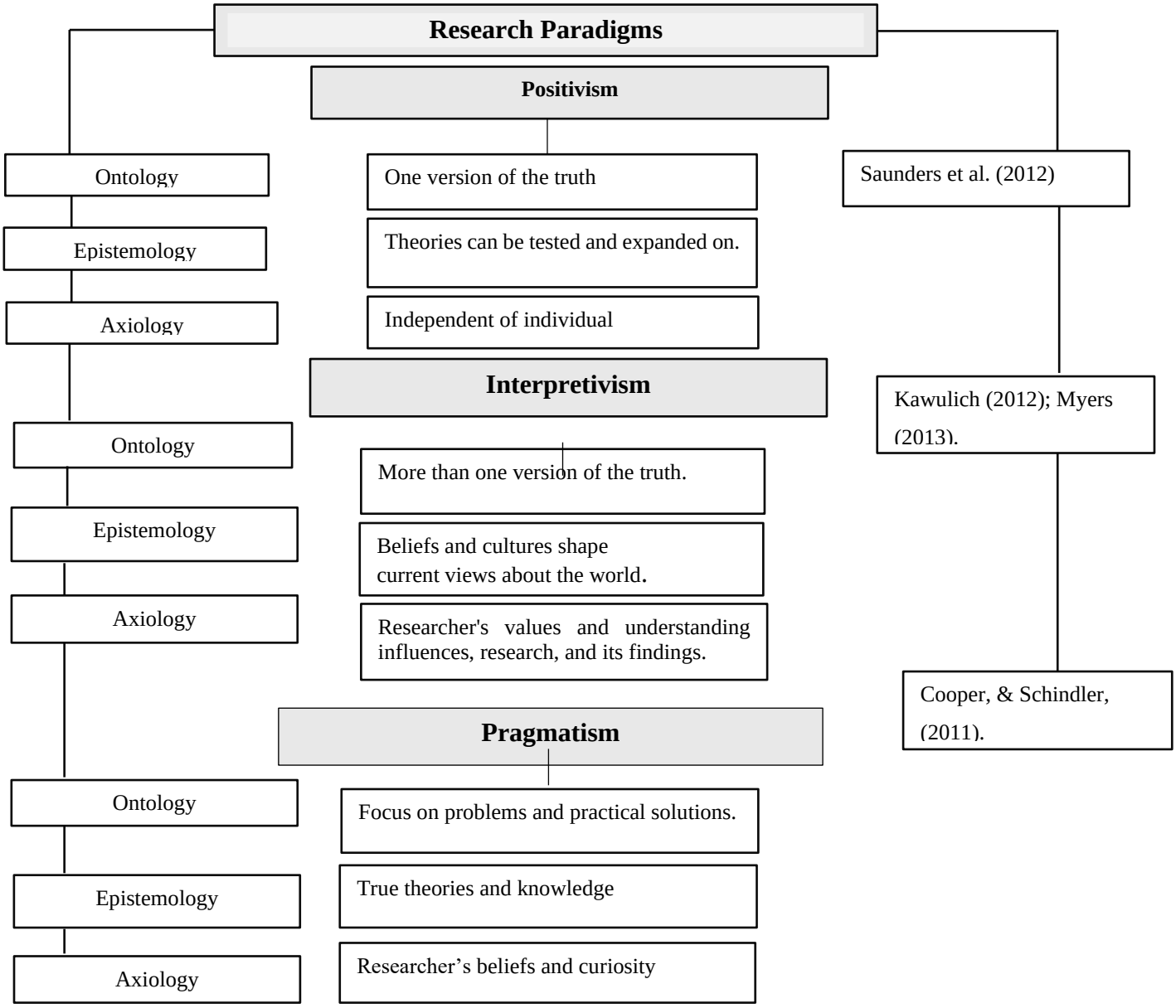


Figure 21: Research Paradigms (**Source:** Author's Own).

The research paradigms described in Figure 21 can be grouped into three main taxonomies, namely, positivism (knowledge being empirical and objective), interpretivism (knowledge being socially constructed and subjective), and pragmatism (knowledge based on many truths and viewpoints) (Ryan, 2018). These paradigms are discussed in detail in section 4.2.1.

Debate continues about the different paradigms, with some authors pointing out that researchers need to be aware of philosophical commitments through the choice of paradigm for research to gain understanding of the phenomena under investigation (Tucker, 2011; Aberra, 2016). However, considerable diversity is noted in the literature regarding how paradigms are used within research contexts. For example, Morgan (2007) argues that the epistemology, ontology, and axiology of a paradigm exert significant influences on the methodological choice of a study. Conversely, Watson (2008) and Bryman (1984), cited in Mkansi (2013), believe that no single research paradigm is better suited than another; instead, one might be more useful than another in a given study. Overall, as Rehman and Alharthi (2016:22) state, "the decision of choosing a paradigm to investigate a phenomenon should be guided by the necessities and requirements of a research study rather than the obdurate insistence of adhering to one particular philosophical outlook to the exclusion of others". To locate this study in a paradigm and to offer the justification needed for the paradigm chosen for this study, the researcher discusses dominant research paradigms that are applied in operations research, namely, positivism, interpretivism, and pragmatism (Pandey and Pandey, 2021), and offers a justification for the paradigm of choice. The section below discusses the paradigms.

4.2.1.1 Positivism paradigm

According to Fraser (2014) and Sarantakos (2013), paradigms are influenced by realist or objectivist and constructionist ontology. The realist ontology is informed by the positivist paradigm. Positivism was first proposed in the early work of Auguste (1857), and its application in research has evolved over the years. Research conducted in the positivism paradigm relies on deductive logic and the formulation and testing of hypotheses to derive conclusions (Kivunja & Kuyini, 2017). The positivism epistemology assumes that reality exists independently of humans (Rehman & Khalid Alharthi, 2016) and that objects in the world have meaning that is independent of any consciousness placed on it (Crotty, 2003). Rao (2013) lists four assumptions by researchers located within the positivism paradigm that are based on measurable outcomes. Those assumptions are determinism (events observed by researchers are caused by other factors), empiricism (research problems are investigated through the collection and verification of empirical data), parsimony (the researcher's attempts to explain the phenomena in the most economical way possible) and generalisability (inductive interference as the means of applying findings from one study to other contexts).

Unfortunately, these assumptions have drawn increasing criticism when applied to complex social phenomena (Yin, 2013). One such criticism stems from Bertrand and Fransoo (2002), who argue that the positivism paradigm assumes that prediction models can be built that explain the behaviour of operational processes. In operations research, this can be problematic because managers and employees alike are part of the process formulation that could often be part of decision-making in real-life operational processes. Shararah (2016) questions the ability of the positivist approach to flexibility in research contexts, as previous studies have noted that positivists struggle to explain organisations and complicated systems. Perhaps the most serious disadvantage of this paradigm is the assumption that generalisations about phenomena can be made across contexts as well as the assumption that context is not important (Neurath, 1973; Fadhel, 2002). These assumptions may limit the objectives of the current study, such as exploring the adaptability of lean manufacturing principles to different contexts; as such, the researcher duly rejects this paradigm.

4.2.1.2 Pragmatism paradigm

The pragmatism paradigm arose among philosophers who argued that it was not possible to access the 'truth' about the real world solely by virtue of a single scientific method (Patton, 1990; Tashakkori & Teddlie, 2003; Biesta, 2010). This paradigm was born out of an attempt to bridge the gap between interpretivist and positivist epistemologies (Pandey & Pandey, 2021). Although the pragmatic epistemology for social research is not entirely new (Gage, 1989; Howe, 1988; Patton, 1988), it is often applied to both qualitative and quantitative research methods (Biesta, 2010; Pearce, 2012; Hall, 2013). A major criticism of pragmatism paradigm is its false duality and warranty through mixed methods (Scott, 2007). Proponents of the pragmatic approach argue that pragmatism can be used in multiple ways and does not limit the researcher to one paradigm, given the ability to address the research problem (Nagitta, 2019; Saunders, Lewis & Thornhill, 2012; Tebes 2012). However, while the pragmatism paradigm may be applicable in providing truth elements to the research problem (Tashakkori & Teddlie, 2010:8), it is limited by its acceptance that the truths are open to empirical inquiry (Creswell and Clark 2011), while the focus of pragmatists is on explaining that there is an objective reality that exists apart from human experience (Morgan, 2014). The approach for this current study would lack a meaningful contribution to the exploration of how people (the social aspect) understand, experience, and create value, which is a key tenant of this research.

4.2.1.3 Interpretivism paradigm

Constructivism and interpretivism are related concepts that emphasise the understanding of the world as others experience it. Its philosophical underpinnings are informed by the belief that reality is constructed by individuals based on their own experiences and interactions with one another and their interpretations of the world in which they live (Jonassen, Cernusca & Ionas 2007:130). Constructivists and interpretivists view reality as constructed in a social environment and believe that there are multiple realities experienced by different people in a social environment (McMillan & Schumacher 2010:6). The significance of the interpretivism paradigm for operations management studies has been highlighted by researchers. For example, MacCarthy et al. (2013) believe that interpretivist research includes qualitative research necessary for theory building and knowledge development in operations management studies.

The purpose of interpretivism is to understand how others construe, conceptualise, and understand events and concepts (Rahi, 2017). According to Lincoln and Guba (1985) and Morgan (2007), the interpretive perspective asserts that every situation is unique and requires analysis in the context in which it is embedded. The belief that contextual factors need to be taken into consideration in any systematic pursuit of understanding fits well with the exploration and understanding of context in this study. Moreover, the interpretivist paradigm addressed the purpose of the current study, namely, developing a framework for adapting lean manufacturing principles and analysing how individuals understood the world in which they lived as well as represented and construed knowledge. Therefore, the study used the interpretivist paradigm.

4.3 RESEARCH METHODOLOGY

Several studies have employed various descriptions of the primary research methodologies, which have comparable themes, categorisations, and overlapping emphases. These approaches can be broadly classified as qualitative or quantitative. For example, quantitative methods have evolved over time to encompass several methodologies, such as surveys, single-subject research, and multiple experimental research procedures (Creswell, 2016). Similarly, a wide range of qualitative methods are frequently employed in research: the phenomenological approach, the hermeneutic phenomenological approach, interpretative phenomenological analysis, the transcendental phenomenological approach, ethnography, the narrative approach, case studies, and the grounded theory approach (Adu, 2019). Hence, qualitative methodologies, commonly known as exploratory approaches (Pandey and Pandey , 2021) focus on elucidating

the way human behaviour can be comprehended within the context of the social structures in which this behaviour occurs.

While some researchers recognise the commonality of these techniques, others consider them distinct entities. Cleland (2022) highlights that quantitative research involves hypothesis testing and confirmation, whereas qualitative research is concerned with hypothesis generation and understanding. Similarly, other researchers emphasise the fundamental differences between qualitative and quantitative research (Ametowobla et al 2017; Baur & Blasius, 2019). The researchers argue that these methodologies represent distinct philosophical paradigms. Qualitative research is rooted in interpretivism, focusing on the subjective experiences and meanings attributed by individuals (Austin & Sutton, 2014). Conversely, quantitative research aligns with positivism, seeking to establish objective, numerical relationships among variables (Amdur, 2011; Knoblauch & Pfadenhauer, 2018). Despite the evident overlap and fluid boundaries between qualitative and quantitative research, the prevailing perspective in methodological discourse continues to uphold a simplistic notion of two distinct "worlds" or "cultures" of social scientific research practice (Reichertz, 2019). In response, there has been a growing trend in methodological discourse to integrate different traditions using mixed methods research since the early 1980s (Baur et al., 2017)

This phenomenon arises because all alternative research methodologies can be categorised as qualitative, quantitative, or combined depending on factors such as the research objective, disciplinary context, temporal considerations, and scholarly sources utilised. Proponents of the mixed methods approach (Baur, 2019) argue that mixed methods research serves to integrate the traditional dichotomy between qualitative and quantitative research. Despite the blending of methodologies, qualitative and quantitative approaches remain separate, necessitating their combination. Furthermore, numerous qualitative researchers express dissatisfaction with the existing recommendations for integrating methods, as they argue that these suggestions neglect crucial principles of qualitative research and instead impose the logic of quantitative research onto qualitative research processes. Consequently, qualitative research has lost its most significant advantages and has become an inadequate rendition of quantitative research (Baur et al., 2017). For a comprehensive understanding of the challenges that arise when attempting to incorporate qualitative research logics into mixed methods research, refer to the works of Akremi (2017), Baur and Hering (2017), and Hense (2017).

4.3.1 Qualitative methodology

Previous researchers who have employed qualitative methods believe that participants' beliefs and behaviours are understandable and make sense in the context in which they live (Acharyya & Bhattacharya, 2019). Qualitative research methods are often used to collect in-depth details on a particular research topic (Rahi, 2017) and are also referred to as exploratory methods. Researchers using qualitative methods often consider the natural setting to be important in understanding a phenomenon (Berg & Lune, 2014). Furthermore, in qualitative methods, the natural setting or environment is as important as the research participants because context influences behaviours and outcomes (Austin, 2014). As such, researchers using qualitative methods do not seek to generalise their findings to a wider population. Rather, they attempt to interpret experiences of the phenomenon of interest within a given context (Acharyya & Bhattacharya, 2019).

Qualitative research also provides a much more flexible approach. For example, if useful insights are not shared during an interview, the researcher can adapt the questions or change the setting to improve the responses (Neuman, 2014). On the other hand, one major drawback of qualitative methods is "selective bias" (Bitektine, 2008:161). For example, the researcher may be biased in selecting a sample that favours anticipated outcomes (Barrat, Choi & Li, 2011). Moreover, since qualitative researchers are limited from formulating hypotheses, the natural inclination is to peek into the data. Therefore, an additional concern is the risk of selectively observing for evidence that fits the prior stated hypotheses. To overcome this limitation, previous studies have suggested that researchers need to become highly sensitive to preconceptions and prior assumptions and then "bracket" them, or put them aside, to maintain objectivity and neutrality (Neuman, 2014).

4.3.2 Quantitative methodology

On the other hand, quantitative research methods involve the gathering and transformation of information to deliver measurable computations in a numeric frame using surveys, tests, and predetermined instruments (Maxwell 2013). For Creswell (2009:13), quantitative methods can be defined as "the means for testing objective theories by examining the relationship among variables which in turn can be measured so that numbered data can be analysed using statistical procedures." Proponents of quantitative research (Denzin & Lincolin, 2005; Zikmund, Carr, & Griffin, 2012) tend to prefer such research types because of their focus on measurements, frequency, and analysis of causal relationships between variables.

While qualitative research capitalises on the use of cases and human understanding of the phenomenon, quantitative exploration uses statistics, numbers, and figures for explanation and analysis (Yilmaz, 2013). However, the use of statistics, numbers, and figures to explain and analyse data has various well-known limitations. One limitation is the inability of quantitative data to answer questions that seem complex for numerical analysis or explanation. In this study, the researcher seeks to understand how lean principles can be adapted to state-owned entities. To gain substantial insights, the context of the organisation is key in facilitating the adaptation of lean to the complex systems and processes of each organisation. Unfortunately, a large amount of data can be collected to explain how adaptation can be possible through hypothesis testing. It is the researcher's view that exploration through interviews may provide sufficient insights to answer the research question, for example, how managers and employees create value and how the value is translated into inputs that can derive critical success factors for lean adaptation.

4.3.3 Mixed methods

In mixed methods research, quantitative and qualitative methods are employed either concurrently or sequentially to answer the research question (Venkatesh, Brown & Bala, 2013). Proponents of mixed methods research appreciate the ability to address both exploratory and confirmatory questions within the same research inquiry (Teddlie & Tashakkori, 2009). Although both qualitative and quantitative methods can arguably be used to answer the research questions of this study, qualitative methods have typically been used more in management studies than in exploratory research to develop a deep understanding of subjective meanings, concepts, and theoretical insights (Flick, 2014). While quantitative studies seek to confirm hypotheses about phenomena (Creswell, 2014; Saunders et al 2015), they do not provide a depth of understanding of issues that are not possible using quantitative, statistically based investigations (e.g., customer value perceptions, contextual factors, influence of organisational culture, etc.).

4.4 JUSTIFICATION FOR QUALITATIVE METHODOLOGY

With the rapid progression and application of lean manufacturing principles in all organisational settings, particularly in the public sector context, organisations constantly face new challenges related to their lean adaptation capabilities and impacts (Nguyen & Lines, 2020). As a result of the increase in the complexity and variability of the organisational environment, researchers must understand the strong interactions that hold between lean

manufacturing principles and organisational systems to facilitate successful adaptation (Dominici & Palumbo, 2012). To explore and understand these interactions, qualitative methods provide a powerful exploration mechanism to determine how lean manufacturing can be adapted to public sector organisations by allowing the researcher to gain deep insights from rich narratives of the participants who work within the public sector organisations (Venkatesh, Brown & Bala, 2013).

The decision to employ a qualitative methodology for this investigation was determined by the research goals and the research paradigm, which encompasses perspectives on epistemology, ontology, and axiology. Furthermore, conducting interviews to understand participants' perceptions of the customer value created by their organisation will assist in providing depth in this research inquiry by allowing the researcher to gain deep insights from rich narratives (Venkatesh, Brown & Bala, 2013). On the other hand, a quantitative methodology might still lack because it offers a comprehensive set of factors that participants might consider value added or because of their experience with adaptable lean tools, whereas qualitative interviews provide much stronger and richer interferences than does a generalised empirical view.

Furthermore, the qualitative methodology aligns with the philosophical assumptions presented by the interpretivist paradigm (as explained in section 4.1), which supports the assumption that there are multiple interpretations of the world (Adu, 2019). Therefore, with respect to qualitative methods, participants may provide varied descriptions of their experiences and the meaning they make out of them (Creswell & Poth, 2018).

Finally, qualitative methods provide an opportunity for the researcher to explore further opportunities for the adaptation of lean principles in public sector organisations by understanding the multiple contingencies in the different contexts of organisations, as Pawson (2013:189) points out that any given study "reveals its truths but in ways that are highly conditional and multiply contingent".

4.5 RESEARCH STRATEGY

Having established that qualitative methodology would be useful for this study, the research design is important. The research design provides clear guidance to researchers to conduct studies effectively and successfully (Wiid & Diggines, 2009). The authors further described the procedures necessary for obtaining the information and assisting the researcher in the collection, analysis, and explanation of the data (Malhotra, 2010:102). A research design can

be defined as "…the logical sequence that connects the empirical data to a study's initial research question and ultimately, to its conclusions" (Creswell & Plano Clarke, 2011:86). Colloquially, a research design is an action plan for getting from here to there, where "here" may be defined as the initial set of questions to be answered and "there" is some set of conclusions (answers) about the questions" (Wright et al., 2016). According to Creswell (2014), the research design defines the type of research (e.g., descriptive, correlational, semiexperimental, experimental, review, meta-analytic) and subtype (e.g., descriptive-longitudinal case study), research problem, hypotheses, independent and dependent variables, experimental design, and, if applicable, data collection methods and a statistical analysis plan.

The different types of designs used within the qualitative research methods fall into one of four major categories of research: (a) phenomenological research, (b) ethnographic research, (c) grounded theory research and (d) case study research (Creswell, 2009). These designs are briefly discussed in the following sections of this research.

4.5.1 Phenomenological research design

Phenomenology originated within a philosophical movement that, since the early 20th century, has endeavoured to make sense of the lived experience (van Manen, 1997). According to Creswell (2016), phenomenology is founded on the key idea that the lived experiences of individuals involve both the subjective experiences of people and an objective experience of sharing something with others. Therefore, in a phenomenological research design, the researcher is concerned with clarifying the specifics and identifying phenomena through the eyes of the participants (Creswell, 2016).

Two types of phenomenological research are described in the literature: 1) descriptive phenomenology – researcher explores the meanings and subjective experience and gains insights into people's actions and motivations (Rodriguez, & Smith, 2018:2) interpretative phenomenology or hermeneutics – the researcher explores meanings, and the reported findings are interpreted by the researcher (Heidegger, 1962).

4.5.2 Ethnographic research design

In ethnographic research designs, the researcher often conducts fieldwork to become involved with the participants or group in a personal manner, using observations as a technique for gathering data (Lunenburg & Irby, 2009). In the field, basic anthropological concepts, data collection methods and techniques, and analysis are the fundamental elements of "doing

ethnography" (Acharyya & Bhattacharya, 2019). The authors answered questions about how cultural knowledge, norms, values, and other contextual variables influence the health experience.

4.5.3 Grounded theory research

Grounded theory design is concerned with theory generation, which is 'grounded' in data that have been systematically collected and analysed (Noble & Mitchell, 2016). It is used to uncover such things as social relationships and behaviours of groups, known as social processes. In grounded theory research, concepts are systematically built in from systematically obtained empirical data (Creswell, 2016).

4.5.4 Case study research

Yin (2003) defines a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly defined. Meyers (2009) contends that adopting a case study strategy explores the relevant issues or factors applicable in a particular context. The case study approach is especially useful in situations where contextual conditions of the event being studied are critical and where the researcher has no control over the events as they unfold. Ritchie and Lewis (2003:44) see the primary defining feature of a case study as the "multiplicity of perspectives which are rooted in a specific context". All the collected evidence is collated to arrive at the best possible responses to the research question(s). As a result, the researcher may gain a sharpened understanding of why the instance happened as it did and what might become important to look at more extensively in future research. There are four basic types of designs for case studies: single case, holistic, single case embedded, multiple case holistic, and multiple case, embedded (Yin, 2003). These designs are briefly explained below.

Holistic Designs- The global nature of a case, whether individual, programme, community or organisation is examined.

Embedded Designs- Involve more than one unit of analysis. Attention is given to subunits. A wide variety of data can be used in case studies, including data from interviews, observations, documents, and artefacts (Yin, 2014).

4.5.5 Case study justification for this research

Given the interpretative position adopted in this research and the nature of the research question, the case study design was considered the most appropriate approach because it provides a systematic way to collect data, analyse information, and report the results, thus helping individuals to understand a particular problem or situation in great depth. More specifically, it:

(i) provides a variety of participant perspectives.
(ii) uses multiple data collection techniques; and
(iii) examines the integration of learning and face-to-face instructional approaches within a technology-rich environment.

Furthermore, the case study design makes use of multiple methods of data collection, such as interviews, document reviews, archival records, and direct and participant observations and, subsequently, 'thick descriptions' of the phenomena under study (Yin, 2003:19). Such 'thick descriptions' give the researcher access to the subtleties of change and multiple interpretations (Walsham, 1995:25). While data collection can often be less structured in an exploratory study, this is not to say that there is no structure; instead, it is a matter of its extent. Generally, one area that requires less structure is that of focus groups. According to Ritchie and Lewis (2003), this can often be attributed to the following:

- the difficulty in imposing structure on a group discussion; and
- the fact that "data emerges through interaction within the group" a key feature of focus groups.

Nevertheless, while unstructured or in-depth interviews often "involve a broad agenda" (Ritchie and Lewis, 2003), they can be focused on through questioning and management techniques. Merriam (1998) identifies four essential characteristics of a case study: particularistic, descriptive, heuristic, and inductive. A particularistic refers to one event, process or situation that is the focus of a study. The term "descriptive" refers to the rich and extensive set of details relating to the phenomenon. Each of these two is heuristic because it advances the understanding of the phenomenon, while inductive reasoning refers to the form of reasoning used to determine generalisations or concepts that emerge from the data. Case studies do not claim to be representative, but the emphasis is on what can be learned from a single case (Tellis, 1997). Case studies have value in advancing fundamental knowledge in

relevant knowledge domains. The underlying philosophy of a single case study is "not to prove but to improve" (Stufflebeam, Madaus & Kellaghan, 2000:283).

Case study research has been subjected to criticism on the grounds of non-representativeness and a lack of statistical generalisability. Moreover, the richness and complexity of the data collected means that the data are often open to different interpretations and potential 'researcher bias' (Cornford & Smithson, 1996:18). Despite the lack of a detailed step-by-step data analysis of case study data (Miles & Huberman, 1994) and the problem of not being able to provide generalisability in a statistical sense, Denzin and Lincoln (2000:55) argue that case studies can be generalised, arguing that "looking at multiple actors in multiple settings enhances generalisability" Similarly, Yin (2003) argues that case studies are used for analytical generalisations, where the researcher's aim is to generalise a particular set of results to broader theoretical propositions. One fundamental question posited by contingency theory is whether the generalisation of approaches to different environments is effective (Netland, 2015). Perhaps the findings from this study may contribute to revealing why different contextual settings most likely require different approaches (Donaldson, 2001). The logic of the viable system theory points to a series of feedback loops and requires the researcher to have a deep understanding of the complex organisational models and the multiple perceived realities that occur through time in the organisations (Dominici & Palumbo, 2010). Therefore, for this study, the theoretical propositions from contingency and systems theory also lay the groundwork for analytic generalisation of the findings within broader public sector organisations.

These for and against views indicate that no research methodology is perfect; therefore, researchers must use methodology that is nested in their world views and philosophies. Given the interpretive stance adopted in this research and the nature of the research question, the researcher believes that the case study approach is the most appropriate research strategy because of its advantages in revealing in detail the unique perceptions and concerns of individual participants in a real-world situation that would have been lost in quantitative or experimental strategies. The selected case studies aid in asking how lean manufacturing principles can be adapted for state-owned entities and why the context of the organisation is an important aspect for consideration in lean adoptions. Yin (2014) noted that a case study investigates the phenomenon in its real-world context more so when the boundaries between the phenomenon and the context are unclear.

4.6 POPULATION

A research population is often defined as people, organisations, objects, units, or items from which a sample is drawn to answer research questions (Saunders et al., 2015). According to Bless (2014:107), a research population refers to a collection of individuals who form part of the objective for the study and the people whom the study aims to achieve its purpose. For Kumar (2011), a population in a research study refers to large units or individuals who are the focus of the study and who may belong to the same geographical area or have similar characteristics. The target population is the group of interest to the researcher, who possesses variable characteristics under study and for which the findings can be generalised (Shukla, 2020). For this research, the population refers to state-owned entities in South Africa. According to the National Treasury (2015), there are approximately 715 state-owned entities in South Africa. Ovens (2013:4) examined the list of national entities in South Africa and found that the PFMA's Schedule 2 public sectors share a total revenue of 71.6%, which makes these public sectors organisations the biggest and more important key stakeholders because they have a direct impact on economic growth and development. By mapping the role that public sector organisations play in the economy, it becomes clear that Schedule 2 (Table 12), public organisations (public organisations classified as major public entities, in terms of finance management, Act No. 1 of 1999, South Africa, 1999), are the largest and most influential contributors to the South African economy. Table 12 shows the compilation of the schedules of SOEs in South Africa (National Treasury, 2019).

Table 12: SOE schedules in South Africa (**Source**: National Treasury, 2019).

Schedule	Description	Operation/and funding characteristics	Number of SOEs
1	Constitutional entities: Means an institution listed under Schedule 1.	Fully funded by Government	11
2	Major public entities	Operate under business principles	21
3A	National Public Entities and SETAs	Fully or substantially funded under the NRF (National Research Foundation, tax levy imposed through legislation	154
3B	National Government Business Enterprises	Operate under business principles with limited borrowing	26
3C	Provincial Public Entities	Fully or substantially funded under NRF, tax levy imposed through legislation	70
3D	Provincial Government Business Enterprises	Operate under business systems with limited borrowing	16

The National Treasury has classified major public sector organisations into three board management categories in terms of their performance (National Treasury, 2010:10):

Urgent Management Attention (Red Zone):
(Eskom, Post Office, SABC, Sentech, Denel, SAA, Transnet, IDT).

Close Monitoring (Yellow Zone):
(Land Bank, DBSA, ACSA, TCTA, ATNS, Infraco, SAX).

Ongoing Monitoring (Green Zone):
(Armscor, SAPO, IDC, SAFCOL, NECSA)

With such a large portfolio of public sector organisations, this study investigates the Schedule 2 public entities, as they represent the major entities that contribute to the national developmental goals, particularly zooming into the red zone public sector entities, which are Eskom, Denel, Transnet, SABC, Sentech, SAA and Independent Developmental Trust (IDT). The second step is to select a unit of analysis and determine which public sector organisation (state-owned entity) will form part of the sample.

4.7 SAMPLE SELECTION

According to Collis and Hussey (2003:155), a "sample" consists of the members of a "population" (the target population), the latter referring to a body of people or to any other collection of items under deliberation for the purpose of the research. The different types of sampling described by previous scholars are probability and nonprobability sampling methods. Three popular approaches to probability sampling are often used by researchers: random sampling, systematic sampling, and stratified sampling (Watkins 2008). In random sampling, everyone in the target population has a known probability of being randomly selected (Tustin et al., 2005); in systematic sampling, elements are listed and selected at regular intervals, for example, by selecting every 15th person on a list of the population (Granger and Siklos, 1995; Kieu et al 1999); and stratified sampling involves dividing a population into smaller groups that are organised based on the shared characteristics or attributes of the members in the group (Sekaran & Bougie, 2012).

An alternative to probability sampling methods is nonprobability sampling methods, which are mainly used for qualitative research (Christopher, 2016). These nonprobability sampling methods include convenience sampling and purposive sampling (Etikan, 2016). In convenience sampling, members of the target population who meet certain practical criteria, such as easy accessibility, geographical proximity, availability at a given time, or the willingness to participate, are often considered (Dörnyei, 2007). Another example of convenience sampling includes data taken subjectively in areas that are easily accessible or an area where density is known to be high (Walliman, 2011). Unfortunately, the selection of participants or data based on accessibility may pose a major limitation to this current study because the opportunity to participate is not equal for all qualified individuals in the target population; thus, the results of the study may not be credible.

On the other hand, the purposive sampling technique, also called judgemental sampling, is the deliberate choice of a participant due to the qualities the participant possesses (Oppong, 2013). The advantage of purposive sampling is that it involves the identification and selection of participants who are proficient and well informed with a phenomenon of interest (Creswell & Clark, 2011). In addition to knowledge and experience (Bernard, 2002), the importance of availability and willingness to participate and the ability to communicate experiences and opinions in an articulate, expressive, and reflective manner are great advantages. Therefore, purposive sampling was the sampling method employed in this study. As the name suggests,

purposive sampling is used for a particular "purpose", for example, choosing people who are "typical" of a group or who represent diverse perspectives on an issue (Page & Meyer, 2006; Wakins, 2008:26). The purposive sampling method was selected for this study due to its consistency with the objectives essential for purposive sampling, where participants are selected purposefully with the expectation that each participant will provide unique and rich information of value to the research.

For this research, the sample comprises three of the major public entities that have been classified as urgent management attention red zones, as stipulated in section 4.5. The names of the organisations are provided with the pseudonym's organisation A, organisation B and organisation C to maintain their anonymity. Although the population that includes major public entities is vast, these organisations were chosen because of the pivotal role that they play in the public sector, namely, electricity generation, freight rail solutions and logistics; unfortunately, from a financial perspective, these organisations have not performed well, and their published year-end results have revealed particularly poor performance and persistent losses for several years (National Treasury, 2020).

However, due to the different operating divisions of the target population (organisation A to C), sampling in every operating group of a specific state-owned entity is not possible. Therefore, to provide a well-defined representative sample of the population, the basic rule that the researcher applies in the purposive sampling technique is that samples are not drawn because they represent a large group; rather, they provide valuable information, even when they are small (Patton, 2012). For this study, twelve employee names were selected from the list of employees obtained from the organisational gate keeper, which comprises male and female managers, officers, engineers, administrative personnel and plant personnel assistants from organisations A and B, respectively. The employee list obtained from the gate keeper manager of organisation C comprises tellers, managers, officers, and controllers. The employees represented from organisations A, B and C were as follows: four managers from each organisation, four skilled employees (SHEQ professionals, accountants, production technicians, officers, tellers) and four semiskilled employees (artisans, yard controllers, train drives) who were purposively selected to participate in the research.

The criteria applied in purposively selecting the twelve employees were that the participants needed to have exposure to operational and production processes within the state-owned entities and be experienced (over 3 years of experience in the current role) and knowledgeable

in the organisational processes to assist the researcher with access to information-rich cases, as suggested by Suri (2011). Moreover, experienced participants provide confidence in the extent to which claims are supported by convincing evidence (Anderson, 2010). In addition, the participants who were selected for this study had relevant characteristics that represented different departments and levels within the organisation and were thought to be most informative.

Of the twelve employees, four represent top management, who provided insights into the leadership and strategic intent aspect of the study; four represent skilled workers, who are artisans, engineers, SHEQ professionals, technicians, and administrative personnel who provide system- and process-related information. The last four employees represent semiskilled workers, such as artisans and plant operators, who provided technical oversight to some of the systems of the state-owned entities and what is happening on the ground. The different groups of participants presented diverse perspectives on the investigated phenomenon, which may enhance the credibility of the research findings (Rubin & Rubin, 2011). Furthermore, the intended participants were grouped as follows in all the sampled organisations:

- Group 1: Management (Organisations Top Management).
- Group 2: Skilled workers. (Engineers, SHEQ professionals, accountants, technicians and/or administrative personnel).
- Group 3: Semiskilled workers. (Plant operators and Artisans).

The different categories selected offer diverse views in relation to the process, waste, culture, and lean tools that are already used in the organisation and allow us to penetrate some of the areas where some levels (for example, management) within the organisation may not access the first hand. In particular, managers who had been fulfilling a management role for more than 3 years in the organisation were selected to participate, as these managers have a deeper knowledge of all organisational process, objectives, and targets. Table 13 provides an overview of the participants of the study.

Table 13: Participants in the study (**Source:** Own)

Organisation	Category	Levels in the conceptual framework	Related Experience	Grouping
Organisation A	Management	Lean philosophy	3 years and above	Group 1 Managers * Group 2 Skilled Employees (Engineers, SHEQ professionals, Accountant, Production Technicians) ** Group 3 Semi-skilled workers***
	Skilled worker	Lean principles	3 years and above	
	Semi-skilled worker	Lean tools	2 years and above	
Organisation B	Management	Lean philosophy	3 years and above	
	Skilled worker	Lean principles	3 years and above	
	Semi-skilled worker	Lean tools	2 years and above	
Organisation C	Management	Lean philosophy	3 years and above	
	Skilled worker	Lean principles	3 years and above	
	Semi-skilled worker	Lean tools	2 years and above	

4.8 DATA COLLECTION TECHNIQUE AND RATIONALE

Several data collection techniques are explored in quantitative studies. These data collection techniques are often underpinned by a variety of different methodological and theoretical approaches, which allows researchers to approach data collection systematically and within given boundaries (Amarakoon, 2014). Qualitative researchers typically rely on four methods for gathering information: (a) participating in the setting, (b) observing, (c) interviewing in-depth, and (d) reviewing documents (Marshall, 2006). Below is a brief description of some of these methods.

Interviews- Interviews include having a one-to-one enquiry with at least one participant at a time (Sah & Singh, 2020). The advantage of this data collection method is that participants can provide useful information while being observed by the researcher during interviews.

Participants setting- The natural setting allows research participants to be free from any control, and data are collected in their natural environment (Christopher, 2014).

Observations include participant observation as the process of gathering open-ended, first-hand information by observing people in organisational processes (Merriam, 2009).

Document review consists of analysing various types of documents, including public and private records obtained from organisations or participants in a study; these can include newspapers, minutes of meeting personal journals, and letters. Any document containing text is a potential source for qualitative analysis (Patton, 2015).

The data collection methods that will be employed in this research, namely, interviews and document review, are discussed below, along with the justification for the specific data collection method. As Given (2008) notes, the researcher must determine which of these approaches to data collection are useful for obtaining relevant cultural and individual-level data for a study and how they should be applied in the study setting.

4.8.1. Interviews

Interviewing is a process of having a one-to-one enquiry with at least one respondent at a time (Yin, 2013). There are different types of research interviews considered in the literature, namely, structured interviews, semi structured interviews, and unstructured interviews (Saunders, Lewis & Thonrnhill, 2016). Structured interviews use questionnaires based on a predetermined and standardised or identical set of questions (interviewer guide) (Sekaran, 2003; Gay, Mills & Airasia, 2012; Doddy and Noonan, 2014). In semi structured interviews, the researcher prepares key questions that often vary from interview to interview (Yin, 2013). Unstructured interviews are often referred to as informal, where the interviewee's perceptions guide the conduct of the interview and the topics discussed (Khotari, 2006). An innovative perspective has been adopted by Scarneci-Domnisoru (2021), who argues that due to technological processes driven by the COVID-19 pandemic, online interviewing allow access to participants that would otherwise be difficult.

In this study, semi structured interviews will be employed as part of the case strategy as a means of gathering in-depth information. Semi structured interviews through a case strategy were chosen because the actual stream of questions in a case study interview is likely to be fluid rather than rigid (Rubin & Rubin, 2011). Furthermore, due to the exploratory and interpretative nature of the study, gathering in-depth information entails asking "why" questions about a particular process in the open-ended discussion. Asking why questions also encourage participants to have the time and opportunity to reconstruct their own experiences

and realities in their own words (Yin, 2010). Subsequently, in the semi structured interviews, aspects of contingency theory, such as fit, and aspects of VST (complex links and interrelationships in systems 1 to system 5 of the viable systems model), can be addressed. Finally, the semi structured interview approach provides reasonably standard questions across participants and allows the researcher the flexibility to probe answers more deeply and gather more information than is found in a structured interview (Gall et al., 1996).

For this research, interview questions will be formulated beforehand and sent to all participants before the interviews can commence to give all participants a chance to adequately prepare for the interviews. After that, an appointment will be set up between the researcher and each participant via email, during which the research process will be discussed in detail, including any issues of connectivity or data availability. Participants will be asked to confirm that access to the internet is possible through their organisational portals. The interviews for this study will all be conducted via MS Teams. The use of an audio-visual option such as MS Teams is preferred because it allows visual contact between the researchers and the participants during the signing process and helps individuals build initial rapport between the researcher and the participants. One limitation of the MS Team platform might be practical constraints, such as connectivity issues associated with load-sharing constraints. To overcome this limitation, the researcher will align the interview appointments with the loadshedding schedules according to the different levels communicated for each region.

At the beginning of the interviews, the researcher explained to the participants how the discussion or interviews would be structured. Participants will also feel comfortable, and the researcher will assure the participants of their confidentiality and that no aspects of the research will be made available for unintended use. Permission to record the interviews will also be requested from the participants prior to commencing the interview. During the interviews, participants will be asked to give their perceptions of what contributes to customer value, what constitutes waste, and how systematic interaction and fit of lean principles with the environment are achieved. The participants will also be encouraged to give examples of situations, people, and organisations that fit their specific perceptions of the interview questions. This allows participants to express their feelings more openly. The researcher also asked follow-up questions to emphasise the researcher's understanding of certain information shared (Lunenburg, 2008). The interviews will be approximately 35 minutes long, and

throughout the interview, the researcher will also listen to nonverbal cues such as long pauses, changes in pitch and tone and, in the video, logged instances, changes in expression.

Microsoft Teams recordings will be used to record the data that will be collected during the interviews, including written notes, transcriptions, and observations. The records from the interviews used pseudonyms in the write-up to help the researcher maintain confidentiality. The recorded interviews and transcripts will also be password protected to prevent unauthorised and unintended use by a third party. The anonymity of the participants who participated in these interviews was maintained, and all identifiable information was removed.

4.8.2 Participating in the setting.

A natural setting allows research participants to be free from any control, and data are collected in their natural environment (Christopher, 2014). For this study, the researcher will interact with the participants in their real-life environment, which is a specific state-owned entity. The importance of the participants' natural setting for this study will assist the researcher in understanding how the context, size and culture of a particular organisation can impact the adaptability of the lean principles to the organisation. Sarkar (2020) noted that studying participants in their natural setting within the field of usability (the degree to which a phenomenon is fit for use in a particular situation) not only helps the researcher make sense of individual participants' views and experiences but also assists in understanding the circumstances in which the research findings are applied. Sarkar's view is particularly noteworthy in this study, as the researcher needed to understand the notion of fit and adaptability in terms of contingency theory in relation to the organisational context and thus the interest in collecting data in the participant's natural setting. Participation in the natural setting will be linked with the analysis of documents, which will be discussed in section 4.8.3.

4.8.3 Document review

In qualitative research, document review requires that data be examined and interpreted to elicit meaning, gain understanding, and develop empirical knowledge (Corbin & Strauss, 2008; Rapley, 2007). Documents can consist of historical papers; personal entries; records; agendas; attendance registers; and minutes of meetings, manuals, and procedures, among others (Lunenburg, 2008). In this research, document analysis will be used together with interviews and the exploration of literature as a means of triangulation (Denzin, 1970:91). Researchers agree that document analysis is not limited to documents containing text only; rather, it can be

broadened to include visual material that can be a source for qualitative analysis (Flick, 2018; Patton, 2015). However, in this study, the researcher employed textual data due to the ease of accessing electronic databases such as state-owned entity websites and the wide range of databases from the university, which allowed the researcher to access a wide range of databases and textbooks (Braun & Clarke, 2013)

Researchers argue that there are limits to how far pre-existing text documents can be used, mainly due to the ethical issues associated with using public documents (Linders, 2007). One example of ethical concerns may result from author biases when the publishing context expresses political perspectives, which may distort objectivity. Other limitations include lack of reliability, lack of control over data quality and inadequacy of the data for the current purposes of the research (Saunders et al., 2007). To overcome these limitations, the researcher will employ the recommendations of Kriedel (2015) that when selecting documents, researchers need to consider authenticity, credibility representativeness and meaning, which are summarised in Figure 22.

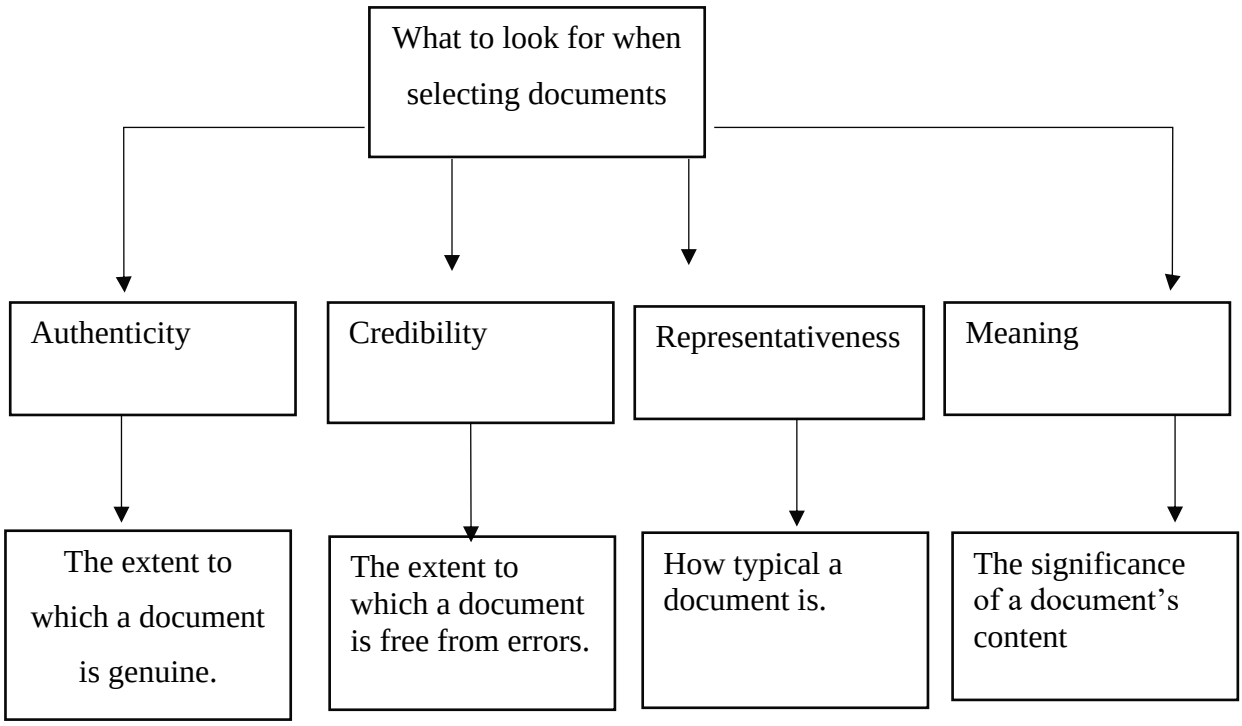


Figure 22: Factors to Use for Selecting Documents (**Source:** Kriedel, 2015).

Figure 22 provides a summary of the document selection process based on the view of Kriedel (2015). The researcher presents four factors for consideration when reviewing documents for a particular study, namely, authenticity (the extent to which a document is genuine), credibility (the extent to which a document is free from errors), representativeness (how typical a document is) and meaning (the significance of a document's content). Mogalakwe (2009) believes that ensuring that the documents are genuine is a researcher's task, and the researcher compares the task to how researchers need to ensure that the evidence is authentic when using other qualitative methods. This view is supported by Morgan (2022), who argues that the crucial component of conducting a document analysis is checking for authenticity of the documents to analyse. For this study, the researcher reviews documents that focused on exploring where waste is generated in SOE processes and how each department or function contributes to value creation and provides background information on the operational trends and performance of SOEs over the past five years. These documents include integrated reports for the state-owned entities that will be obtained from the internet and from the websites of the respective state-owned entities; these reports have been audited and verified for the last five-year period under review to maintain authenticity. Other documents that will be sampled for this research include organisational procedures that have been reviewed, approved, and authorised.

The researcher checked for credibility by ensuring that the documents were not modified. For data credibility, the documents to be reviewed will be downloaded directly from the state-owned entities websites to ensure access to the original documents (Flick, 2018). For representation and meaning, the researcher will select documents that can assist the researcher in exploring the extent of the adaptation of lean practices, such as context, fit, environment, organisational culture, and organisational systems, depending on the research questions and flashed out aspects of the interview. As Mogalakwe (2009:25) points out, "meaning involves the significance of a document's content and pertains to whether the evidence is clear and understandable."

For this study, document analysis will be conducted prior to the interviews to look for trends in the integrated reporting of the state-owned entities that were selected, which includes changes in performance indicators against customer requirements, value creation models (inputs, processes, and outputs), business operational strategies to create value, and flagging where that value is not added or achieved. During the interviews, the researcher will then

corroborate some of the data to the information that was obtained during the interviews using a back-and-forth interplay with the data, codes, and concepts to identify similarities, differences, and patterns (Bowen, 2009). The information contained in the documents will also suggest flesh-out questions that were also discussed during the interviews (Goldstein and Reiboldt, 2004).

4.9 QUALITATIVE DATA ANALYSIS

Data analysis is a mechanism for reducing and organising data to produce findings that require interpretation by the researcher (Quinlan, 2011:365). Qualitative data analysis for this research will be conducted to examine, interpret, and explain the data as they emerge as concepts, constructs, themes, categories, and relationships according to the research aims (Van Vuuren, 2008). The data collected for this research will be analysed and interpreted by the researcher. The process of data analysis begins with planning for the analysis (Pandey and Pandey, 2021). The planning involves organising and preparing the data for analysis. The organising and preparation of data include the categorisation and organisation of data in search of patterns, critical themes and meanings that emerge from the data; this process is often referred to as "open coding" (Quinlan 2011:425). Coding is the process of bringing together the data for themes, ideas and categories and then marking similar passages of text with a code label so that they can easily be retrieved at a later stage for further comparison and analysis (Gibbs & Tylor, 2010).

For this research, qualitative interview data will be transcribed verbatim from MS Teams into a written format to remove any bias or changes from what the participants originally intended. The transcribed data were then sent back to the participants for member checking with the aim of using their feedback to improve the authenticity of the data (Campbell, & Walter, 2016). Some authors advise that member checking be conducted with caution because some of the participants may feel discomfort when their transcripts are sent to them for review (Mero-Jaffe, 2011). To mitigate the risk of minor discomfort to participants as a result of reading and verifying the interview transcripts, participants who indicated time constraints with regard to reading the interview transcripts were given the list of codes that were generated from their transcripts. Therefore, the codes generated will represent a summary of the transcribed interviews to determine whether the codes best represent the information that the participants will have provided to the researcher during the interviews (Adu, 2018).

Furthermore, the researcher read through all the written transcribed data to obtain a sense of the information and to gain an overall understanding of the ideas and knowledge expressed by the participants. Key words and phrases will be underlined and manually coded with the assistance of Microsoft Word tools to attach meaning and group it into categories. Analysing the qualitative data will also involve looking for patterns and themes into some form of explanation, understanding or interpretation of the people and situation that is being investigated. Thereafter, the manually coded documents will be uploaded into the qualitative data analysis software ATLAS.ti., which will be used for coding, and the results will be used to make interferences through open coding. ATLAS.ti provided the means to start grouping the codes into themes containing not only the codes but also those phrases that made an impression and would be used to clarify the findings (McMillan & Schumacher, 2010:371). The emergent themes will be recorded from the literature from which the interview questions will be derived; these themes emerged from the initial ATLAS.ti (Saldaña, 2009). The researcher will also create additional notes and comments from the quotations, codes, and themes within the relevant code manager of ATLAS.ti to identify patterns and trends and to determine the relationships among the themes. Themes will also be determined for each research question and compared to each other for further analysis. Additionally, themes from the data will be compared to those in the literature.

Finally, the next step in the analysis involves compiling an information sheet where the code frequency (the number of times) a particular code is assigned to empirical indicators is computed (MacQueen, & Namey, 2012). To assess the number of counts (i.e., frequency) and number of cases for each code, the researcher will determine the number of cases or participants connected to a specific code (Adu, 2018). This approach will assist the researcher in interfering with the interviews, document analysis and literature, which will assist with the research findings.

4.10 DATA TRUSTWORTHINESS AND CREDIBILITY

In qualitative research, validation, such as reliability and validity, is not promoted as a criterion for evaluating qualitative research (Guba & Lincoln 2005; Stenbacka, 2001). Validity in the context of a qualitative study is evaluated in terms of trustworthiness and credibility (Polit & Beck 2012:858). According to Lincoln and Guba (1985), in a qualitative study, trustworthiness involves dependability, transferability and conformability.

Dependability can be compared to reliability in quantitative studies. In other words, dependability is an evaluation of the quality of the integrated processes of data collection, data analysis, and theory generation (Guba, 1985). Other dependability techniques include a 'thick' description of phenomena and an audit trail so that the process of theory development is both visible and verifiable (Bowen, 2009). Furthermore, Lincoln and Guba (2005) assert that a dependable study needs to be accurate and consistent. To address the issue of dependability for this study, the researcher will document the research processes and the research design and methodology at length, thus allowing other researchers to repeat the work. As Shenton (2004) advised, detailed documentation of the research process and methods employed allows other researchers to assess the extent to which appropriate research practices have been adopted.

Transferability involves describing the context in such a way that future researchers can easily transfer the findings or apply the interpretation of the results to a similar context (Trochim, 2006). Furthermore, the research findings become transferable to another context when a detailed account of the environment surrounding the research is kept and a thick description, records, field notes and observational data are included in the final report (McMillan, 2015). According to Stahl and King (2020), transferability is possible only when a thick description provides a rich enough depiction of the research context for application to other contexts. However, transferability is considered a major limitation in qualitative research due to researcher bias during data gathering and interpretation. This limitation means that qualitative researchers must enhance transferability by detailing the research methods, contexts, and assumptions underlying the study. One criticism of the transferability of a qualitative study to other contexts is that the burden of transferability lies not with the study but with a researcher who might use the study in the future (Deventer, 2015).

The concept of fit from the contingency theory underpinning this research appears to support the assumption that transfer in qualitative research is not a recipe but rather a suggestion that must itself be researched for its applicability to a new context (Stahl & King, 2020:2). Arguably, the aspect of transferability for this current study was determined in the provided thick descriptions about the context of the research, including the research location, situation, participants' experiences, and sampling techniques. Thus, the question of transferability addresses the fundamental but still unsolved problem of how lean manufacturing principles can be transferred from the context in which they are generated to the context in which they should

be applied (SOEs), which is the main argument of this research. Therefore, the aspect of transferability was determined after the study was published but not in advance.

Credibility entails conducting the research in a manner that enhances the believability of the findings and taking steps to demonstrate credibility in the research report (Polit & Beck, 2012). To demonstrate the truth value, a researcher must "carry out the inquiry in such a way that the probability that the findings will be found to be credible is enhanced" (Lincoln & Guba, 1985:296). This study employed the following criteria to ensure credibility: Audit trail systematic collection of materials and documentation that would allow an independent auditor to come to the same conclusion were employed to enhance the credibility of the study. Furthermore, the researcher used the steps suggested by Mkhaya (2012) to further ensure credibility, which include the following steps:

- Raw data (field notes, interview transcripts).
- Data reduction and analysis products (condensed notes).
- Process notes (methodological notes and notes from member check sessions).
- Materials relating to the researcher's intentions and disposition (personal notes on intentions).
- Instrument development information.

In addition, the researcher shared the interview transcripts and themes with all the participants through email to check whether what was transcribed and coded made sense to the participants. This study will use reflexivity (reflection on the influence of the researcher on the research), triangulation (through document analysis) and a substantial description of the interpretation process; verbatim quotations from the data were supplied to illustrate and support the interpretations (Sandelowski, 1986).

Confirmability refers to the neutrality and congruence between two or more people about data accuracy, relevance and meaning (Polit et al., 2001). To determine conformability, the dynamic role of the researcher in interpreting the participants' experiences or the double hermeneutic circle is implicitly recognised. The findings are presented as the researcher's interpretations of the participants' experiences, and on the part of the researcher, there is a commitment to the self-critical theme of reflexivity to avoid bias. Reflexibility informs or reminds the readers that the author has interpreted the data to construct the version they are reading, and the reader has an involvement in and a position on the research topic (Coolican, 2001:234). In this study,

triangulation through document analysis assisted the researcher in promoting such confirmability to reduce the effect of researcher bias. Table 14 provides an overall summary of the trustworthiness criteria that will be applied to this research, as discussed above.

Table 14: Summary of trustworthiness criteria applied to the research (**Source**: Own)

Data Trustworthiness criteria	**Purpose**	**Original strategies in literature**	**Application for trustworthiness in this research**
Dependability	An evaluation of the quality of the integrated processes of data collection, data analysis, and theory generation (Guba, 1985).	• Thick descriptions • Member checking • Audit trail	• The researcher included a thick description of the research design and methods. • Sequential records detailing aspects of the study including interview guide, interview transcripts, steps for coding transcripts, recordings memos and events related to the study were maintained
Transferability	Describing the context in such a way that future researchers can easily transfer the findings or apply the interpretation of the results to a similar context (Trochim, 2006)	• Fit to context. • Purposive sampling • Thick description	• The researcher provided thick descriptions necessary to enable other researchers that are interested to reach a conclusion about whether transfer can be contemplated as a possibility to their context.
Credibility	Conducting the research in a manner that enhances believability of the findings and taking steps to demonstrate credibility in the research report (Polit & Beck (2012).	• Peer debriefing • Member checking • Triangulation • Persistent observation	• The researcher applied reflexivity (reflection on the influence of the researcher on the research). • Triangulation of data sources (through document analysis) • Description of the interpretation process; verbatim quotations from the data were supplied to illustrate and support the interpretations

Confirmability		• Confirmability audit • Reflexive journal • Research paradigm	• The researcher stated the believes or paradigm of the study which is interpretivism for reflexivity.

4.11 TRIANGULATION

Triangulation refers to the merging of qualitative and quantitative data to understand a research problem (Creswell & Clark, 2007). Triangulation is another method for ensuring that a study is robust, valid, and reliable. The purpose of triangulation is to consolidate evidence that breeds credibility (Bowen, 2009). For Patton (2000), the use of multiple methods or data sources in qualitative research assists researchers in developing a comprehensive understanding of the phenomenon under investigation. Patton identified four types of triangulations:

- Method triangulation
- Investigator triangulation
- Theory triangulation; and
- Data source triangulation.

Triangulation of methods is derived from the idea that looking at something from multiple points of view improves accuracy (Neuman, 2014). c Thus, methodological triangulation involves the use of multiple qualitative and/or quantitative methods to study the phenomenon. Therefore, if the conclusions drawn from each of the methods are the same, then validity is established (Chako, 2017).

Investigator triangulation includes the use of several researchers in a study to increase the validity and trustworthiness of their findings (Rothbaue, 2008). Although this technique allows for additional insights in the process of making sense of the data, it is criticised for the lack of practicality in that it may not always be practical to gather different investigators given the constraints of time and individual schedules (Chako, 2017).

Theory triangulation involves examining research findings using different theoretical lenses and can also aid researchers in overcoming their own personal biases or ideological blinders (Carter, 2014). Theory triangulation can enable a deeper understanding of the research, as investigators can explore different ways to make sense of the data. Furthermore, tensions that

might arise between theoretical explanations of the same data may yield new insights into the aspects of the research problem (Roulston, 2018). For this study, data were collected based on two theories, which inform the study, contingency theory and VST, to explore the effects of the fit of lean principles to context and systemic interactions according to the viable system view. Theory triangulation was achieved using multiple theoretical perspectives to scrutinise and interpret the data. Thus, this deductive approach involves beginning from the known to the unknown.

Data source triangulation includes the use of a variety of data sources, including time, space, and persons, in a study (Carter, 2014). The findings can be corroborated, and any weaknesses in the data can be compensated for by the strengths of other data, thereby increasing the validity and reliability of the results (Patton, 1990).

In this study, data triangulation was achieved by interviewing male and female employees of the sampled state-owned entities in different groupings, namely, managerial, skilled, and semiskilled levels, to obtain their perspectives on customer value and waste (Gay & Airasian, 2000). For theory triangulation, the researcher aligned the research interview questions to the two theories that underpin the study. Furthermore, the supervisors of the researchers validated the data collection instrument, adding to the aspect of investigator triangulation. In addition, the researcher tied contingency theory and VST to the literature for theory triangulation. Finally, the researcher gathered evidence through interviews, written documents, and archival records. Each type of source of data will yield different evidence that in turn provides different insights into the phenomena under study.

4.12 ETHICAL CONSIDERATIONS

In the context of research, according to Saunders, Lewis and Thornhill (2000:130), "…ethics refer to the appropriateness of your behaviour in relation to the rights of those who become the subject of your work or are affected by it." The researcher will adhere to the list of general ethical guidelines referred to by Babbie and Mouton (2011:521–525) and Van Zyl (2014:85–89) as follows:

- Voluntary participation.
- Protection of participants from harm.
- Anonymity and confidentiality (privacy).
- Subjects must never be deceived; and

- Debriefing (in cases where participants may need this).

In terms of informed consent, participants were told in advance about the nature of the research and were given the choice of either participating or not participating. Informed consent will be obtained from every human participant in this research. This form ensures ethical behaviour, and to protect participants, it will contain at least the following information (Van Zyl, 2014:86–87):

- Objective of the research.
- The identity of the researcher.
- A description of the research.
- An indication of the duration of the participant's involvement.
- Potential benefits of the study.
- Assurance of confidentiality.
- An undertaking by the researcher to make the results of the study available to participants; and
- Contact details of the researcher in case of questions.

The nature and quality of the participants' performance will be kept strictly confidential, and the researcher will report the findings of the study in a truthful manner without misrepresenting what has been done or intentionally misleading others to the nature of the findings. For this research, there was no unequal power-based relationship between the researcher and the participants. The researcher will seek ethical clearance in accordance with the Unisa Policy.

4.12.1 Obtaining organisational permission.

According to Shenton and Hayter (2004:223), one of the most fundamental tasks relating to undertaking fieldwork for a qualitative research study lies in "gaining access". Obtaining organisational access for this study involves securing entry into the sampled organisations and ensuring that employees serve as research participants. The researcher will identify the key contact personnel from the sampled state-owned entities by use of the company websites to send the gate access request letter in advance of the research being conducted at the organisations. The first mail-out will include a cover letter explaining the study, a copy of the ethics approval certificate, and the nondisclosure agreement form. The gate access request letter will detail the key information pertaining to the research being conducted and include contact details of the researcher and the letter referring to the ethical clearance reference that

was granted by the ethics committee. Despite the general perception among qualitative researchers that approval to conduct research in organisations is difficult to secure, sometimes taking months or a year (Amundsen, Msoroka & Findsen, 2017; Cunliffe & Alcadipani, 2016; Mutch & Hu, 2015), the researcher believes that citing the ethical clearance approval letter from the ethics and review committee is critical to the researcher's success in gaining access to the organisations, as Shenton (2016:5) notes "individuals often immediately consent if a research organisation has granted prior permission". For the sampled state-owned entities, human resources managers will be contacted as gatekeepers and will also be requested to obtain other supporting organisational signatories as support or decision makers in granting the signed gate keeper letter.

First, the human resources manager acknowledges the email and provides the researcher with the organisational process for obtaining signatures of approval. Since each organisation is different, the researcher will comply with the specificities of each organisation. Second, true to the contingency view, gaining access to organisation dynamics will be impacted by different contextual factors (approaching different actors within organisations that handle applications for internal ethical clearance and various organisational members).

Researchers note that conducting research during the COVID-19 pandemic poses additional challenges for researchers wanting to access organisations due to the risks imposed through face-to-face meetings and personal contact (Mutch, Yates & Hu, 2015).

To mitigate these challenges, in this research, the researcher will conduct follow-up engagements by requesting a Microsoft Teams (MS Teams) meeting with the human resources managers of the respective state-owned entities to build rapport and trust and have them assist in reaching out to potential participants. This, unfortunately, might take much more effort, time, and patience on the side of the researcher due to time schedules and other organisational priorities. In addition to practical constraints resulting from the COVID-19 pandemic, participation and access will be conducted only online through MS Teams, and any exchanges of signatures will be conducted via digital signing of documents. Each state-owned entity has different requirements for granting access, which include organisation's specific consent forms and control of documentation agreements, which upon completion will all be sent back to the gate keeper electronically. The gatekeeper/s will indicate to the researcher the list of employees who are based on the inclusion and exclusion criteria, and participants who will be purposively selected for the study will be approached by the gatekeeper, and their email address will be

subsequently communicated with the researcher. The next step was to obtain informed consent from the participants, which will be discussed in detail in section 4.8.4.

4.12.2 Informed consent

Informed consent is a legal procedure to ensure that research participants are informed of all the risks that are involved in a particular study (Remler and Van Ryzin, 2021). Furthermore, informed consent is crucial for the data collection process, as it is used to provide the background of the study and to obtain permission from the targeted respondents to participate in the study (Bryman et al., 2014:194). For this study, the informed consent letter also serves as a request for informed consent from the participants and for voluntary participation. The significance of the research, the importance of the participants' assistance, and the assurance of confidentiality, along with the anonymity of the responses, are highlighted in the information consent letter.

For all three state-owned entities, the researcher will seek approval to sample the different participants in the Group 1 to Group 3 categories. Twelve names will be purposively selected from the list of employees obtained from the organisational gate keeper, which comprises male and female managers, officers, engineers, administrative personnel and plant personnel assistants from organisations A and B, respectively. The employees listed from the gate keeper manager of organisation C comprise tellers, managers, officers, and controllers. The level of management to represent organisation A will include two engineering managers from Group 1 (one male selected from 14 names and one female selected from 16 names), one safety manager (one male selected from three names), and one risk manager (one female selected from two names). The level of management from organisation B is as follows: one procurement manager, one production manager, one logistics manager, and one lean six sigma manager (two males and two females, selected from 18 names). The level of management from organisation C is as follows: two branch managers (two females, selected from six names), one quality manager (one male, selected from four names), and one logistic manager (one male, selected from six names).

Informed consent will be obtained from the participants who will participate in the study. The research participants will be approached via email. The participants' contact details will be requested and obtained from the gate keeper of their organisation in line with the POPI Act. The researcher will recruit the participants by explaining how their participation in this research was chosen and detail how their participation may assist with the outcomes of the research.

The researcher will also disclose the number of participants in the research. Participants will be assured that participating in this study is voluntary, that participants are under no obligation to consent to participation and that they can withdraw from the research at any point without providing any reasons. If the participants agreed to participate in the research, they were issued an information sheet and asked to electronically sign a written consent form. Thereafter, interviews will be scheduled via MS Teams.

4.13 LIMITATIONS AND DELIMITATIONS OF THE STUDY

The researcher seeks to propose a framework that will be applicable for lean implementation in the public sector environment; however, the study is limited to only state-owned entities in South Africa. According to National Treasury research (2017), the public sector context of South Africa comprises approximately 715 state-owned enterprises, which form part of the broader public sector environment; hence, the limitation of this study is to look at the applicability of all state-owned entities, but more emphasis was placed on urgent management zone state-owned entities and other state-owned entities. Thus, the findings of this research cannot be generalised to all state-owned entities in South Africa. Second, the sampled state-owned entities have various organisational divisions; however, due to the complex value chain of the state-owned entities, the research was limited to specific divisions.

The delimitations utilised by the researcher in this study were determined by a desire to gain an understanding of the relationship that exists between a specific state-owned entity context (internal and external issues) and the adaptation of lean tools or principles to that specific context and how that adaptation relationship will result in creating value for customers or shareholders of the organisation. To gain insights and perspectives, the researcher purposively sampled participants who were in management and operation to answer what and why questions were driven by certain theoretical abstractions to the understanding of lean principles. Future research can extend the investigation to other Schedule 2 entities, and there is also a greater opportunity to apply the developed framework for validation.

4.14 SUMMARY OF THE CHAPTER

This chapter presented a detailed discussion of the chosen research design, methodology, data collection and analysis methods used to conduct the research study. These issues were addressed considering the research objectives identified in Chapter 1, as well as the theoretical and literature reviews in Chapter 2 and 3, respectively. This research used a qualitative

methodology, specifically, under the case study strategy. The target population and the sample design in all the cases are specified. The research design was chosen based on the research objectives and the theoretical and literature review conducted in earlier chapters. The qualitative methodology was selected to gain a deeper understanding of the research topic and explore the nuances and complexities of the case study. The target population for the study was clearly defined, and a rigorous sample design was used to ensure the representation of diverse perspectives and experiences. Overall, this chapter provides a comprehensive framework for conducting the research study and ensures the validity and reliability of the data collected. The framework used for the research process is indicated in Figure 23

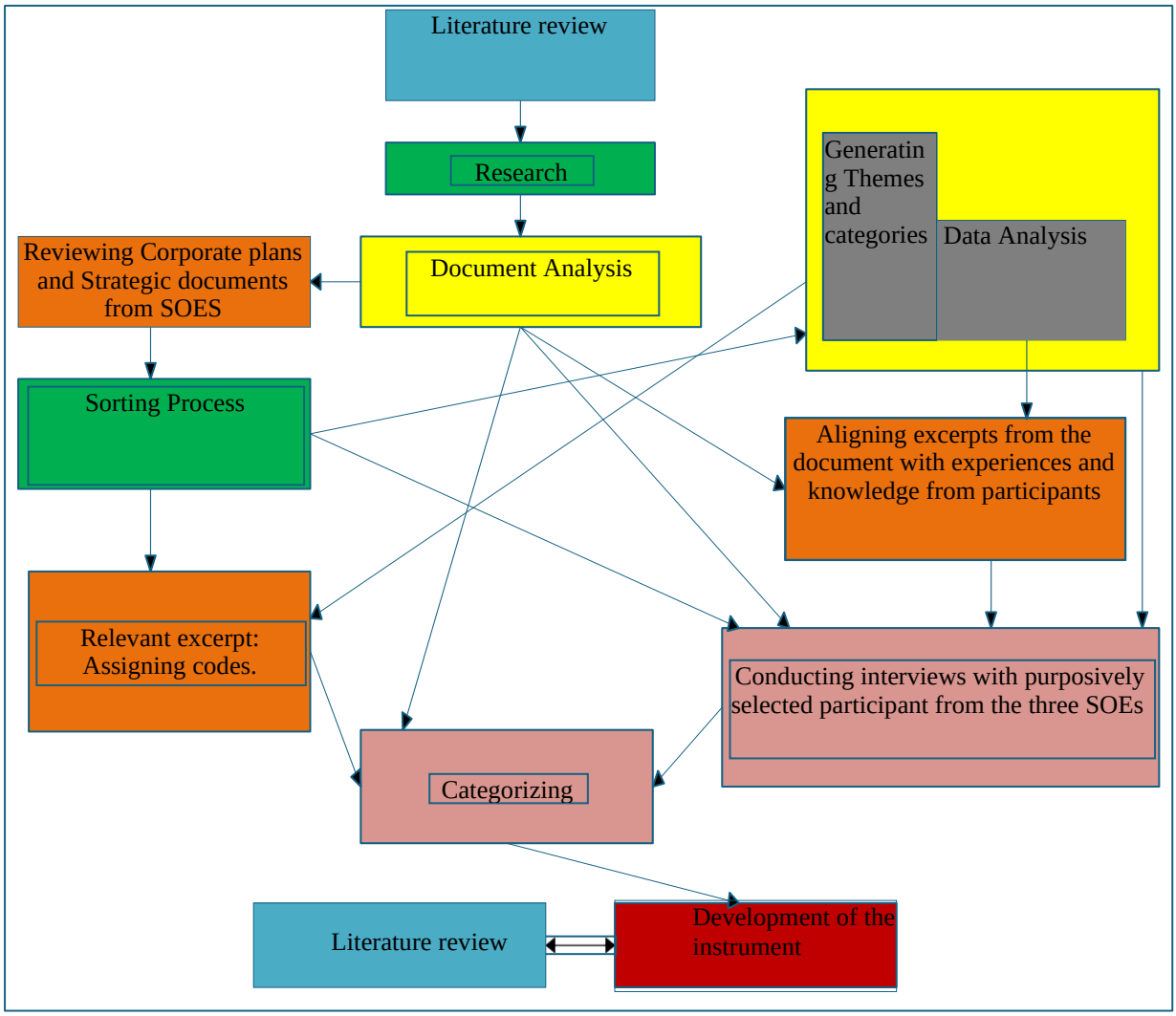


Figure 23: Framework for qualitative research process (**Source:** Adapted from Nagitta, 2019).

CHAPTER FIVE

PRESENTATION OF QUALITATIVE DATA

5.1 INTRODUCTION

In the previous chapter, the research paradigm and methodology employed to answer the research questions were discussed. This chapter analyses the document reviews and the interview data. As presented in the literature review chapter, contingency theory posits that lean manufacturing principles are most effective when adapted to the organisation's context, and viable systems theory suggests systematic interaction between organisational processes and lean principles to identify value flow and reduce waste. The initial section of this chapter presents a comprehensive summary of the documents followed by the interview data (refer to appendix 1 for the document analysis instrument used).

5.2 DOCUMENT ANALYSIS

First, document analysis was conducted prior to the interviews to look for trends in the integrated reports and operational plans of the state-owned entities that were selected; these included changes in performance indicators against customer requirements, value creation models (inputs, processes, and outputs), business operational strategies to create value, and flagging where that value was not added or achieved. The document analysis was guided by the conceptual framework that was presented in Chapter 3 of this study based on the integration of two theories, namely, contingency theory and viable systems theory. The framework allowed for a comprehensive evaluation of the overall effectiveness and efficiency of the state-owned entities' strategies for creating value for their customers and stakeholders. The conceptual framework was established through a review of the literature and existing lean manufacturing frameworks that have been developed for the application of lean principles in different organisations and industries. This led to the creation of a document analysis instrument that showed how the constructs from the conceptual framework, theories, and variables were connected. Refer to appendix 2 for the coding of the data used for the analysis.

Six relevant documents were secured from the state-owned entity websites and from the state-owned entities’ gatekeepers. The integrated reports were relevant in this study because they

afforded an overall strategic overview of the organisation's capacity to generate and sustain value over both the immediate and extended periods (Adams & Simnett, 2013). Other documents identified as primary sources included operational plans, which provided the operationalisation of the strategies that assisted in the understanding of some of the trends identified in the integrated reports. The SOE 2's integrated report already included operationalised information, and the condensed financial report was used to supplement the information instead of the operational plan, which was difficult to procure. Therefore, the integrated reports and the operational plans together provided a more holistic view of the SOEs. Integrated reports from the respective websites of the state-owned entities have been audited and verified for the last ten-year period under review to maintain authenticity (Flick, 2018; Morgan, 2022).

The provided documents were saved in a word processing application to facilitate the extraction of pertinent data, which was subsequently uploaded to ATLAS.ti for analysis. The study adhered to ethical standards by providing pseudonymised labels to state-owned entities, which are considered cases, namely, SOE 1, SOE 2 and SOE 3. In SOE 1, the documents used for document review are #D1 and #D1.1. In SOE 2, the reports used for document review are #D2 and #D2.2. Finally, in SOE 3, the documents used for document review are #D3 and #D3.3. These labels are meant to safeguard the identities of the respective organisations, as presented in Table 15

Table 15: Summary of the documents (**Source:** Own)

State-Owned Entities Labels	Document Review Label	Number of documents
SOE 1	**#D1** (Corporate Plan FY24-FY28)	**2**
	#D1.1 (Operational Plan FY2022/2023 – 2024/25)	
SOE 2	**#D2** (Integrated Report FY2022)	**2**
	#D2.2 (Condensed financial results)	
	#D3 (Integrated Report FY 2013-FY2022)	**2**

SOE 3	**#D3.3** (Operational plan FY2022)	

5.3 DOCUMENT ANALYSIS AND PRESENTATION OF DATA

This section provides the analysis of the respective documents from the three state-owned entities used as case studies. The complete findings with respect to the key quotations and key words from the document reviews are presented in Appendix 1. Each question from the research instrument (appendix 1 A-C) assisted in extracting the relevant information from the documents. Codes were extracted and categorised into themes and aggregated themes. The researcher conducted the coding, which Creswell (2012:184) defined as "aggregating the text or visual data into small categories of information, seeking evidence for the code from different databases being used in the study." The data were coded using the document analysis framework (Table 17) in the content analysis (Adu, 2017; Zhang & Wildemuth, 2005).

An anchor code was created for each research question (see column 3 in Table 17); thereafter, relevant excerpts from the data were assigned a code or connected to an existing code (Adu, 2017). The coding process allowed the researcher to systematically analyse the data and identify recurring themes and patterns. By aggregating the data into small categories, the researcher was able to extract meaningful information and evidence to support the research questions. The use of a document analysis framework in the content analysis provided a structured approach to coding, ensuring that the analysis was grounded in existing theories and concepts. Creating anchor codes for each research question helped to streamline the coding process and ensure consistency in assigning codes to relevant excerpts from the data. Overall, process was a crucial step in analysing the data and generating insights for the study.

5.3.1 Value constituents from SOE 1-SOE 3

In line with Objective 1, the study explored value constituents from the public sector perspective. The purpose was to determine how SOEs create value for their customers to develop a value creation framework that adapts lean manufacturing principles to state-owned entities in South Africa. Question 1 explores how the leaders within the respective cases create value for their customers in line with objective 1 of the study. Two main themes emerged from the data, namely, strategic leadership and customer centricity. The theme of strategic leadership comprises three (3) subthemes, namely, strategic customer focus, strategic planning, and communication. The theme of customer centricity comprises four (4) subthemes, namely, technology adoption, customer requirements, reasonable pricing, and service delivery. These themes and subthemes were then clustered into one aggregated theme of leadership ensuring value creation (see Figure 24).

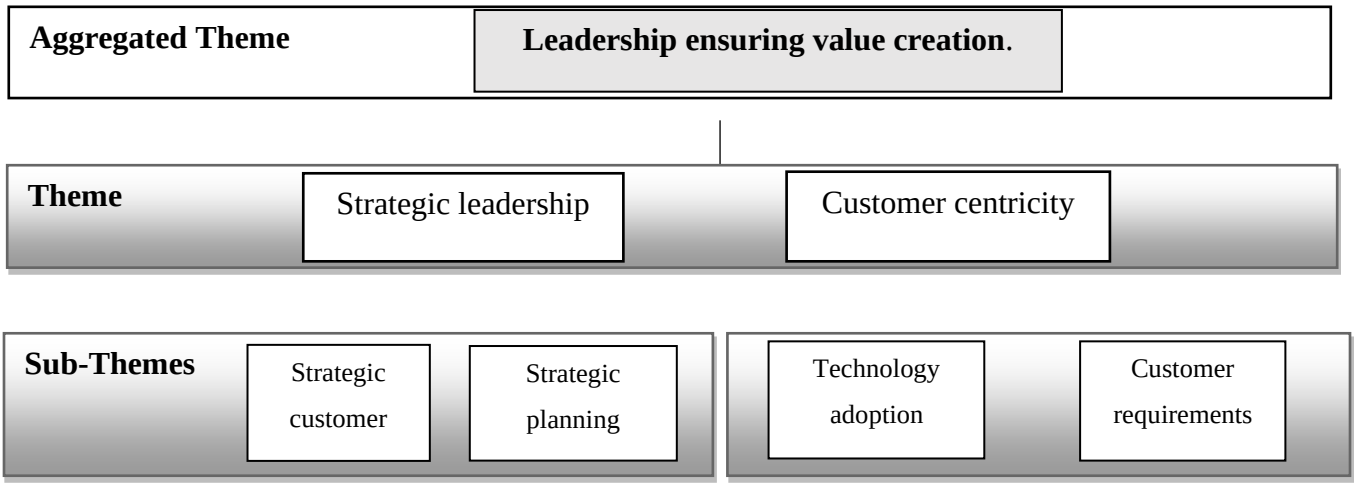


Figure 24: Leadership ensuring value creation themes and sub-themes (**Source:** Own).

5.3.1.1 Strategic leadership

SOE 1: This document highlights customer-driven approaches within the organisation, which emphasise on the importance of catering to customer needs. These customer-driven approaches include understanding and adapting to the evolving needs of customers. There seems to be customer-focused leadership that highlights the importance of strategic leadership centred around meeting customer needs. The following excerpt from the integrated report reinforces the importance of strategic customer focus within the context of leadership, particularly in terms of understanding and meeting evolving customer expectations, empowering staff, and using metrics and feedback for continuous improvement, which aligns with the subtheme of strategic customer focus within the broader theme of strategic leadership.

> *With evolving customer expectations towards energy independence, the business adopts customer-focused leadership, empowers staff, and uses metrics and customer feedback to drive continuous improvement* ***(SOE 1, Integrated Report FY24-FY28, p. 140).***

The documents highlighted the efforts of the leadership of the organisation to foster a customer-centric culture, signifying a fundamental shift in its operations and strategies toward creating value for customers.

> *The organisation aims to enhance customer value and experience by embracing customer centricity. This approach allows the business to stay relevant, competitive, and sustainable amidst changing market trends, competition, and regulatory pressures* ***(SOE 1, Integrated Report FY24-FY28, p. 140)***.

Furthermore, promoting strategic customer focus throughout SOE 1 involves emphasising communication with employees and ensuring that any issues involving awareness, customer needs, changes in strategy, or external issues that may impact customer value creation are made known to employees. Communication is an important aspect of strategic leadership. The following excerpt from the document relates to communication:

> *This includes ensuring that an effective communication plan is implemented alongside the Eskom strategy and works hand-in-glove with the Human Resources function to ensure effective strategic change management, ensuring that Eskom employees remain aligned, agile and responsive to key strategic shifts in Eskom's dynamic operating environment* ***(SOE 1, Integrated Report FY24-FY28, p. 129).***

SOE 2: SOE 2's leadership prioritises understanding and meeting customer needs through customer-centric strategies. They implement robust governance structures for compliance and ethical practices. Strategic planning is a major aspect of leadership style and aligns departmental objectives with overall organisational goals. Leadership fosters an environment of empowerment and effective communication, encouraging staff empowerment and seamless information flow across departments to align with customer needs and objectives.

> *SOE 2's strategic direction for the next five years is contingent on five key levers aimed at actualising shared stakeholder value. Customer service: We*

> *guard against our personal interests influencing business decisions. We aspire to honour the content and spirit of all business transactions. We aim to exceed internal and external customer expectations. We strive for superior service and quality in all our tasks honestly and without prejudice. Care for our people: We strive to build a company where colleagues trust each other's best intentions. Mutual respect governs our business practices. Our people—their ideas, commitment, knowledge, and competencies—are our strength and pride* ***(SOE 2, Integrated Report, 2022, p. 06).***

SOE 3: The findings illuminate how strategic leadership, anchored in customer focus within SOE 3, significantly influences a positive contribution to communities and the environment. This alignment between leadership strategies and customer-centric initiatives directly impacts an organisation's ability to reward individual contributions that drive value creation:

> *We have a passion for our customers and excellent customer service. Contributing positively to our communities and environment. Treating each other with respect, dignity, honesty, and integrity. Also, recognising and rewarding individual contributions and embracing diversity and transformation in the way we conduct business* ***(SOE 3, Operational Plan, 2022, p. 19).***

The documented initiative within SOE 3 emphasising leadership behaviour to cultivate a high-performance culture directly contributes to strategic leadership's impact on customer value creation. The findings also reveal a proactive approach, focusing on fostering a high-performance environment and talent development forums, which aligns leadership behaviours with enhancing customer value through several strategic pathways.

> *Ensure leadership behaviour supports a culture of high performance that is rewarded and addresses underperformance or non-performance appropriately. Talent and development forums will be implemented as the vehicle for these initiatives* ***(SOE 3, Operational 2022, p. 60).***

5.3.1.2 Customer centricity

SOE 1: The documents indicate that by understanding and responding to customer needs, the organisation aims to remain pertinent and aligned with the dynamic expectations of its customer base. Further, the data indicate that customer focus involves technology adoption, customer requirements, reasonable pricing, and service delivery. The commitment to building relationships with its stakeholders and focusing on improvement by leveraging customer feedback for refining services were mentioned as areas of focus for value creation by the organisation. Furthermore, the implementation of customer-centric strategies is widely considered to achieve long-term sustainability.

> *Customer centricity entails understanding customer needs, preferences, and behaviors and utilising data analytics and other technologies to design and deliver solutions that meet or exceed their expectations. This approach creates value for customers while achieving business goals, resulting in an agile, responsive, and sustainable business. (**SOE 1, Integrated Report FY24-FY28, p. 140).***

The corporate plan mentions that the organisation adopts customer-focused leadership, empowers employees, and uses metrics and customer feedback and service delivery metrics to drive continuous improvement. The organisation places a significant emphasis on customer satisfaction surveys as a tool for gauging and understanding customer needs comprehensively and creating value.

> *With evolving customer expectations towards energy independence, the business adopts customer-focused leadership, empowers staff, and uses metrics and customer feedback to drive continuous improvement **(SOE 1, Integrated Report FY24-FY28, p. 140**).*

SOE 2: The data from the documents reveal that SOE 2 focuses on investing in and maintaining robust infrastructure as a means to improve customer focus. This includes the physical structures and organisational systems necessary to support operations and innovation. The emphasis lies in ensuring that the infrastructure aligns with customer needs and supports the delivery of quality products or services. The organisation emphasises the adoption of technology across various operations, which involves leveraging technological advancements to enhance efficiency, improve service delivery, and innovate products to better serve customer needs in a rapidly evolving technological landscape. Furthermore, SOE 2 implements

predictive systems to anticipate customer demands and market trends. The integrated report mentions three key components: infrastructure, technology adoption, and predictive systems. The data included an acknowledgement that both physical and technological infrastructure are essential. Physical infrastructure supports operational functions, while technological infrastructure underpins efficiency and innovation.

> *The intention to divide its operations into network and non-network segments, enabling external entities to utilise the network infrastructure to improve customer value creation, aligns with a strategy that recognises the significance of both physical and technological infrastructure. Specifically, the Network business portfolio will oversee rail, port, and pipeline operations, while the Operations business portfolio will manage rail operations, port terminals, property, and engineering operations* ***(SOE 2, Integrated Report, 2022, p. 09).***

SOE 3: The strategic elements outlined in SOE 3's plan collectively contribute to a strong foundation of customer centricity. The organisation goes beyond the transactional aspects of customer service, aiming to create a positive impact on both customers and the broader community. By integrating values such as respect, integrity, and diversity into its culture, SOE 3 sets the stage for a holistic and sustainable customer-centric approach.

> *We have a passion for our customers and excellent customer service. Contributing positively to our communities and environment. Treating each other with respect, dignity, honesty, and integrity. Also, recognizing and rewarding individual contributions and embracing diversity and transformation in the way we conduct business.* ***(SOE 3, Strategic Plan, 2022, p. 19)***

5.3.2 Resources required for customer value creation.

The second question sought to understand the resources that are required by the organisation to create customer value. Two main themes emerged from the data, namely, human, and financial resources. There were two subthemes related to human resources, namely, recruiting skilled staff and training and development programs. On the other hand, the theme of financial resources comprises infrastructure investments and budget allocation (Figure 25).

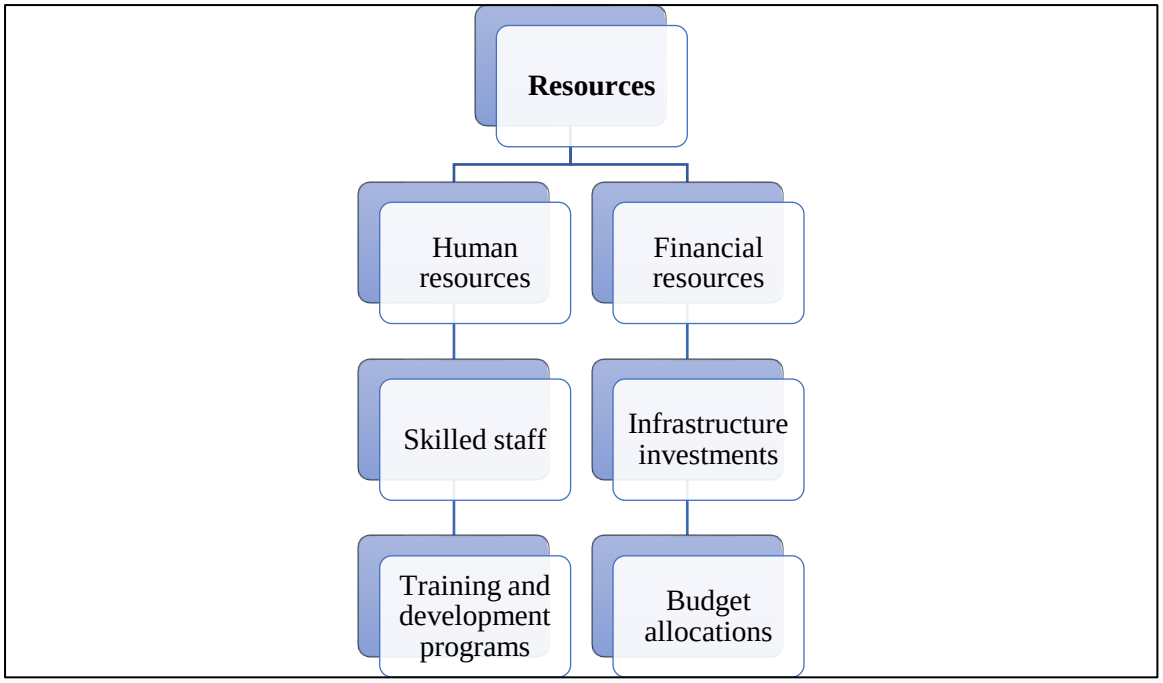


Figure 25: Resources required for customer value creation themes and subthemes (**Source: Own**).

5.3.2.1 Human resources

SOE 1: There is much emphasis placed by the SOE on resources and the crucial role that the human resource's function is fulfilling in enabling the organisation to deliver the right type of skilled employees for optimising human performance.

> *The Human Resources function is primarily responsible for ensuring systematic and integrated co-ordination, implementation and management of Human resources practices and processes aimed at optimising human performance for the sustainability of the plant's long-term production capability (**SOE 1, Corporate Plan FY2022/2023-2024/25, pg. 13**).*

Both the corporate plan and the operational plan mention the importance of training and development as crucial aspects of ensuring that employees have the necessary knowledge and skills to meet customer needs. The emphasis on upskilling and reskilling is linked to a proactive approach to address identified competency gaps. Moreover, the revision of training plans by divisional learning committees in the organisation is also set to prioritise critical training needs to enhance employee skills and competencies. This strategic investment in workforce development aligns with the goal of ensuring that employees are equipped with the necessary skills to deliver value-added services to customers, ultimately enhancing customer satisfaction and experience.

An upskilling and reskilling framework has been created, which, together with the results of the skills audit, is being used to develop an implementation plan to address the identified skills and competency gaps through future-fit career paths, redeployment strategies and training interventions. Divisional learning committees are revising their training plans to prioritise critical training needs over the next financial year, which will be captured into employees' individual development plans ***(SOE 1, Integrated Report FY24-FY28, p. 69).***

SOE 2: SOE 2 prioritises human resource development by consistently allocating 3.75% of its budget on training expenditure from FY18 to FY22. The organisation's unwavering dedication to training and development programmes demonstrates its strategic emphasis on improving skills and capabilities. The hiring of highly trained employees and the focused investment in training highlight SOE 2's dedication to developing a talented workforce capable of addressing changing customer needs and connecting human resources with customer value creation (Table 16).

Table 16: SOE 2 Initiatives and KPIs (**Source:** Document Review).

SOE strategic objective	Divisional objective	Initiative	KPI	Unit	FY18	FY19	FY20	FY21	FY22
Transformation Elements	Transformation Elements	Skills & Capability	Training Spend	%	3.75	3.75	3.75	3.75	3.75

SOE 3: The analysis of SOE 3's integrated report reveals significant findings about the necessary resource requirements for enhancing customer value inside the organisational structure. The recurring themes of hiring skilled staff, managing human resources, providing training and development, and ensuring employee engagement and well-being are crucial elements in enhancing customer-focused value propositions. The documented extracts clearly highlight the several complex issues faced, particularly the significant hurdle presented by a high vacancy rate that hinders the organisation's ability to train employees in different skills,

necessitating a quick resort to recruitment techniques. The empirical evidence reveals the complex interaction between resource limits, particularly financial constraints, and appointment moratoriums, which hinders the smooth implementation of strategic human resource initiatives.

> *As a result of the high vacancy rate, the cross-skilling or upskilling of current resources into new roles is not viable and urgent recruitment is required. Recruitment efforts have been hampered by lack of funds and a moratorium on appointments* ***(SOE 3, Integrated Report, FY 22, p. 57****)*

Moreover, the tangible consequences of insufficient resources, including a lack of skilled personnel and financial support, provide a significant obstacle that hinders the achievement of essential control goals. The emotional depiction of obstacles in contract review, caused by the lack of skilled personnel, highlights the necessity of outsourcing these tasks to guarantee fairness, depending on the availability of funds. These selected passages emphasise the crucial importance of a skilled, involved, and well-supported workforce in driving the enhancement of customer-focused value inside the operational system of SOE 3:

> *Contracts could not be reviewed as planned due to a lack of skilled resources to perform the contract review. It is planned that during 2022/23 FY the contract reviews will be outsourced to ensure objectivity; however, this depends on funding availability. (****SOE 3, Integrated Report, FY 22, p. 45).***

5.3.2.2 Financial resources

SOE 1: There is a highlighted need to invest in the physical and organisational infrastructure necessary for operations and growth and to remain apt with the changing industry and technological trends. Leadership may need to allocate financial resources to build and maintain or enhance infrastructure to support the organisations objectives for value creation. Furthermore, although it is not explicitly stated in the document if the SOE has already made the investment, the stated intention indicates a commitment to enhancing the infrastructure. This improvement can lead to better service delivery, potentially offering customers more reliable and efficient electricity services.

> *The industry is experiencing an increase in digital electricity infrastructure investment and decreasing costs of grid technologies. New data generated globally will lead to new ideas and business models, unlocking significant*

value creation potential plans ***(SOE 1, Integrated Report FY24-FY28, p. 208).***

Additionally, according to the organisation's integrated report, financial stability is crucial for SOE 1 to invest in the infrastructure, technology, and skilled personnel necessary to provide reliable and quality services to customers. However, the SOE's financial performance remained constrained due to municipal debt and the unsustainable levels of debt servicing, the unprecedented usage of diesel turbines at substantial levels above plan and budget, which further eroded the finances.

> *"Eskom's financial performance remained constrained. In addition to having to contend with escalating municipal debt and the unsustainable levels of debt servicing, the unprecedented usage of diesel turbines at substantial levels above plan and budget further eroded our financial sustainability. Financial constraints forced us to limit diesel burn, but the resultant escalated levels of loadshedding are to the detriment of the people of South Africa and our economy* ***(SOE 1, Integrated Report FY24-FY28, p. 127)****."*

SOE 2*:* The significance of adequate planning, review, and budgeting is emphasised within operations management. This study stresses the importance of continuous performance monitoring and strategic planning to ensure successful execution of programs aligned with stakeholder expectations. The trade-offs between maintenance spending and expansionary capital expenditure underscore the complexities of financial management decisions. This dilemma highlights the challenges in balancing operational sustainability and enhancing logistics value chains. The findings also reveal that resource coordination is essential for value creation: Ensure adequate capacity and well-coordinated resources to meet customer demand (SOE 2, Integrated Report, 2022, p. 14). Moreover, the findings also suggest that choosing between maintenance spending, which is crucial for sustaining existing operations, and expansionary capital expenditure, which is vital for enhancing and upgrading logistics value chains, poses a complex dilemma:

> *There are trade-offs between using financial resources on maintenance spend or expansionary capital expenditure to upgrade logistics value chains (SOE 2, Integrated Report, 2022, p. 18).*

The document analysis has also shown the significance of adequate planning, review, and budgeting, emphasising active collaboration with governmental entities and partner organisations for sponsored programmes. These measures ensure that the sponsored programmes are aligned with the goals and objectives of all the stakeholders involved. It is crucial to have a comprehensive understanding of the requirements and expectations of governmental entities and partner organisations to ensure successful execution of the programmes. Furthermore, active collaboration promotes transparency, accountability, and efficient allocation of resources, which ultimately leads to impactful and sustainable outcomes.

> *Adequate planning, review, and budgeting. SOE1 to actively involve both national and provincial government and active partnering with organisations that provide sponsored programmes* ***(SOE 2, Integrated Report, FY 22, p. 47).***

SOE3: The excerpt from the SOE 3 operational plan indicates a pronounced commitment to capital investment. Specifically, an earmarked amount of R529 million is allocated to the capital investment budget and subsequently disbursed to functional units. The data pertain to the historical underinvestment in infrastructure within SOE 3. In response to this historical trend, a substantial proportion of the existing capital budget is strategically directed towards addressing this deficiency. Allocation is principally oriented towards the twin objectives of replacing obsolete technologies and upgrading critical infrastructure facilities, which are seemingly important aspects of SOE 3 for ensuring customer value. This strategic allocation is underpinned by the overarching goal of augmenting operational efficiency and reliability and potentially introducing novel features or services aimed at engendering value for the clientele.

> *An amount of R529m is allocated to the capital investment budget and disbursed to the functional units as per the table below. Due to the low investment in infrastructure over the years, a significant portion of the available capital budget is applied to either replacing or upgrading legacy technologies and key infrastructure facilities* ***(SOE 3, Operational Plan, 2022, p. 38)***

5.3.3 The role of different departments in customer value creation

The third question sought to explore factors that can impede the successful implementation of lean practices within the public sector environment. The results from the document analysis revealed one theme to provide an answer to the role played by different departments in

customer value creation. The themes include the context of the organisation, which includes internal factors and external factors – coordination and collaboration. Internal coordination and collaboration include employee safety and skilled resources, interdepartmental communication, interdepartmental collaboration, planning and performance monitoring and financial management.

5.3.3.1 Context

SOE 1: According to the data, the context of the organisation in SOE 1 includes internal coordination within SOE 1, which involves achieving the organisation's goals together, ensuring collaboration among the departments, and external collaboration, which includes the achievement of stakeholder expectations. The departments can be internal departments within the SOE or partnerships with government departments to form a policy and legislative point of view. For example, as noted in the integrated report, the government, as a major shareholder in state-owned entities, mandates that SOEs align their operations with current legislation and national policies, with the goal of supporting the government's aspirations for change. Interdepartmental collaboration reflects this system by integrating efforts across units, fostering synergy, and leveraging collective expertise to address customer needs comprehensively.

> *Embedded within its planning, SOE 1, as an SOC, gives effect to prevailing legislation to support and enable the government's transformation objectives. As such, SOE 1 is required to align itself with the relevant legislation, national plans, and policies residing in relevant government policy departments. SOE 1's Transformation Plan drives SOE 1's revised Corporate Social Responsibility (CSR) Strategy, which, in turn, is aligned with SOE 1's short, medium, and long-term strategic trajectory. Consequently, the revised CSR strategy serves as a vehicle for leveraging business value-creating opportunities that arise from the execution of the strategy* ***(SOE 1, Integrated Report FY24-FY28, p. 57).***

Furthermore, SOEs experience a notable degree of political intervention. Politicians can effectively utilise their power to push for value creation by the SOE. They employ platforms such as energy-related committee meetings where some of the organisational board members collaborate with politicians to effectively tackle crucial challenges regarding energy supply.

> *The National Electricity Crisis Committee (NECOM). The NECOM provides an integrated political co-ordinating platform for the response to the energy crisis to address loadshedding and enable the reforms necessary for the long-term sustainability of the electricity supply industry* ***(SOE 1, Corporate Plan FY24-FY28, p. 03).***

The documents also underscore the importance of interdepartmental engagement and integration in policies and procedures across departments. By aligning resources with strategic objectives, departments aim to optimise their capabilities, ensuring that human, financial, and technological resources are deployed effectively to enhance customer experiences.

> *Processes, policies, and operational procedures, together with the competency and skills of our workforce, are critical to ensuring that each component of the integrated power system is operated optimally to deliver on key stakeholders' expectations* ***(SOE 1, Corporate Plan FY24-FY28, p. 54)***

SOE 2: The SOE prioritises active engagement with governmental organisations and partner organisations for sponsored initiatives, highlighting the significance of efficient internal and external communication. This facilitates the coordination of activities, guaranteeing that programmes are consistent with the goals and objectives of stakeholders. The document analysis emphasises the importance of interdepartmental collaboration, emphasising the role of teamwork and shared expertise in effectively satisfying customer needs. In addition, external engagement is also crucial for maintaining positive relationships with partner organisations and governmental bodies. The collaborative approach mentioned in the integrated report intends to provide adequate capacity and effective resource management, which are specifically tailored to satisfy the varied demands of the customer base.

> *… to ensure adequate capacity and well-coordinated resources to meet customer demand* ***(SOE 2, Integrated Report, 2022, p. 14).***

The integrated report highlights the importance of ensuring sufficient capacity through collaborative initiatives, emphasising the need for efficient resource allocation and infrastructure planning to satisfy diverse customer demands. The report acknowledges the importance of skilled resources, focusing on initiatives that aim to manage resources effectively and cater to varying customer needs.

The document analysis has also shown the significance of adequate planning, review, and budgeting, emphasising active collaboration with governmental entities and partner organisations for sponsored programmes. These measures ensure that the sponsored programmes are aligned with the goals and objectives of all the stakeholders involved. It is crucial to have a comprehensive understanding of the requirements and expectations of governmental entities and partner organisations to ensure successful execution of the programmes. Furthermore, active collaboration promotes transparency, accountability, and efficient allocation of resources, which ultimately leads to impactful and sustainable outcomes.

> *Adequate planning, review, and budgeting SOE1 to actively involve both national and provincial government and active partnering with organisations that provide sponsored programmes* ***(SOE 2, Integrated Report, FY 22, p. 47)***

SOE 3: The investigation of the roles that different departments have in fostering customer value creation within SOE 3 revealed pivotal initiatives and strategies detailed in their operational plan. Notably, the strategic deployment of the eMall eCommerce platform, a collaborative venture with the organisation, has emerged as a cornerstone initiative poised to present a competitive edge in the growing economy. The document excerpt highlights the anticipated role of technology adoption, specifically the utilisation of digital platforms, intertwined with leveraging existing logistical infrastructure, emblematic of SOE 3's concerted effort to align with government policy-making departments and other departments within the organisation.

Moreover, the outlined approach signifies a deliberate endeavour to merge external resources from different departments, which include capital, skills, technology, and expertise, into the organisational framework, complementing internal capabilities. This strategic stance signifies SOE 3's profound commitment toward not only customer commercial success but also fostering trade competitiveness in both local and international markets, echoing a holistic approach encompassing fund provision, skilled workforce acquisition, technology integration, efficient customer service delivery, logistical optimisation, and capacity building:

> *In addition, the robust implementation of the SOE 3 eCommerce platform (eMall) in collaboration with DTPS and its launch into the marketplace as a competitive alternative in this growing sector are seen as key features of the*

strategic plan. The eCommerce platform, earmarked to take off in 2019/2020, will contribute towards achieving the objectives of the developmental state agenda using the available logistical infrastructure at the SOE 3, allowing us to adequately service our markets. ***(SOE 3, Operational Plan, 2022, p. 4)***

5.3.4 Important factors in customer value creation

The fourth question examined the important factors for improving customer value creation. This question revealed two main themes, namely, operations and fit.

5.3.4.1 Operations

SOE1: The finding revealed that operations are linked to proper planning and performance monitoring as well as to the inclusion of customer needs in the planning for value creation. They also look for ways to enhance service delivery while preserving service quality.

Customer centricity entails understanding customer needs, preferences, and behaviors and utilising data analytics and other technologies to design and deliver solutions that meet or exceed their expectations. This approach creates value for customers while achieving business goals, resulting in an agile, responsive, and sustainable business. ***(SOE 1, Corporate Plan FY24-FY28, p. 140)***

Furthermore, coordination emerges as another factor that is important for ensuring that an organisation creates customer value. Collaborative efforts among various departments are necessary to synchronise activities, align objectives, and streamline operations for enhanced service delivery. These factors denote the organisation's commitment to optimising internal processes, maintaining service excellence, and diligently monitoring performance metrics to ensure continuous improvement.

SOE 2: The Integrated Report of SOE 2 highlights various strategic facilitators that enhance the production of customer value. Customer service is recognised as a strategic tool that emphasises the importance of meeting and surpassing customer needs and expectations. Enhancing customer service entails understanding consumer requirements, delivering information swiftly and accurately, and promptly resolving difficulties. This aspect immediately helps to improve the whole customer experience and, as a result, increases customer value.

Moreover, the incorporation of "the employees" as a strategic facilitator acknowledges the need for competent and driven staff. Employees are essential for providing exceptional services. The allocation of resources to staff training, empowerment, and satisfaction has a direct impact on their capacity to deliver exceptional service to clients, hence enhancing customer value. Furthermore, the effective use of resources, such as ports, railroads, and pipelines, is essential for maximising operational efficiency. Properly managed and efficiently utilised resources guarantee dependability and timely provision of services, thus influencing customer satisfaction. Customers derive advantages from a proficient infrastructure that effectively fulfils their requirements for transportation and handling.

> *SOE 2's tactical enablers, including customer service, people, asset utilization, safety, and cost optimization, aim to restore the company's core business operations, enabling critical port, rail, and pipeline cargo transport and handling services. These enablers support safety, productivity, innovation, and accountability among employees, ensuring SOE 2's nameplate status as an efficient custodian of ports, rail, and pipelines.* ***(SOE 2, Integrated Report, 2022, p. 26)***

The significance of adequate planning, review, and budgeting is emphasised within operations management. This study stresses the importance of continuous performance monitoring and strategic planning to ensure successful execution of programs aligned with stakeholder expectations. The trade-offs between maintenance spending and expansionary capital expenditure underscore the complexities of financial management decisions. This dilemma highlights the challenges in balancing operational sustainability and enhancing logistics value chains. The findings also reveal that resource coordination is essential for value creation: Ensure adequate capacity and well-coordinated resources to meet customer demand (SOE 2, Integrated Report, 2022, p. 14). Moreover, the findings also suggest that choosing between maintenance spending, which is crucial for sustaining existing operations, and expansionary capital expenditure, which is vital for enhancing and upgrading logistics value chains, poses a complex dilemma:

> *There are trade-offs between using financial resources on maintenance spend or expansionary capital expenditure to upgrade logistics value chains* ***(SOE 2, Integrated Report, 2022, p. 18).***

SOE 3: The findings reveal a focus on developing seamless integration between customer's digital and physical activities while acknowledging the evolving nature of customer interactions. This approach acknowledges that customers often engage through both online and offline channels. By integrating these activities seamlessly, the organisation places this as an important factor that aims to enhance the overall customer experience.

> *The SOE's modernisation strategy focuses on increasing customer value by optimising and modernising our business segments. The primary goal of this strategy is to develop a seamless integration between the customer's digital and physical activities. Fundamentally, the organisation is working towards becoming a modern cyber-physical business* ***(SOE3, Operational plan, 2023 pg. 04)***.

5.4.3.2 Fit

SOE 1: SOE 1: The integrated report highlights strategic alignment between organisational strategies and external factors, particularly government initiatives such as the Just Energy Transition plans. The organisation focuses on refining some of their plants to meet the demands for renewable energy partnerships and implementing a socioeconomic strategy. This means that the organisation is ensuring fit and alignment with national objectives and adapting strategies to create value for customers and stakeholders, as demonstrated by the following excerpt from the document:

> *Key focus areas in the immediate and short term include refining the approach to the repurposing and repowering of stations, ensuring alignment with the government's Just Energy Transition plans, actively pursuing renewable energy allocations through partnerships, and implementing an integrated socio-economic strategy* ***(SOE 1, Corporate Plan FY24-FY28, p. 34)***

The data are indicative of the role that various departments within the organisation play in ensuring customer value creation through their contributions to aligning with organisational strategies. For example, the departments involved in planning and strategy contribute to strengthening customer value creation mechanisms throughout the organisation by ensuring that the SOE plans for the development of strategies can enhance customer value creation. Similarly, departments focusing on quality management play a critical role in ensuring that products or services address standards and policy requirements. They contribute to delivering consistent value by maintaining quality and meeting or exceeding customer expectations.

Departments involved in operations management and optimisation streamline processes to maximise efficiency. Their role directly impacts customer value by ensuring smooth operations and timely delivery of products or services**.** Departments handling immediate responses to breakdowns or issues play a crucial role in minimising disruptions. Their swift actions directly impact customer satisfaction by ensuring minimal interruptions in service or product delivery.

SOE 3: In SOE 3, fit includes aligning the processes and operations of the organisation with changing customer needs and leveraging technology for business transformation. To enhance customer value creation, the organisation needs to strategically embrace technology, innovate its service offerings, and address financial sustainability issues. These improvements are essential for remaining competitive, meeting customer expectations, and ensuring the long-term success of SOE 3 in a dynamic business environment. The following quote:

> *Customers' needs are changing, and the SOE 3is still using old methods of doing business and has not embraced technology as a vehicle for radical economic transformation and for customers to be empowered. The traditional postal business is not generating adequate revenues to support increasing operational expenditure, which has resulted in net losses year on year***.**
> ***(SOE 3, Strategic Plan, 2022, p. 10)***

5.4 CROSS-CASE ANALYSIS: SOE 1- SOE 3

This section presents the findings from the document analysis dataset across the cases. To answer research objective 1 to determine what constitutes customer value from a public sector perspective. The data that emerged from the documents revealed four aggregated themes, namely, leadership ensuring value creation based on customer needs, resources required for customer value creation, the roles of the departments in customer value creation, and important factors to improve customer value creation, as illustrated in Figure 26.

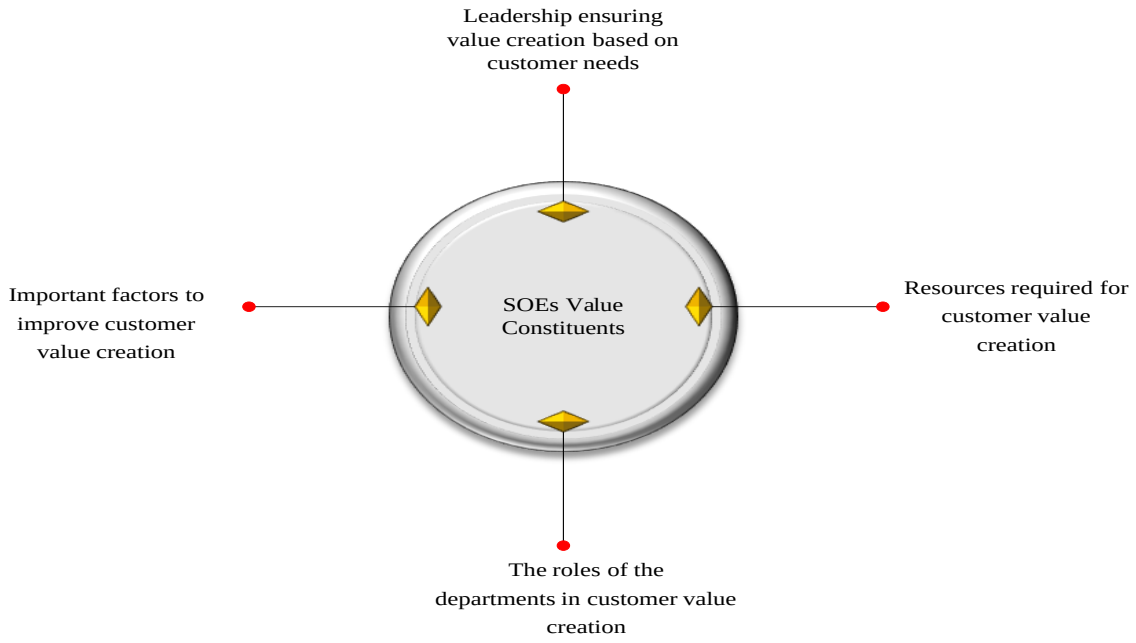


Figure 26: The value constituents from the public sector perspective (**Source:** Own)

5.4.1 Leadership ensuring value creation based on customer needs.

The mapping of findings regarding value constituents from the public sector perspective across SOE 1 to SOE 3, as presented in Table 17, reveals an emphasis on strategic customer focus, strategic planning, and transformational leadership and communication, showing a uniform emphasis on these aspects of ensuring value creation across all three state-owned entities. While this uniformity exists, variations emerge in other key areas. SOE 1 and SOE 2 emphasise technology adoption, customer requirement gathering, and service delivery for customer centricity and satisfaction. In contrast, SOE 3 places more emphasis on employee welfare, engagement, and operational excellence. This divergence in emphasis highlights the differing approaches each SOE adopts concerning human resources, technological integration, and customer-centric strategies within their value creation frameworks.

5.4.2 Resources required for customer value creation.

The cross-case analysis reveals several commonalities and divergences among SOE 1, SOE 2, and SOE 3 concerning the resources required for customer value creation. SOE 1, SOE 2, and SOE 3 prioritise "recruiting skilled staff" and "training and development programs" equally (3 occurrences each). This demonstrates a shared focus on talent acquisition and employee skill enhancement across all three entities. Human resources management stands out unanimously, with all three cases emphasising the recruitment of skilled staff and training and development

programmes. Financial resource allocation, particularly for infrastructure investments and budgeting, emerges as another shared priority across the cases. However, strategic leadership facets such as establishing a maintenance culture and strategic policy and partnerships show varied degrees of attention from organisations. Moreover, aspects such as employee safety and predictive systems exhibit disparities in emphasis across entities, underlining a nuanced approach to resource allocation for customer-centric initiatives among state-owned entities.

5.4.3 The roles of the departments in customer value creation

The mapping findings on value constituents from the public sector perspective across cases. The examination of departmental roles in customer value creation across SOE 1, SOE 2, and SOE 3 underscores the significance of interdepartmental collaboration and effective communication. All three entities prioritise interdepartmental collaboration as a vital driver of value creation, emphasising the need for cohesive efforts across various departments. Operations management, particularly in terms of planning and performance monitoring, emerges as a crucial aspect for all organisations, highlighting the emphasis placed on efficient processes. Furthermore, effective internal and external communication is recognised as integral, albeit with varying degrees of focus among the entities. Financial management also surfaces as a common thread, emphasising the importance of astute financial resource allocation in the pursuit of customer-centric objectives. This analysis showcases the shared priorities and differing emphases within departmental roles across state-owned entities, reflecting nuanced strategies for enhancing customer value creation.

5.4.4 Important factors for improving customer value creation.

The exploration of crucial factors impacting customer value creation across SOE 1, SOE 2, and SOE 3 reveals a shared emphasis on customer centricity and strategic leadership. All entities prioritise incorporating customer needs into their operations, highlighting the significance of aligning services with customer expectations. Ensuring reliable and sustainable service delivery is underscored by SOE 2 and SOE 3, emphasising the importance of consistent quality for driving customer satisfaction. Strategic leadership, particularly in proper planning and performance monitoring, emerges as a focal point across all organisations, indicating the critical role of robust planning and effective oversight in enhancing customer value. Additionally, the attention given to service downtime mitigation and workplace dynamics further emphasises the commitment to operational efficiency and employee engagement as key contributors to improving customer value creation strategies. This analysis showcases a

multifaceted approach among the entities, integrating customer-centric practices with strategic leadership and operational excellence to drive value for their customers.

5.4.5 Emerging themes and dimension in customer value creation

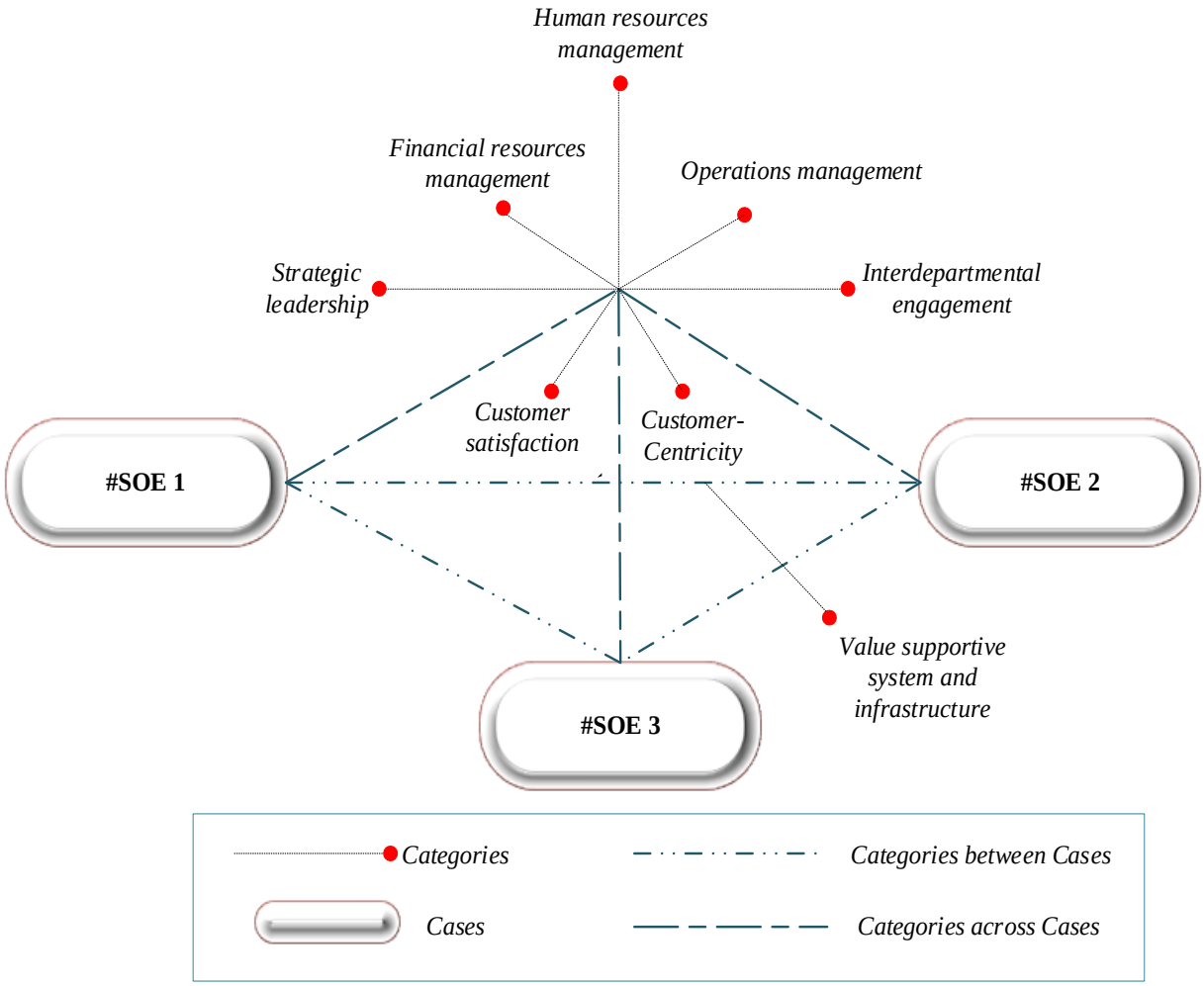
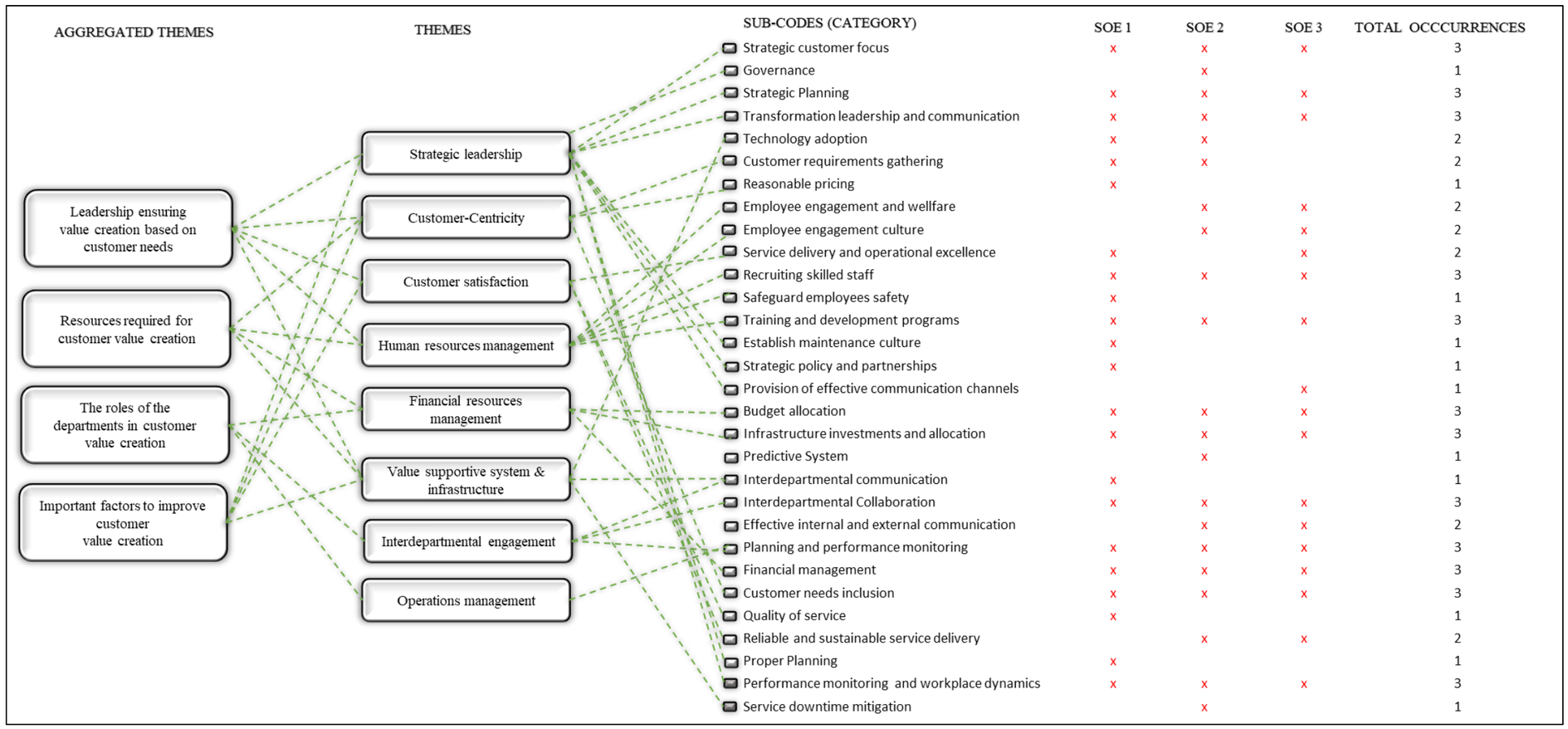


Figure 27: Model-Cage for the emergence of themes on value constituents across the cases (**Source:** Adapted from Asiedu, 2020).

Table 17: Mapping findings on value constituents from the public sector perspective across cases

Aggregated themes	Themes	Sub-Codes (Categories)	SOE 1	SOE 2	SOE 3	Total Sub-Codes Occurrences
Leadership ensuring value creation based on customer needs	Strategic leadership	Strategic customer focus	x	x	x	3
	Strategic leadership	Strategic Planning	x	x	x	3
	Strategic leadership	Transformation leadership and communication	x	x	x	3
	Value supportive system and infrastructure	Technology adoption	x	x		2
	Customer-Centricity	Customer requirements gathering	x	x		2
	Customer-Centricity	Reasonable pricing	x			1
	Human resources management	Employee engagement and welfare		x	x	2
	Strategic leadership	Governance		x		1
	Human resources management	Employee engagement culture		x	x	2
	Customer satisfaction	Service delivery and operational excellence	x		x	2
Resources required for customer value creation	Human resources management	Recruiting skilled staff	x	x	x	3
	Human resources management	Training and development programs	x	x	x	3
	Strategic leadership	Establish maintenance culture	x			1
	Strategic leadership	Strategic policy and partnerships	x			1
	Financial resources management	Infrastructure investments and allocation	x	x	x	3
	Strategic leadership	Provision of effective communication channels			x	1
	Financial resources management	Budget allocation	x	x	x	3
	Human resources management	Safeguard employee's safety	x			1
	Value supportive system and infrastructure	Predictive System		x		1
The roles of the departments in customer value creation	Interdepartmental engagement	Interdepartmental communication	x			1
	Interdepartmental engagement	Interdepartmental Collaboration	x	x	x	3
	Operations management	Planning and performance monitoring	x	x	x	3
	Interdepartmental engagement	Effective internal and external communication		x	x	2
	Financial resources management	Financial management	x	x	x	3
Important factors to improve customer value creation	Customer-Centricity	Customer needs inclusion	x	x	x	3
	Customer satisfaction	Quality of service	x			1
	Customer satisfaction	Reliable and sustainable service delivery		x	x	2
	Strategic leadership	Proper Planning	x			1
	Value supportive system and infrastructure	Service downtime mitigation		x		1
	Strategic leadership	Performance monitoring and workplace dynamics	x	x	x	3



SUB-CODES (CATEGORY)	SOE 1	SOE 2	SOE 3	TOTAL OCCCURRENCES
Strategic customer focus	x	x	x	3
Governance		x		1
Strategic Planning	x	x	x	3
Transformation leadership and communication	x	x	x	3
Technology adoption	x	x		2
Customer requirements gathering	x	x		2
Reasonable pricing	x			1
Employee engagement and wellfare		x	x	2
Employee engagement culture		x	x	2
Service delivery and operational excellence	x		x	2
Recruiting skilled staff	x	x	x	3
Safeguard employees safety	x			1
Training and development programs	x	x	x	3
Establish maintenance culture	x			1
Strategic policy and partnerships	x			1
Provision of effective communication channels			x	1
Budget allocation	x	x	x	3
Infrastructure investments and allocation	x	x	x	3
Predictive System		x		1
Interdepartmental communication	x			1
Interdepartmental Collaboration	x	x	x	3
Effective internal and external communication		x	x	2
Planning and performance monitoring	x	x	x	3
Financial management	x	x	x	3
Customer needs inclusion	x	x	x	3
Quality of service	x			1
Reliable and sustainable service delivery		x	x	2
Proper Planning	x			1
Performance monitoring and workplace dynamics	x	x	x	3
Service downtime mitigation		x		1

Figure 28: Model-Cage for value constituents from the public sector perspective across case

5.5 THE CRITICAL FACTORS THAT DETERMINE THE APPLICABILITY OF LEAN TOOLS IN THE PUBLIC SECTOR.

This question is designed to understand the critical factors that determine the applicability of lean tools in the public sector to address Objective 2 of the study. In answering this question, the study emphasised three aggregated themes, namely, specific lean tools used for continual improvement in customer value creation, the effectiveness of the lean tools used for continual improvement in customer value creation and monitoring deviations in the customer value creation processes, as shown in Figure 29 and explained as follows.

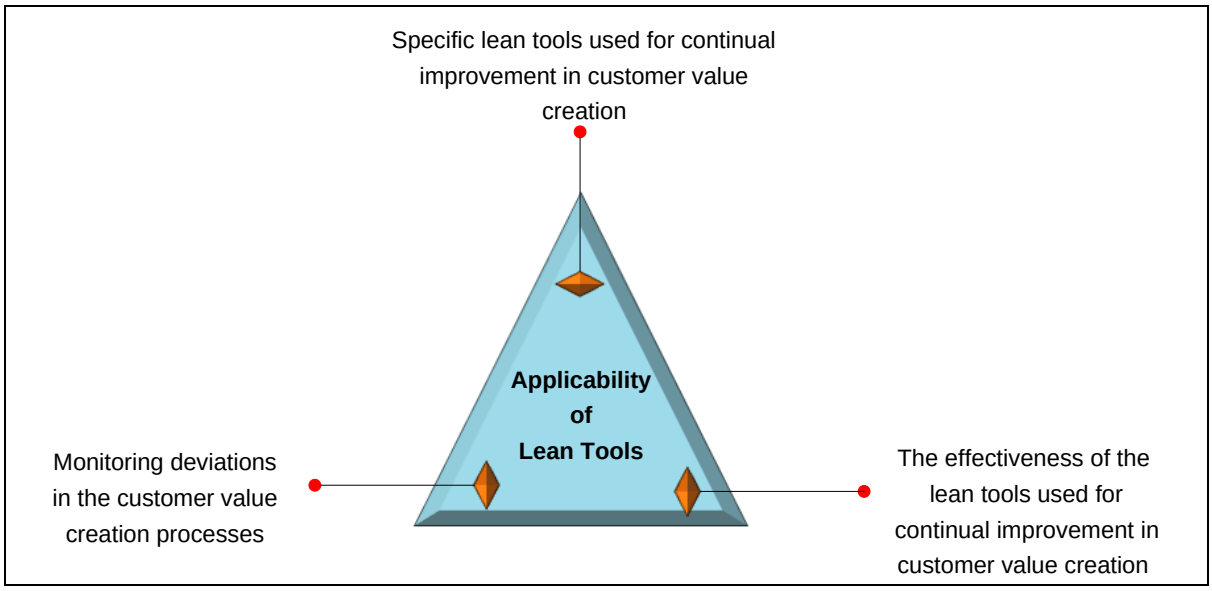


Figure 29: The applicability of lean tools from a public sector perspective (**Source:** Own).

5.5.1 Specific lean tools used for continual improvement in customer value creation.

SOE 1: The most interesting finding was that trouble shooting or assessment in SOE 1 entails employing root cause analysis, incident investigations, risk assessments and fault tree analysis. However, corrective action involves putting corrective actions in place form activities that do not conform to process requirements or addressing findings from audits. Further exploration within the corrective action theme revealed three key subcodes: waste reduction, quality control, and continuous process improvement. These subcodes delineate the specific tools and approaches adopted to rectify issues identified during problem solving. Overall, the findings show that SOE1 employs different tools that include not only identifying problems but also implementing multifaceted solutions to create value for customers. The excerpt from SOE 1's

corporate plan for FY24-FY28 reinforces the findings related to their approach to continuous improvement and problem investigation. These efforts highlight the adaptability of operating, maintenance, and outage processes in actively engaging in assessments and benchmarking exercises to enhance their operations.

> *Driving continuous improvement through effectiveness assessments for operating, maintenance, and outages, including deep dives and participation in relevant incident investigations (such as outage slips and unit trips), as well as benchmarking exercises* ***(SOE 1, Corporate Plan FY24-FY28, p. 57).***

The findings from the document analysis also reveal the use of predictive monitoring techniques and a proactive approach to problem solving and risk management within SOE1. By identifying, diagnosing, and mitigating imminent risks, the organisation demonstrates a commitment to corrective actions, aligning with the essence of continuous improvement methodologies within the context of lean tools:

> *…. predictive monitoring techniques to identify, diagnose, mitigate, and eliminate imminent operating and engineering risks through early warning and reporting to power stations* ***(SOE 1, Corporate Plan FY24-FY28, p. 57).***

Some of the tools that SOE 1 incorporates are automated procurement systems, as outlined in the Corporate Plan for FY24-FY28, which provides a clear example of fitting and adapting lean tools to their operational processes. For example, by digitising stock control and utilising tools such as price check and e-auction, SOE 1 streamlines the procurement process to fit into changes in the technological environment.

> *SOE 1 is implementing automated systems in the procurement of goods and services and the management of spend to better manage procurement spend and protect against integrity breaches, including tools such as Price Check, the digitalisation of stock control, the use of an augmented procurement model in certain business areas, and the use of e-auction* ***(SOE 1, Corporate Plan FY24-FY28, p. 57).***

SOE 2: Considering the analysis of SOE 2's organisational documents, several critical factors influencing the applicability of lean tools emerged, notably linked to process improvement and technological adaptation. The theme of process improvement within SOE 2's integrated report aligns with the utilisation of specific tools such as SAP software, innovation, and agility. This

highlights the organisation's drive towards enhancing operational efficiency, innovation, and adaptability, key elements often associated with lean tools. Furthermore, some critical insights that have emerged from the document, acknowledging other significant technological developments within the sector, have not yet been adopted by the organisation.

> *There has been significant technological development in tools and operating models in the sector, which has not adopted to date* ***(SOE 2, Integrated Report, 2022, p. 31).***

The lack of adoption of advanced technological tools might signify that SOE 2 lacks opportunities to optimise its processes, enhance its productivity, and improve its valued added for its customers. These tools often automate tasks, reduce manual effort, and improve accuracy; these are the main aims of lean methodology. The lack of adoption of significant technological developments within the sector by SOE 2 also suggests a missed opportunity to leverage advancements that align closely with the principles and objectives of lean tools. Automated tools and software can eliminate the need for manual data entry, reducing human error and increasing the overall accuracy of the organisation's operations. Moreover, integrating these technologies can also help foster a culture of continuous improvement by providing real-time data and analytics, allowing the organisation to identify areas for enhancement and make data-driven decisions. Ultimately, leveraging these advancements can significantly contribute to reducing waste and creating value for customers.

SOE 3: The document extract highlights the use of digital access as a tool for continual improvement, emphasising the provision of Wi-Fi hotspots to facilitate digital access and contribute to bridging the digital divide among citizens. This aligns with the organisation's strategic plan and demonstrates a proactive approach toward leveraging digital infrastructure to enhance customer value creation.

> *The organisation assists in bridging the digital divide by making its property infrastructure and branches available as Wi-Fi hotspots, facilitating digital access, and bringing the digital economy to communities* ***(SOE 3, Operational Plan, 2022, p. 26).***

Furthermore, the operational plan mentions that the organisation ulitses some lean management tools to improve its operations: “To this end, SOE 3 will apply lean management principles to guide its continuous improvement programmes” (SOE 3, Operational Plan, 2022, p. 25). Some of the tools mentioned in the document mention a payment platform, which functions as a

comprehensive and integrated infrastructure that facilitates digital payment processes within the organisation. The role of this platform is in accordance with the concept of value stream mapping in lean tools. Value stream mapping entails the visual representation and thorough analysis of the complete process, spanning from initiation to completion. It involves the identification of processes that contribute value and those that do not. Similarly, the SOE 3 payment platform provides a full overview of the payment value chain.

> *The Payment Platform is an end-to-end integrated infrastructure platform which enables SAPO's digital payment value chain* ***(SOE 3, Operational Plan, 2022, p. 59).***

The data also indicate a strategic endeavour by the organisation towards innovation and the use of new technologies (tools) within the organisation. Although lean tools are not explicitly mentioned, the emphasis on facilitating inventive problem solving and collaborating with industry to offer intelligent innovations clearly indicates a tendency to embrace sophisticated approaches, which may include lean tools. Lean approaches are well known for their ability to foster innovation through process optimisation, waste reduction, and increased efficiency. The stated intention to collaborate with the industry is in line with innovation and improvement, which emphasise continual development by sharing knowledge and adopting best practices.

> *Foster innovation and adoption of new technologies. We provide the information and tools to enable innovative problem solving. We partner with industry to bring smart innovations from the private/public to the public sector* ***(SOE 3, Operational Plan, 2022, p. 76).***

5.5.2 Effectiveness of the lean tools used for continual improvement in customer value creation.

SOE 1: To answer question 2 on the effectiveness of the lean tools for continual improvement, the data indicated that there are different lean tools that are already employed at the organisation, although some tools were not necessarily understood and categorised as "lean tools." It has also been established that the theme of problem investigation and problem solving recurred throughout the dataset. In reviewing the organisation's strategic document, it became evident that the effectiveness of the tools is apparent as past incidents, have transformed into lessons learned, and have not recurred but instead been applied to enhance system resilience.

> *Lessons learned from past events through problem investigations are implemented to improve the resilience of the system to unforeseen events* ***(SOE 1, Corporate Plan FY24-FY28, p. 48).***

SOE 2: The excerpt from the integrated report FY 22 of SOE 2 emphasises a crucial element of risk management tools. Although not specified as lean tools, there is mention of the second level of assurance and application of the tool to perform risk assessments. This highlights the importance of improving efficiency in handling the top 10 strategic risk clusters and developing threats. However, the results also indicate an identification of a need for improvement in this risk assessment tool, which indicates a discrepancy or deficiency in the current risk management tools employed by the organisation. The proposal for more stringent integrated audits across different assurance roles, such as risk, sustainability, and compliance, suggests a possible opportunity for enhancement.

> *The second line of assurance aims to further embed adequacy and effectiveness in managing the top 10 strategic risk clusters and key emerging risks. During the 2022 reporting year, this element of assurance was reviewed and was found to require improvement, which could be achieved through more rigorous integrated audits across assurance functions such as Risk, Sustainability and Compliance* ***(SOE 2, Integrated Report, 2022, p. 31).***

SOE 3: The strategic plan and integrated report of SOE 3 did not mention the effectiveness of the tools specified for customer value.

5.5.3 Monitoring deviations in the customer value creation processes

SOE 1: Monitoring deviations include inspections, performance reviews, monitoring systems and audits. Monitoring systems provide real-time data and feedback, enabling proactive identification of deviations in customer value creation processes. Audits serve as a structured and systematic approach to evaluate the efficiency and effectiveness of these processes, contributing to controlling deviations and ensuring alignment with customer-centric objectives.

The extract below highlights the establishment of an audit recovery programme aimed at addressing challenges related to public finance management act (PFMA) reporting. This programme specifically targets assessing the effectiveness of procurement compliance monitoring systems and other internal controls within the organisation. The audit findings suggest that SOEs are seeing a decline in financial discipline and management. The findings also suggest that the performance of SOEs declined in comparison to that in the previous year

and substantially declined over the past five years. The level of trust in the competence of the executives responsible for overseeing the operations of state-owned enterprise has also declined in recent years. The implementation of turnaround programmes, which occur nearly every year, has had no success in rehabilitating the SOE environment. This lack of progress in implementing these solutions can be attributed to the constant changes in executive and management positions, which prevent individuals from being held accountable for their actions.

> *An audit recovery programme to address its challenges with PFMA reporting, which includes assessing the effectiveness of the procurement compliance monitoring systems and other internal controls* ***(SOE 1, Corporate Plan FY24-FY28, p. 30).***

The use of lean tools such as audits to monitor deviations in the value creation process in SOE 1 is useful in the observations made during the audit recovery programme about declines in performance and deficiencies in critical controls, and this suggests the need for further investigation into root causes. RCA and other lean tools can help pinpoint fundamental reasons for repeated failures or declining performance, enabling organisations to make targeted improvements.

SOE 2: The excerpts from SOE 2's integrated report emphasise the implementation of proactive measures and monitoring frameworks across various operational aspects of the organisation. These measures aim to enhance compliance monitoring, ensure adherence to regulatory conditions, and implement robust monitoring and evaluation strategies within the organisation's processes. In the context of monitoring deviations in customer value creation processes, these excerpts point out the efforts of the organisation to implementing proactive assurance in procurement processes by establishing checkpoints to monitor compliance effectively.

> *Implement proactive assurance within procurement. processes, including compliance checkpoints to ensure effective compliance monitoring and reporting* ***(SOE 2, Integrated Report, 2022, p. 43).***

The document also highlights monitoring frameworks related to regulatory decisions, and the implementation of associated conditions suggests extending to permit, licence, and tariff applications, indicating an intent to monitor and ensure adherence to regulatory standards that might affect customer value creation activities. Furthermore, there is an emphasis on

monitoring and evaluation strategies, and codifying lessons learned indicates a commitment to continuous improvement.

> *Implementing the monitoring framework to ensure that conditions attached to regulatory decisions regarding permits, licenses and tariff applications are implemented* ***(SOE 2, Integrated Report, 2022, p.***

SOE 3: The monitoring of deviation in customer value creation processes is linked to audits, both internal and external, as noted in the operational plan document of SOE 3. The excerpt from the SOE 3 operational plan highlights the need for closely monitoring and resolving both internal and external audit results within the organisation. The document analysis emphasises an acknowledged deviation in addressing audit issues, showing that the existing performance does not meet the necessary criteria for ensuring that value is created for the customers of the organisation:

> *Monitoring of Audit Findings (External and Internal Audit issues). The effective and timely resolution of external and internal Audit issues is currently not at required levels to ensure an effective and well-governed organisation* ***(SOE 3, Operational Plan, 2022, p. 88).***

5.5.4 Cross-case analysis: the critical factors that determine the applicability of lean tools (SOE 1- SOE 3)

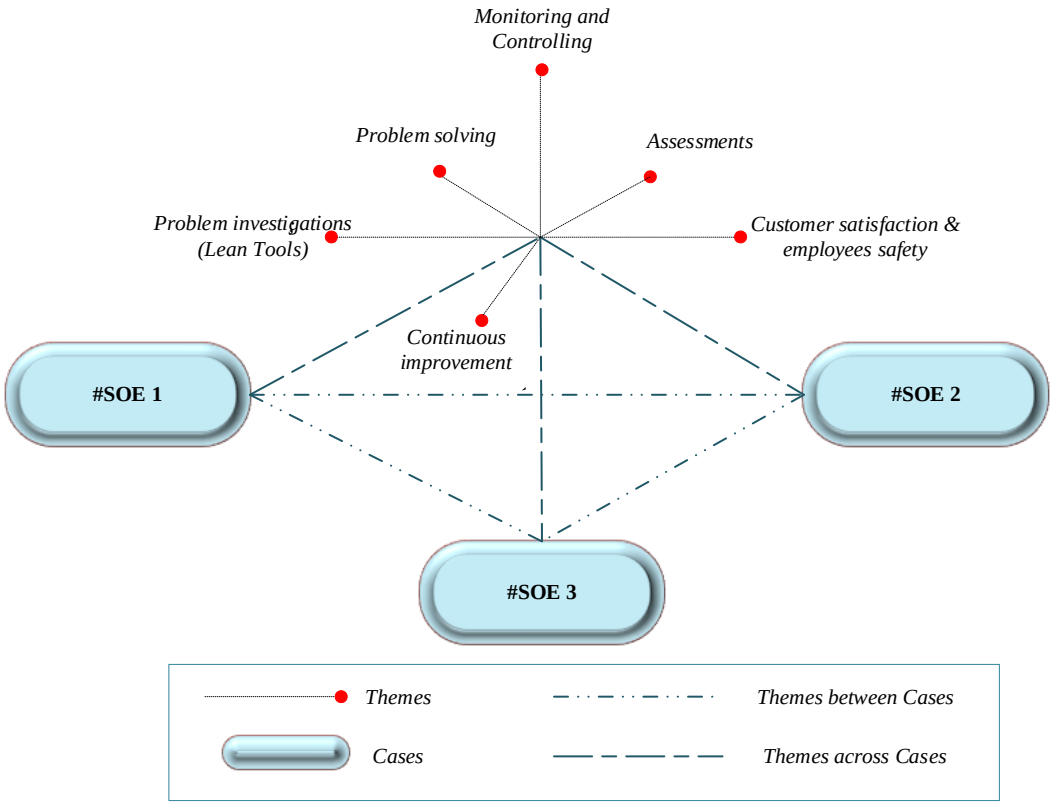


Figure 30: Model-Cage for the emergence of themes on lean tool applicability factors (**Source:** Adapted from Asiedu 2020).

This section presents the findings from the document analysis dataset across the cases. To answer research objective 2 to determine the critical factors that determine the applicability of lean tools in the public sector.

5.6 SPECIFIC LEAN TOOLS USED FOR CONTINUAL IMPROVEMENT IN CUSTOMER VALUE CREATION

The factors that determine the applicability of lean tools are consistent across state-owned entities, which reveals a consistent emphasis on using lean tools for addressing problems and enhancing processes to create customer value. The themes of monitoring and controlling, auditing, monitoring and control systems, assessments, performance reviews, and inspections were prevalent in all the SOEs. However, issues related to audits were not particularly prominent in the document analysis of SOE 2. Additionally, the findings across the cases suggest a strong focus on monitoring deviations in processes related to customer value creation

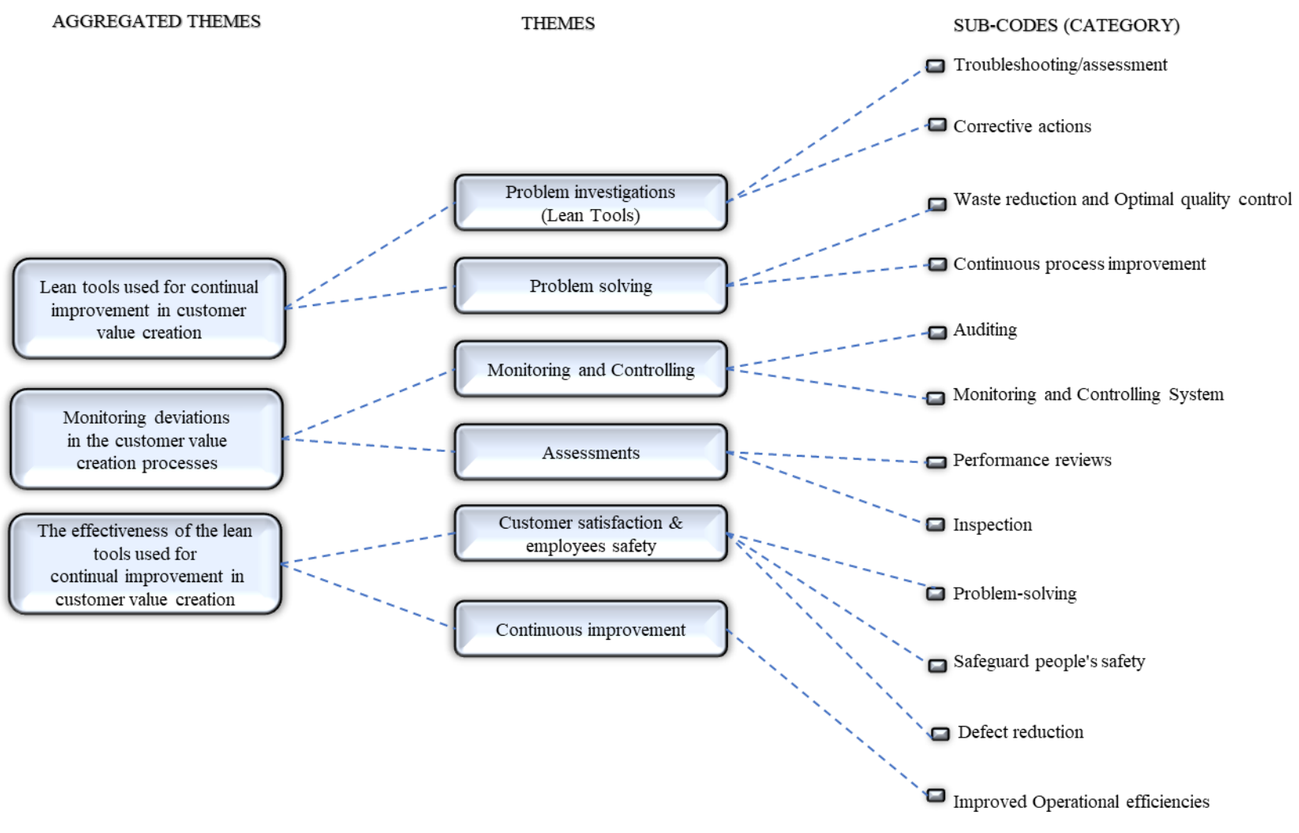
and identifying areas for improvement. The key themes identified include customer satisfaction and problem solving, which are predominant among all the state-owned entities.

5.7 EFFECTIVENESS OF THE LEAN TOOLS USED FOR CONTINUAL IMPROVEMENT IN CUSTOMER VALUE CREATION.

Concerning the effectiveness of lean tools used for continual improvement, the data indicated a direct correlation between the use of lean tools and their effectiveness in addressing problems, improving customer satisfaction, and enhancing value creation processes. Across the cases analysed, several critical factors determine the applicability of lean tools within an organisation. These factors include a consistent emphasis on problem solving and continuous improvement, a proactive approach to monitoring and controlling processes, and the direct impact of lean tools on enhancing customer satisfaction and problem solving. The recurrent presence of these themes underscores their significance in determining the successful application and effectiveness of lean tools within an organisation's operations.

5.7.1 Monitoring deviations in the customer value creation processes

Each organisation utilises problem-solving techniques and monitoring mechanisms to ensure operational efficiency and enhance customer satisfaction. Troubleshooting and waste reduction methods are consistently employed, reflecting a commitment to identifying and addressing operational issues to improve service delivery. Along with performance assessments, monitoring and control systems are utilised to track deviations and drive continuous improvement in customer-centric processes across all three entities. This comprehensive approach underscores the importance of lean methodologies in problem solving, waste reduction, and process optimisation, leading to enhanced customer satisfaction and improved operational efficiencies within these state-owned enterprises.



SOE 1	SOE 2	SOE 3	TOTAL OCCCURRENCES
x	x	x	3
x	x	x	3
x	x	x	3
x	x	x	3
x		x	2
x	x	x	3
x	x	x	3
x	x	x	3
x	x	x	3
x			2
x	x	x	3
x	x	x	3

Figure 31: Model-Cage for findings on critical factors that determine the applicability of lean tools in the public sector across cases.

5.8 FACTORS THAT CAN IMPEDE LEAN IMPLEMENTATION

The third research objective sought to identify factors that can impede successful implementation of lean principles within the public sector environment. In the quest to achieve this objective, the research focused on two main themes, as depicted in Figure 32.

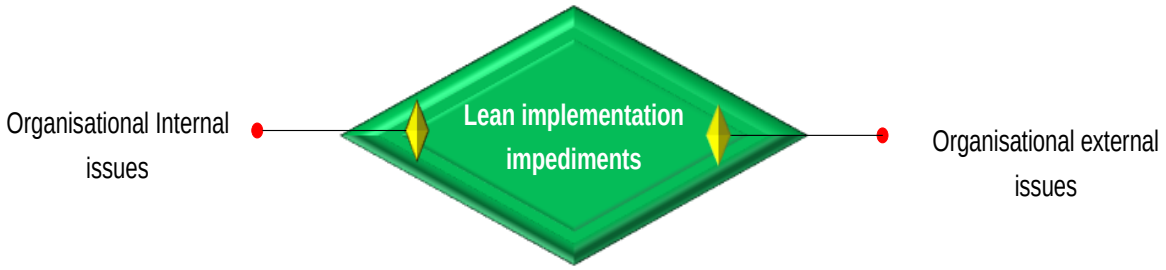


Figure 32: Lean principles implementation impediments (**Source:** Own).

5.8.1 Organisational internal issues

SOE 1: Several internal issues were identified in the document analysed; these issues included human resources, financial constraints, infrastructure, operational efficiency, and integrity. For human resource challenges, training, attraction and retention of critical skills, skills gaps and high employee turnover were the predominant issues that were highlighted. For example, some key excerpts from the corporate plan highlighted the issue of leadership and skills challenges:

> *The high turnover of Group executives causes leadership instability and diluted focus. There is also a high turnover of competent skills that are leaving SOE 1 for better opportunities both locally and globally as the job market improves. Skills gaps and the inability to retain the required skills, as well as vacancies that are not timeously filled, are leading to a growing dependence on the contracting of external skills, which, in turn, are not always at the required levels of proficiency and quality* ***(SOE 1, Corporate Plan FY24-FY28, p. 94).***

The high turnover of group executives in SOE 1 has also been highlighted in the operational plan as a key audit outcome cited in the PFMA audit conducted during the 2020 financial year. : ‘Turnaround plans initiated almost on an annual basis had almost no impact on restoring the SOE environment, as executive and management instability makes it impossible to hold those responsible accountable (PFMA report, 2020)’. This finding suggests that the high turnover of executives within the organisation due to leadership changes According to the organisations integrated reports, the SOE has experienced twelve (12) CEO changes over the past ten years from 2013 to 2023. These changes in leadership result in unstable leadership, which hinders the consistent application and sustained focus on value creation, as continuous commitment and consistent direction from leadership are needed. Furthermore, the departure of skilled employees due to better opportunities impacts SOE 1's talent pool. The data also suggest that, to compensate for internal skill deficiencies, SOE 1 relies heavily on external contractors. However, contracted skills might not always meet the necessary proficiency and quality standards. This dependency could impede the seamless implementation of lean strategies, as it introduces variability in expertise and may not align with the organisation's objectives.

An essential discovery regarding organisational internal factors pertained to training issues. While the document did not explicitly detail the financial allocation for organisational training, it emphasised the critical importance of training and interventions. The focus was specifically on ensuring that employees remain relevant in the face of global technological changes.

…. ensure that employees go through training and interventions to remain relevant to meet global changes ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***

The issue of unavailability of funds was found to be a predominant internal factor mentioned in the organisations document, as it significantly influences the execution of improvement projects. This poses a substantial obstacle to prioritising performance enhancement initiatives, as safety and statutory scopes take precedence over such improvements due to constrained funding.

> *SOE 1 is operating in a constrained environment, with liquidity challenges confronting the company. This has necessitated a reduction in allocated capex, specifically for the execution of improvement and reliability projects, including the required planned outages where safety and statutory scopes are prioritised over performance improvement* ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***

SOE 2: Organisational internal issues include some human resource challenges, operational challenges, and infrastructural challenges. These challenges, as identified in the documents, serve as contingencies that could hinder the effective implementation of lean principles within the organisation. The corporate planning document highlighted how workforce demobilisation affects operational sustainability.

The downsizing of the workforce has a detrimental influence on the execution of plans and strategies within state-owned enterprises (SOEs). This is attributable to the imperative of having a dedicated and proficient workforce for the successful adoption and enduring maintenance of strategic initiatives. According to the Integrated Report of SOE 2 for the year 2022 (p. 23), the demobilisation of the workforce is a major reason why supply commitments were not met. This shows how complex the relationship is between the dynamics of the workforce and the results of operations within an organisation. This underscores the nuanced impact of human resource decisions on the broader organisational landscape, particularly in the realm of strategic implementation and supply chain performance.

> *Workforce demobilisation contributes to non-delivery of supply* ***(SOE 2, Integrated Report, 2022, p. 23)***.

Furthermore, the document highlights substantial inadequacies in infrastructure, encompassing the absence of crucial port equipment, technological challenges, maintenance deficiencies, and concerns associated with the railway asset base. This discovery brings to light a complex infrastructure problem within the organisation. The problems go beyond just not being available; they involve how reliability, age, and limited supply affect each other. The highlighted inadequacies not only pose direct obstacles to operational efficiency but also imply a need for comprehensive interventions addressing the broader spectrum of infrastructure-related challenges faced by the SOE. This insight prompts a deeper consideration of the systemic issues affecting infrastructure resilience and calls for strategic solutions that go beyond addressing immediate unavailability concerns. This is exemplified by the following excerpt:

> *Unavailability of critical port equipment due to poor reliability, aging, and sourcing issues impedes operational efficiency* ***(Integrated Report, 2022, p. 44)***.

SOE 3*:* From the document analysis, several internal issues within the organisation have been highlighted, namely, logistic reliability issues, funding constraints, organisational restructuring

for operational enhancement and digital transformation. The document notes challenges with the chrome and magnetite channels due to locomotive reliability issues. This is attributed to the nonavailability of original equipment manufacturer (OEM) spares and a high incidence of theft and vandalism, indicating logistical and security challenges affecting operational efficiency.

> *The chrome and magnetite channels are also experiencing locomotive reliability issues due to the non-availability of OEM spares and high incidents of theft and vandalism* ***(SOE 3, Strategic Plan, 2022, p. 28).***

Furthermore, the strategic plan indicates that new business initiatives face delays or are not brought to market due to funding constraints. The cost of development is high, while the return on investment (ROI) is uncertain, indicating that financial challenges hinder the development and launch of new products.

> *New business initiatives are not taken to market or extensively delayed because funding is not available to develop the product, and the cost of development is exponential, while the return on investment (ROI) is not realised* ***(SOE 3, Strategic Plan, 2022, p. 10).***

5.8.2 Organisational external issues

SOE 1: Organisational external issues encompass environmental factors and regulatory and political factors. Several environmental factors emerged from the data, including weather conditions and climate change, which are associated with a risk of load loss, negative emissions, and other environmental requirements. Additionally, an organisation's compliance with stringent environmental regulations imposes limitations on plant output, demanding prolonged outages and substantial funding for projects, thereby constraining the organisation's operational efficiency (SOE 1, Corporate Plan FY24-FY28, p. 107).

> *Compliance with environmental requirements places a limitation on plant output in certain cases. Long-duration outages, unfavourable economic, and extensive funding are required for the projects.* ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***

Furthermore, other external factors, such as stakeholder engagement, public policies, and regulatory issues, significantly impact SOE 1's operational strategies, reflecting the contextual

interdependence between the organisation and its surrounding environment. Stakeholder engagement emerged as a pivotal factor for the organisation's sustained revenue generation. As highlighted in Corporate Plan FY24-FY28, the need for long-term engagement with stakeholders is an essential aspect of establishing a prudent and efficient revenue price path.

> *Engage with stakeholders for a long-term generation revenue price path at prudent and efficient cost-reflectivity, including legacy and capacity costs. This is essential to enable the servicing of generation debt and to avert placing an additional burden on an already constrained national Treasury* ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***

SOE 2: The statement from SOE 2's integrated report represents recognition of the external issues that affect the organisation's operations, namely, strategy and an overall value creation model. The company acknowledges that external factors such as trading conditions, resource availability, societal developments, and climate change have crucial roles in shaping its operations. Furthermore, the excerpt from the document highlights a recognition by the SOE regarding the impact of economic fluctuations, market dynamics, and customer requirements on its activities and outcomes.

> *We have identified the material external issues that create risks and opportunities for our business model, operations, and strategy, such as trading conditions, the availability of resources, societal changes, and climate change.* ***(SOE 2, Integrated Report, 2022, p. 85).***

5.9 CROSS-CASE ANALYSIS: FACTORS THAT CAN IMPEDE LEAN IMPLEMENTATION.

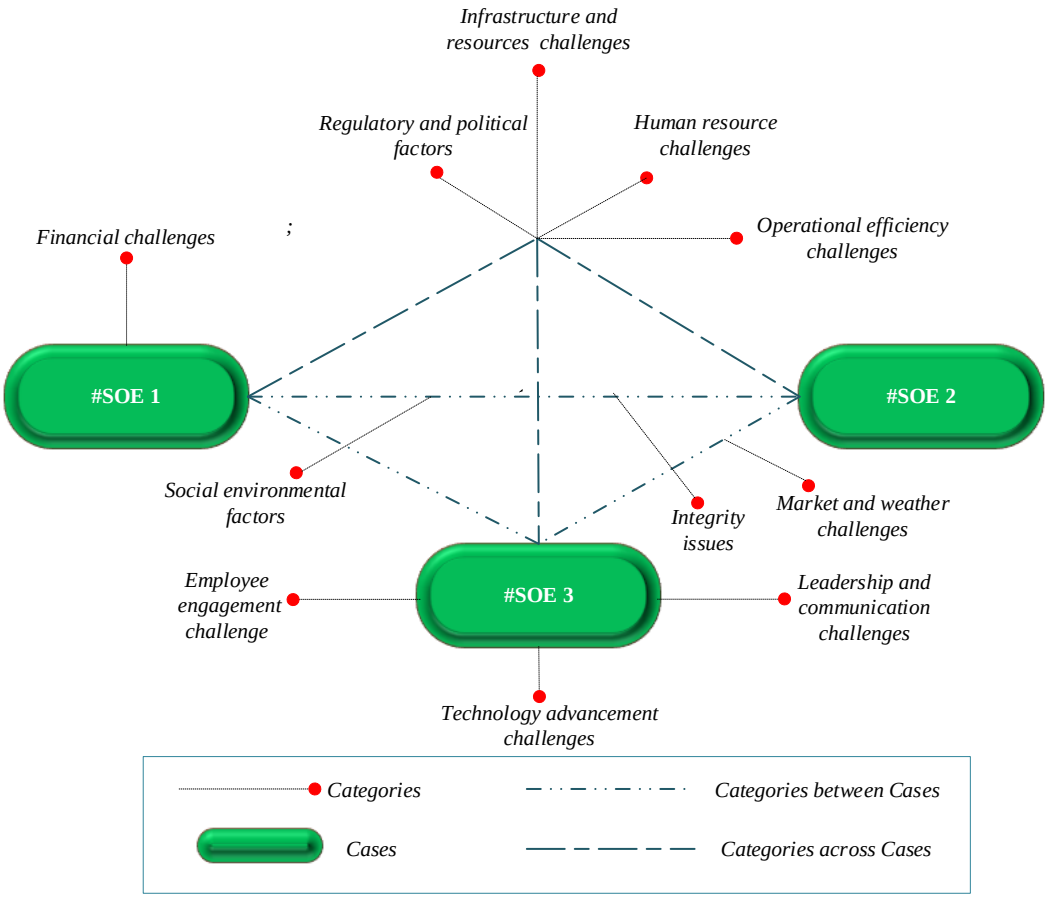


Figure 33: Model-Cage for the emergence of themes on lean principles impediments across the cases

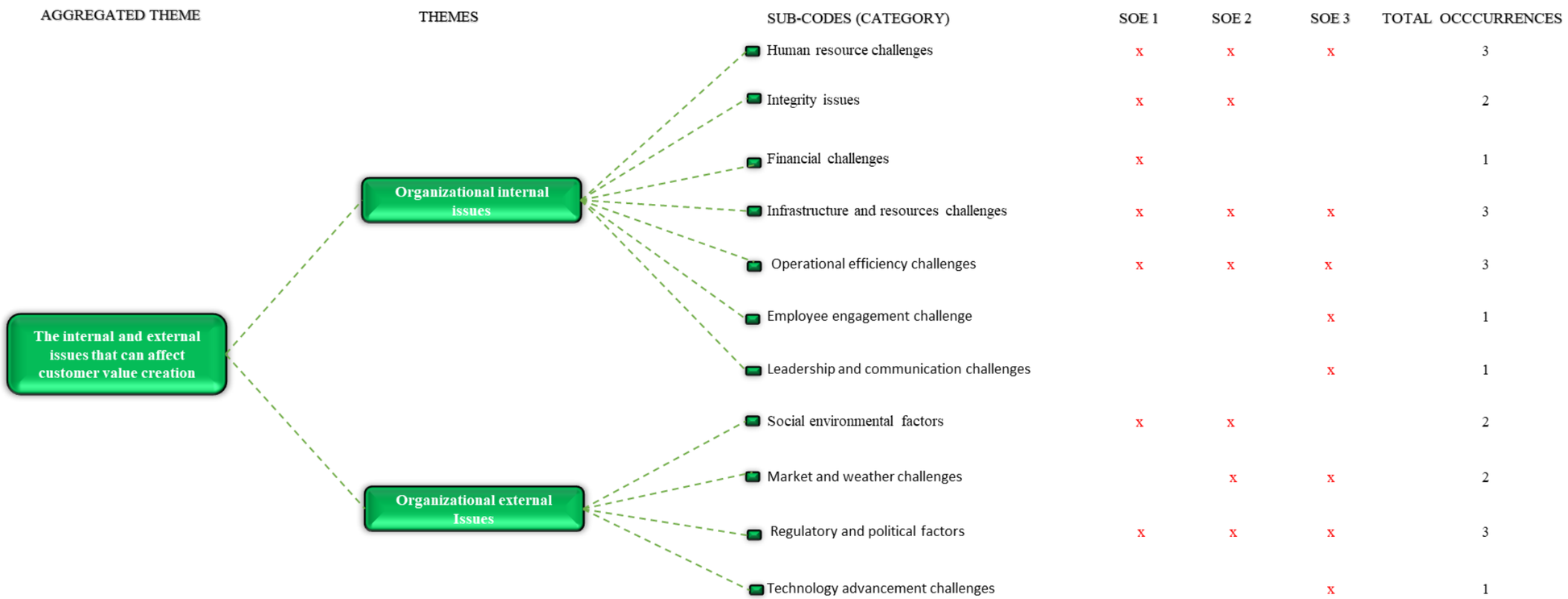


Figure 34: Model-Cage for findings concerning the implementation of lean principles within the public sector environment across cases.

5.9.1 Cross-case analysis (SOE1-SOE 3)

The issues that can impact the successful implementation of lean principles from the three SOEs emerge from the context of the organisation. The organisational context comprises internal and external issues that affect the ability of organisations to create value for customers.

5.9.1.1 Internal issues

There is a similar description across the three SOEs of the extent to which the participants are aware that external and internal issues can change and therefore should be monitored and reviewed. Although there are similarities in operational challenges and importance placed on external monitoring, each SOE has a unique set of internal issues and strategies for adapting to external factors, emphasising the multifaceted nature of challenges and approaches in different organisational contexts.

Comparing the results, operational inefficiencies, financial constraints, and infrastructural limitations were prevalent in SOE1 and SOE2. However, SOE3 emphasised logistical reliability issues, security challenges, and infrastructure limitations. However, maintenance issues, technological limitations, and the unavailability of critical equipment were consistent issues across all three SOEs, impacting operational efficiency and reliability. While document analysis highlighted issues such as funding constraints and logistical challenges impacting lean implementation, interviews in SOE3 shed light on communication and cultural hurdles not explicitly documented. This divergence suggests that nondocumented factors, such as communication issues and cultural barriers, also hinder lean implementation.

5.9.1.2 External issues

Another interesting observation was that all three SOEs recognise the significance of external monitoring for adapting to changing environments and market dynamics. Stakeholder engagement, PESTEL analysis, and market/customer feedback are essential for strategic planning.

5.10 LEAN STRATEGIES USED TO ELIMINATE WASTE IN THE PUBLIC SECTOR

This question aimed to determine appropriate lean strategies that can be used to eliminate waste in the public sector with the aim of answering research objective 4 of the study. To answer this question, the study focused on two aggregated themes that emerged from the data, namely, identification of waste or non-value-adding activities in the customer value creation processes and lean strategies used to eliminate waste in customer value creation, as highlighted in Figure 35

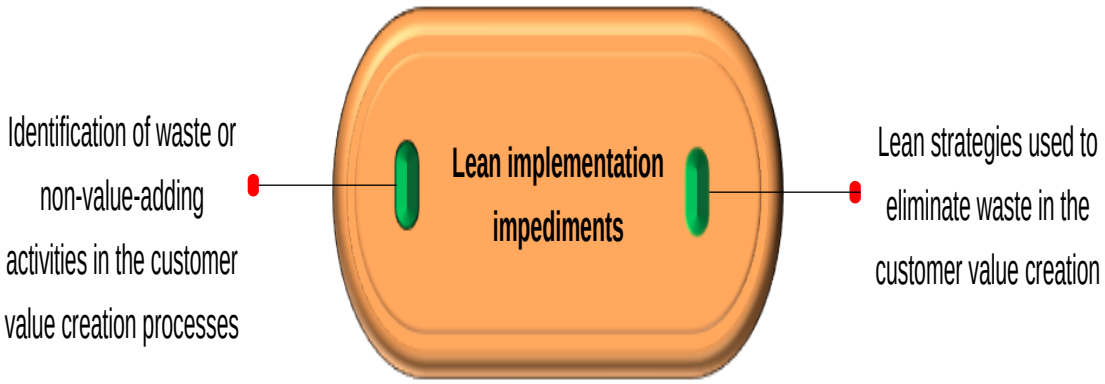


Figure 35: Lean strategies used to eliminate waste in the public sector (*Source:* **Own**).

5.10.1 Identification of waste or non-value-adding activities in the customer value creation processes

SOE 1: Based on the document review conducted from SOE 1's Integrated Report FY24-FY28, there are clear indications of the different types of waste or non-value-adding activities within the organisation. Different categories of waste were identified, namely, waiting or delays, unnecessary motion, operational inefficiency, plant breakdowns, and defects. This breakdown aligns with lean principles of reducing various forms of waste in processes as defined by Mungovan (2009). The integrated report of SOE 1 outlines some major projects that are underway to increase grid capacity. However, delays in the decision-making process, regarding when to commence projects, directly impact their outcomes; specifically, delays in initiating construction projects lead to missed timelines and budget overruns that detract from the overall success of the project. This delay likely affected the synchronisation of various project phases, leading to challenges in design implementation and execution. The following excerpt is provided from the document:

> *Some Business units have not delivered on expectations due to critical shortcomings in project planning, design, and execution, a direct consequence of the delay in the decision to commence building.* ***(SOE 1, Integrated Report FY24-FY28, p. 10)***

The corporate planning document excerpt outlines the primary focus of the project department within SOE 1, emphasising the objective of executing technical plan projects within specified timeframes, costs, and quality benchmarks. In simpler terms, the department's core aim is to successfully manage and complete various projects while adhering strictly to predetermined criteria regarding time, budget, and quality. Although reference is made to a standardised framework (project life cycle model) or methodology that guides the entire project management process, there is no mention in the operational plan of project performance or delays that occur in the operationalisation stages of the projects, making it difficult to expand on the understanding provided in the organisation's integrated report on project delays. By incorporating project performance metrics and an operational plan that outlines the specific activities during the operationalisation stages, the department may enhance its project management process and mitigate potential delays in the future. The excerpt below from the operational plan of SOE 1 supports the above assertion:

> *The focus of the Projects department is to execute Technical Plan Projects within the time, cost and quality requirements specified for each of the projects according to the latest revision of the Gx Project Life Cycle Model* ***(SOE 1, Operational plan, FY22, p. 16)***.

Findings from the document analysis also highlighted waste from operational inefficiencies such as inventory management, where there is lack of compliance when orders are placed. The report highlights incidences of theft and preservation of spares and warehouse management within the organisation, leading to financial losses and resource wastage. The lack of effective control mechanisms and noncompliance with established norms and standards for inventory management were highlighted as significant challenges. Without proper controls and adherence to industry standards, the organisation is susceptible to inventory discrepancies, mismanagement, and potential regulatory issues. Other issues that emerge as waste include overstocking, unnecessary expenditures, and the risk of items becoming obsolete or stolen due to inadequate oversight and insufficient inventory checks. The following excerpts from the document support the abovementioned issues:

Inventory, spares, and warehouse management with poor control; lack of compliance with norms and standards relating to inventory management; and cases where orders are created for store items without first checking the inventory levels result in the business spending more money on items idling in the stores or being stolen ***(SOE 1, Integrated Report FY24-FY28, p. 176).***

The results of the analysis also revealed that some of the operational inefficacies are related to energy availability factors (EAFs). There has been a notable decline in the organisation's EAF (a decrease in the actual available energy output compared to the potential maximum output) since FY13, as shown in Figure 36. The organisation has not recovered from its declining EAF by FY22, largely due to the increase in other losses experienced across the SOE. The EAF measures the efficiency and reliability of power plants in providing electricity. This decline signifies operational inefficiencies, maintenance issues, or other factors affecting plant performance. This observation is illustrated in Figure 36 and in the following excerpts:

The organisation has not recovered from its declining Energy Availability Factor (EAF) since FY18 [for five-year report period], this being largely due to the increase in UCLF experienced across all its business units. Planned losses (PCLF) has been higher than unplanned losses (UCLF) since FY00 however, in FY13 the trend changed and the organisation has not recovered ***(SOE 1, Integrated Report FY24-FY28, p. 51).***

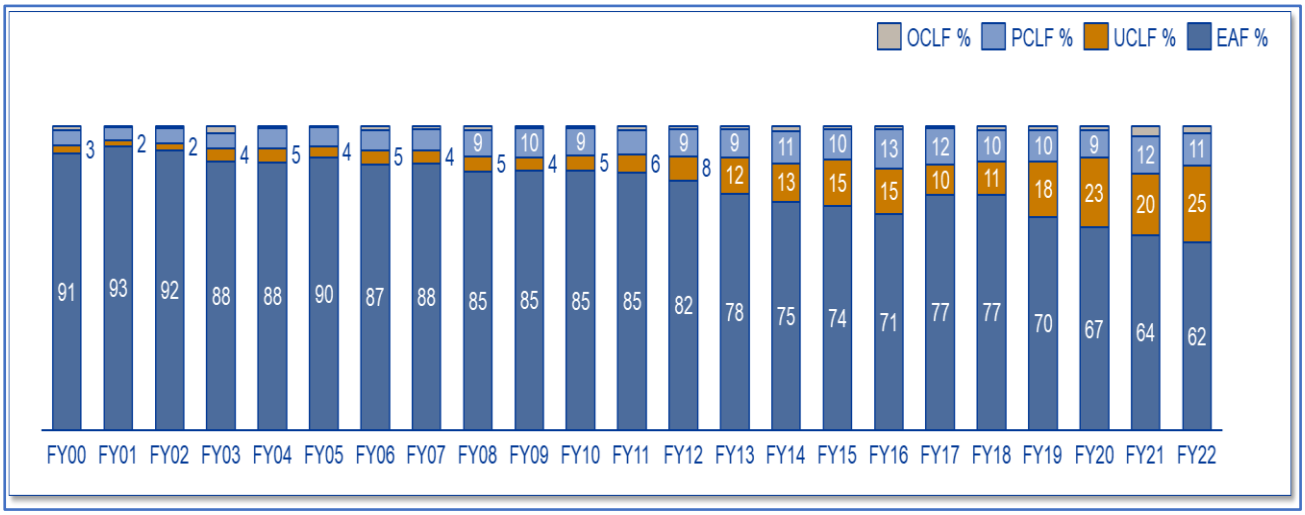


Figure 36: Energy availability losses over the past twenty-two years **(Source:** Organisational Documents).

Furthermore, illegal connections, theft, and vandalism contribute to wastage. These illegal connections, particularly in impoverished areas, draw power without accountability. Residents

tap into the power lines without authorisation, leading to substantial electricity theft, losses and a shortage of resources for the SOE. In addition, theft and vandalism not only result in direct material losses but also require additional replacement resources (such as spares and equipment) for repairs, which could have been allocated more effectively elsewhere. Additionally, vandals target transformers and substations, causing costly damage that further strains the company's already limited resources. Consequently, SOEs face an ongoing financial burden and struggle to meet the energy demands of legitimate customers, hindering economic growth and development in the region. Illustrated in the quotation below from the documented analysis is how the issue of illegal connection affect the SOE:

> *However, concerns remain around breakdown of networks due to overloading caused by illegal connections, theft and vandalism of electrical equipment, and challenges in restoring supply to unsafe areas* ***(SOE 1, Integrated Report FY24-FY28, p. 53)***.

Finally, several aspects contribute to the financial challenges that can be seen as sources of waste or inefficiency in SOE 1. These financial challenges are further exacerbated by the organisation's inability to implement effective cost-cutting measures. The lack of cost-reflective tariffs has limited SOEs' ability to generate sufficient revenue to cover their expenses. In addition, the high cost of using diesel turbines as a backup power source adds to the financial burden, as it increases the company's operational costs. Moreover, the escalating arrear municipal debt puts additional pressure on the organisation's financial stability, making it difficult to meet its financial obligations. Overall, these factors contribute to the unsustainably high levels of debt servicing costs that can be seen as sources of waste or inefficiency:

> *Financial performance is similarly constrained, with profitability negatively affected by a lack of cost-reflective tariffs, the high cost associated with the use of diesel turbines to supplement electricity supply during times of generation constraints, the continued escalation in arrear municipal debt, and unsustainably high levels of debt servicing costs* ***(SOE 1, Integrated Report FY24-FY28, p. 81).***

The operational plan also highlighted that the SOE exceeded the targeted annual usage of diesel in terms of volume usage for the financial year ending in 2023, which provides a clear view of what is highlighted in the integrated report relating to high fuel (diesel) usage. Furthermore, a

linear projection outlined in the operational plan shows that, at the current fuel oil costs, the SOE will overspend R4.6 bn for FY 23. This projection raises concerns about the financial sustainability of the SOE and calls for immediate cost-cutting measures to be implemented. The operational plan suggests exploring alternative energy sources and investing in fuel-efficient technologies to mitigate the escalating costs and reduce the environmental impact of excessive diesel usage. Additionally, the plan emphasises the importance of regular monitoring and evaluation of fuel consumption to identify areas for improvement and ensure efficient resource allocation in the future. Table 18 provides an overview of the waste generated in SOEs based on their expenditures on fuel usage.

Table 18: Fuel oil usage in SOE 1 during the FY23 period **(Source:** Organisational Documents)

F2023 YTD Actual Tons	F2023 Annual Target Tons	F2023 YTD Actual Rands (millions)	F2023 Annual Target Rands (millions)	% Spend above target expenditure	Rank
25 105	25 751	R 398	R262	160%	5
6 346	16 133	R 198	R167	103%	9
24 763	43 102	R 394	R455	49%	11
6 178	7 836	R 109	R90	107%	8
42 273	37 859	R 617	R394	168%	4
16 665	30 378	R 107	R259	-29%	14
37 714	25 906	R 397	R221	207%	3
32 705	21 258	R 382	R207	217%	2
581	8 562	R 8	R85	-83%	16
16 055	36 001	R 183	R313	0%	13
7 370	8 616	R 98	R70	142%	7
89 912	49 338	R 1 305	R461	386%	1
5 218	7 476	R 75	R77	66%	10
17 171	17 411	R 251	R171	151%	6
11 741	45 756	R 150	R453	-43%	15
43 757	79 891	R 597	R761	35%	12
383 552	461 274	R 5 269	R4 446	103%	
		-R 2 676			

Table 18 outlines the total fuel oil usage in the top 5 countries in terms of waste in terms of spending above the targeted expenditure, highlighting the total fuel oil usage and volume usage in YTD. For example, number 1 surpassed its annual target usage by 386%, with a total volume usage of 89 912 units year to date. Similarly, number 2 exceeded its target by 217%, recording a volume usage of 32 705 units year to date.

SOE 2: Findings from the document analysis indicate multifaceted waste within SOE 2's operations, covering waiting times, inefficiencies, integrity issues, operational disruptions, and defects. For example, document analysis revealed that SOE 2's procurement process was riddled with delays and excessive waiting times, leading to missed opportunities and increased costs. Additionally, it uncovered instances of operational disruptions caused by inadequate maintenance practices, resulting in frequent breakdowns and production losses. Delays in the procurement of long-lead items due to global challenges directly impact the organisation's costs and turnaround time and ultimately result in the non-delivery of strategic objectives.

> *Delays in procurement of long-lead items due to global challenges increase costs, turnaround time, and non-delivery of strategic objectives,* ***(SOE 2, Integrated Report, 2022, p. 45).***

In addition, the revelation of R105bn in irregular and fruitless expenditures underlines financial mismanagement and possible inefficiencies within the organisation. These statistics indicate inefficiencies and poor use of resources, which correspond to recognised waste categories such as operational inefficiency, irregular expenditure, and fruitless/wasteful expenses, as indicated in the analysis:

> *"SOE 2 disclosed R105 billions of irregular expenditure, fruitless and wasteful expenditure"* ***(SOE 2, Condensed Financial Report, 2022, p. 58).***

Moreover, the findings include challenges such as vandalism, cable theft, intermittent power cuts, maintenance backlogs, and breakdowns affecting operational performance. Waste categories such as plant breakdowns, integrity problems, and operational inefficiencies are directly related to the impacts mentioned above, which include supply chain bottlenecks and reputational risks.

> *The company is exploring various strategic initiatives hamstrung by challenges in our operating environment, such as cable theft, vandalism, breakdowns and maintenance backlogs* ***(SOE 2, Integrated Report, 2022, p. 55).***

SOE 3: From the extracted data within the SOE 3 operational plan, a consistent theme of waste emerges, vividly depicted through financial and operational setbacks. The mention of payment backlogs exceeding R1 billion to crucial suppliers during the 2018–19 fiscal year portrays an evident strain on operational capacity, signifying inefficiencies in financial management or

logistical processes. The non-payments of suppliers within the organisation may lead to a range of adverse consequences affecting operations and strained relationships with suppliers, resulting in delays or disruptions in the procurement of essential goods or services. The corporate plan indicates that such a backlog has impacted the ability to maintain operations within the organisation. The direct excerpt from the operational plan is used as evidence of waste in the form of backlogs within the organisation.

> *The payment backlog to critical suppliers peaked at over R1 billion during the 2018–19 FY, which further restricted the operating environment.* ***(SOE 3, Corporate Plan, 2022, p. 103)***.

Additionally, the plan mentions a lack of accountability and oversight in procurement practices, leading to inflated costs and questionable contracts being awarded to preferred suppliers. The operational plan details an allocated amount of R132 million for the 2022 financial year, designated fruitless and wasteful expenditures awaiting write-off. The allocation of such a substantial amount as fruitless and wasteful expenditure highlights a serious issue of waste within the organisation. This allocation signifies that a significant portion of financial resources has been utilised in a manner that does not yield any value or benefit to the organisation and, as such, can be classified as waste from a lean perspective. This allocation of funds could have been better utilised for essential projects or investments that would benefit the organisation and its stakeholders. These excerpts, which are illustrated below, collectively highlight systemic challenges within SOE 3, where financial setbacks and operational inefficiencies contribute to significant waste and adversely affect the organisation's operational capabilities and value creation.

> *The amount of R132 million for the 2022 financial year relates to fruitless & wasteful awaiting write-off for SAPO Group* ***(SOE 3, Operational Plan, 2022, p. 93)***.

Another finding that emerged in the operational plan concerning waste within SOE 3 was the imbalance within the workforce, where more staff were placed in areas or departments with low demand and there was a shortage of staff in high-demand regions. This type of imbalance in resource allocation results in inefficiencies and inadequate utilisation of human resources, impacting productivity. This imbalance can be classified as waste of resources, particularly waste caused by unevenness or overburden. Furthermore, the findings also indicate the absence of sufficient tools that are designated for official use. This absence of tools directly contributes

to the inefficiency caused by waiting, as employees are unable to perform their tasks effectively due to the lack of necessary tools or resources. Although the duration of this waiting period is not mentioned in the operational plan, such waiting has the potential to diminish productivity and impact operational efficiency. (waste). For example, the following excerpt from the operational planning document states the following:

> *However along with the vacancy issue, the organisation's workforce is also unbalanced, meaning there are more staff in areas with low demand and vice versa. Most staff also don't have adequate tools of trade which further impedes their effectiveness and productivity* ***(SOE 3, Strategic Plan, 2022, p. 94)***

5.10.2 Lean strategies used to eliminate waste in customer value creation.

SOE 1: Several strategies and changes in approaches are inferred from SOE 1's efforts to eliminate waste and enhance operational efficiency. The findings revealed that the legal support for a revenue collection strategy is one of the strategies employed by the organisation. Concerning this strategy, the data reveal that the affirmation of SOE 1's legal right to receive payment from municipalities is a significant step in improving revenue collection. This legal reinforcement could reduce the financial waste caused by outstanding payments to improve cash flow and ensure that resources are utilised efficiently. Furthermore, legal support for the revenue collection strategy will also enable SOE 1 to take legal action against delinquent municipalities, thus deterring them from defaulting on their payments. This not only helps reduce outstanding payments but also sends strong messages to all municipalities to fulfil their financial obligations. By strengthening its legal rights, SOE 1 can ensure a more streamlined and efficient revenue collection process, ultimately leading to improved financial stability and better allocation of resources for the organisation. The reference to this strategy is as outlined in the quote below:

> *Various strategies are being considered in collaboration with National Treasury. The organisation's legal right to receive payment from municipalities was affirmed by the Supreme Court of Appeal, which sets a positive precedent for revenue collection efforts* ***(SOE 1, Integrated Report FY24-FY28, p. 81)***.

In addition to this strategy, other strategies that the SOE developed involved a revised mandate for procurement oversight. This includes shifting the approval of procurement transactions away from the board to emphasising oversight through the approval of procurement strategies, which indicates a focus on streamlining and optimising the procurement process. This shift could reduce delays caused by bureaucratic approval processes and ensure that procurement aligns more closely with strategic goals, thus minimising waste of resources and time.

> *As mentioned, the mandate of investment finance committee (IFC) has been revised to remove the board's involvement in the approval of procurement transactions and, instead, emphasise oversight through the approval of procurement strategies* ***(SOE 1, Integrated Report FY24-FY28, p. 81)***.

SOE 2: The SOE has formulated strategies that could assist in improving value creation and eliminating waste. Although the strategies are not specified as lean strategies in the organisational documents, the broader focus of the strategies is on streamlining processes and increasing efficiency. Furthermore, these strategies are formulated and approved at the board level. However, the input from stakeholders (employees, customers, and investors) to ensure a comprehensive approach to decision-making is not specified in the integrated report. Inclusive stakeholder input is crucial for comprehensive decision-making and ensuring that diverse perspectives and insights are considered in strategy formulation. This absence of specified stakeholder involvement in the report might imply a potential gap in the organisation's approach to decision-making, as it could benefit from incorporating a more diverse range of viewpoints for a more well-rounded and holistic strategy development process.

> *The Board holds strategy workshops and deep dive sessions where matters of a topical and strategic nature are discussed in detail. Initiatives and recommendations from these sessions are then formulated into strategies and plans and submitted to the board for formal consideration.* ***(SOE 2, Integrated Report, 2022, p. 25).***

The findings from the integrated report of SOE 2 highlight the operationalisation of the strategies, particularly citing the 4-point turnaround strategy, whose aim is to improve the efficiency and effectiveness of core divisions within the organisation.

The 4-point turnaround strategy aim to assist the organisation to redirecting and re-engineering the business, with the major focus on improving efficiency and effectiveness of core divisions ***(SOE3, Integrated Report FY22).***

5.10.3 Cross-case analysis

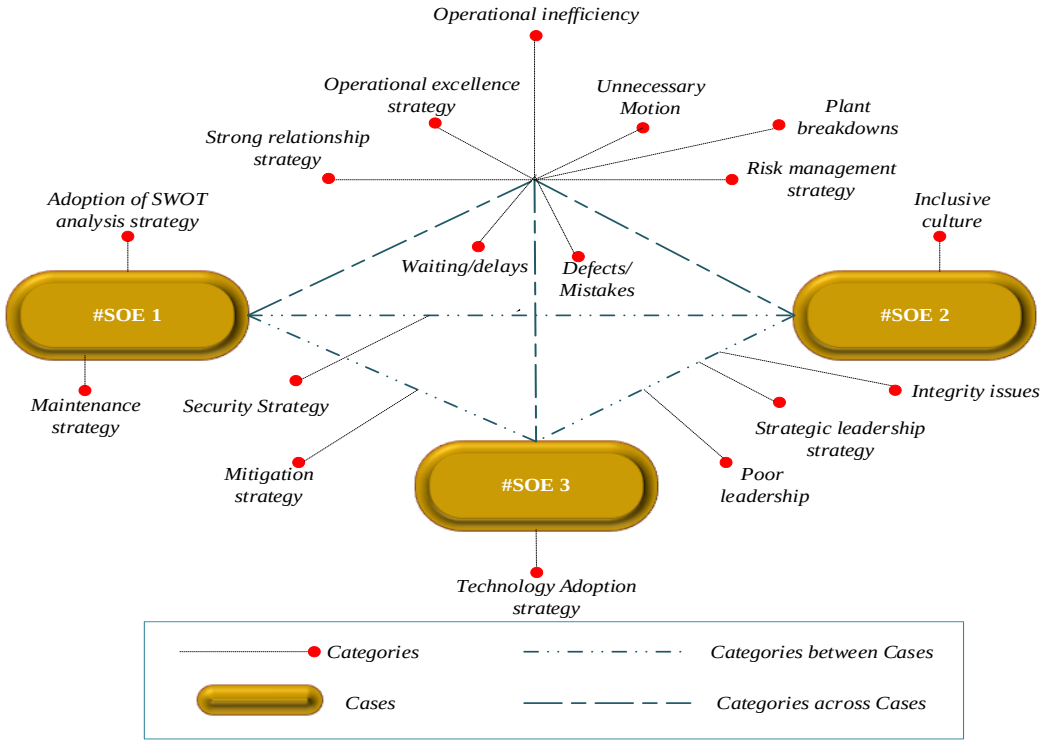


Figure 37: Model-Cage for the emergence of themes on waste and lean strategies used to eliminate waste in the public sector across the cases.

5.10.3.1 Identification of waste or non-value-adding activities in the customer value creation processes

Similarities

All three SOEs exhibit common issues, including delays in processes, long waiting times, excessive paperwork, delivery delays, low employee productivity, and high error rates. These inefficiencies span various stages of operation. These non-value-adding processes are prevalent in all three SOEs. The issues vary in severity and impact across different stages of operation, potentially making some SOEs more efficient than others in certain areas. For example, in the case of SOE 2, delays in processes and delivery delays were more prevalent in the logistics and distribution stage, resulting in longer wait times for customers receiving

their goods. On the other hand, in the energy SOE, excessive paperwork and high error were more common in the billing and invoicing stage, leading to inaccuracies in customer bills and potential revenue loss. Furthermore, SOE 2 was the only SOE that demonstrated leadership and integrity challenges that potentially hindered operational efficiency.

Obsolete technology is highlighted as a significant contributor to waste across SOEs, leading to inefficiencies in service delivery and extended waiting times. This issue was particularly evident in SOE 3, where outdated equipment and systems hindered the speed and accuracy of order processing. This not only caused frustration for customers but also resulted in increased costs for the organisation due to the need for manual intervention and error correction. Waiting and delays are common among all SOEs. Similarly, SOE1 had issues with obsolescence spares that led to plant unavailability. Additionally, the lack of proper maintenance and replacement of obsolete spares in SOE 1 led to frequent breakdowns and plant unavailability, further exacerbating waiting and delay issues. This not only disrupted production schedules but also increased costs for the company as emergency repairs and replacements had to be made. Overall, these inefficiencies in customer value creation and service delivery across all SOEs highlighted the urgent need for modernisation and investment in up-to-date equipment and systems to improve efficiency and reduce waste.

Irregular expenditures, fruitless spending, and procurement delays due to global challenges contribute to financial waste and inefficiencies across SOEs. These financial mismanagement issues further exacerbated the existing problems within SOEs. The irregular expenditures and fruitless spending drained the company's resources and hindered its ability to invest in much-needed upgrades. Additionally, the procurement delays caused by global challenges resulted in missed opportunities and hindered the company's ability to compete in the market. Thus, addressing these financial inefficiencies is crucial for the long-term sustainability and success of SOEs.

Each SOE faces unique challenges: SOE 1 grapples with top-down strategies impacting artisans' contributions, while SOE 2 faces significant infrastructure and system-related challenges. SOE 3 highlights issues such as criminal conduct and inventory demand management. These specific industry challenges further compound the financial inefficiencies faced by SOEs. In the case of SOE 1, the top-down strategies hinder the artisans' ability to contribute effectively, leading to a decrease in productivity and profitability. SOE 2's infrastructure and system-related challenges not only result in procurement delays but also

impact the overall operational efficiency of the company. Finally, SOE 3's criminal conduct and inventory demand management issues not only led to financial losses but also damaged the reputation of the company. Therefore, addressing these specific industry challenges is essential for improving the financial performance and competitiveness of SOEs.

SOE 2 emphasises maintenance backlogs, downtime, and safety concerns, impacting both operations and customer service, whereas SOE 1 emphasises challenges arising from managerial decision-making. These challenges include poor resource allocation, ineffective cost control, and lack of strategic planning. By addressing these issues, SOE 1 can improve decision-making processes, streamline operations, and enhance overall efficiency. Additionally, implementing proactive maintenance strategies and prioritising safety measures can help SOE 2 minimise downtime, reduce maintenance backlogs, and ensure a safe working environment, ultimately leading to improved customer satisfaction and increased competitiveness in the industry.

SOE 3 addresses specific waste issues, such as rework due to error rates, delays, and train cycle times, highlighting intricacies within their operational processes. By analysing error rates and identifying the root causes of rework, SOE 3 can develop targeted solutions to eliminate these inefficiencies. Additionally, focusing on reducing delays and optimising train cycle times will result in faster and more reliable service for customers. These process-specific improvements will not only enhance overall efficiency but also increase productivity and profitability for the company. These issues, categorised into different types of waste across organisations, can be addressed through the application of various lean tools and principles, as shown in Table 19:

Table 19 : Types of waste in the state-owned entities (**Source:** Organisational Documents)

Types of waste	**SOE 1**	**SOE 2**	**SOE 3**	**Lean Tools and Principles for Reduction**
Operational Inefficiencies	Top-down strategies not involving artisans; Managerial decisions impacting operations	Delays in procurement; Maintenance backlog; System inefficiencies	Delays in train cycles; Rework due to errors; Cable theft	Process optimisation; Continuous improvement methodologies; Employee involvement

Technology Obsolescence	Lack of involvement in strategy formulation; Tools not aligned with employee needs	Obsolete technology causing delays; IT hardware failures	Outdated systems leading to delays; System glitches	Technology adoption ; Modernisation stratégies; Infrastructure development
Financial Mismanagement	Lack of transparency in strategic planning; Ineffective resource allocation	Irregular expenditure; Procurement delays	Irregular expenditure; Inefficient inventory planning	Financial planning tools; Better procurement practices; Resource optimisation
Employee Productivity	Limited input in strategy; Inefficient processes affecting productivity	Maintenance backlog affecting capacity; Delays impacting productivity	Error rates affecting efficiency; Lack of effective tools	Employee training on lean methodologies; Process efficiency improvements
Customer Service Delays	Strategies not aligning with customer needs	Procurement red tape affecting efficiency	Train cycle delays impacting customer service	Customer-centric process design; Streamlined procurement procedures

5.10.3.2 Lean strategies used to eliminate waste in customer value creation.

All SOEs acknowledge the importance of technology adoption for streamlining operations and addressing inefficiencies caused by obsolete systems. Strategies involving continuous improvement methodologies such as Lean Six Sigma, process optimisation, and efficiency improvement are emphasised across SOEs. Although some of the strategies were not expressed as lean or given the name lean, it is clear across SOEs that some lean tools, such as root cause analysis, total quality management, Gemba plant walks, and 5S methodologies, are employed. Each SOE emphasises aligning strategies with organisational goals and capabilities, ensuring that their initiatives resonate with their objectives and operational realities.

SOE 1 and SOE 3 expressed concerns about top-down strategy implementation without employee involvement, whereas SOE 2 involved various departments in strategy formulation and alignment. While technology and continuous improvement are common, SOE 2 places a strong emphasis on security policies and infrastructure development to counteract theft and improve operations. SOE 1 emphasises the need for more inclusive managerial decisions impacting artisans' contributions.

The strategies of SOE 3 are more tailored to address railway-specific issues such as cable theft and train cycle times, focusing on efficiency within its unique operations. In summary, while the three SOEs share commonalities in identifying waste and employing lean strategies for waste elimination, their unique operational contexts lead to varied emphases in strategy formulation and execution, reflecting the specific challenges faced within their industries and organisational structures. The approaches to addressing waste and inefficiencies demonstrate a mix of common methodologies and context-specific interventions tailored to their respective operational landscapes.

Table 20: Lean strategies across SOEs (**Source:** Organisational Documents)

Lean Strategies	**SOE 1**	**SOE 2**	**SOE 3**
Continuous Improvement	Empowering employees to contribute to process optimisation	Driving efficiency improvements, aligning strategies with operational needs	Fostering a culture of continuous improvement among employees
Technology Adoption	Implementing digital tools for operational excellence	Implementing technology strategies and governance to support work practices	Aligning port strategies with the overall organisational strategy
Strategic Planning	Involving frontline employees in strategy formulation	Aligning strategies with corporate customers and best practices	Developing policies to address cable theft and security issues
Performance Measurement	Using lean tools and Six Sigma applications to drive efficiency	Ensuring timely and cost-efficient project completion	Conducting regular environmental scans for objective assessment
Employee Involvement	Involving artisans in strategy discussions and decision-making	Incorporating input from various departments in strategy development	Engineers providing input on resource allocation for projects

AGGREGATED THEMES	THEMES	SUB-CODES (CATEGORY)	SOE 1	SOE 2	SOE 3	TOTAL OCCCURRENCES
Identification of waste or non-value-adding activities in the customer value creation processes	Waste of lean	Waiting/delays	x	x	x	3
		Unnecessary Motion	x	x	x	3
		Operational inefficiency	x	x	x	3
		Plant breakdowns	x	x	x	3
		Defects/Mistakes	x	x	x	3
		Poor leadership		x	x	2
		Integrity issues		x	x	2
Lean strategies used to eliminate waste in the customer value creation	Continuous performance measurement	Risk management strategy	x	x	x	3
		Environmental scan strategy	x	x		1
		Mitigation strategy	x		x	2
	Continuous performance improvements	Operational excellence strategy	x	x	x	3
		Strong relationship strategy	x	x	x	3
		Security Strategy	x	x		2
		Resource planning strategy	x	x	x	3
		Maintenance strategy	x			1
		Inclusive culture		x		1
		Strategic leadership strategy		x	x	2
		Technology Adoption strategy			x	1

Figure 38: Model-Cage for findings on waste and lean strategies used to eliminate waste in the public sector across the cases

5.11 INTERVIEW ANALYSIS

Following the document analysis, semi structured interviews were conducted with purposively selected participants from the three state-owned entities**.** The findings follow the same sequence as the objectives stated in Chapter 1. First, the study presents an analysis of each of the three case studies, followed by a cross-case analysis, which includes a comparison of the individual case studies by study objective. The researcher conducted a total of 30 interviews across the three state-owned entities, and all the interviews were recorded and transcribed verbatim. The researcher confirmed that the transcriptions were accurate by listening to the recorded interviews and checking for any information that could have been left out or erroneously captured. The data analysis began after the first interview. The crucial insights, findings, and recurring themes from the document analysis formed the foundation for follow-up questions to add depth to the interviews. From the interview data, codes were generated, and categories and themes were created based on the codes. The interview transcripts and the themes were subsequently sent to the participants for member checking and confirmation of accuracy.

5.11.1 Demographic information

In this section, the various demographics of the research cases, participants, and document reviews are presented. Table 21 provides a summary of the provision of labels for state-owned entities and participants as well as the participants' positions, years of experience, and qualifications.

The research participants hold different positions within the respective state-owned entities: as outlined in Table 21. The objective of incorporating participants with a diverse range of positions was to acquire comprehensive insights into the operational framework of the organisation, as well as the various interconnections it has with other processes and stakeholders in the process of value creation. By incorporating a broader spectrum of participants, the researcher was able to access the knowledge and insights of individuals who had a heightened awareness of certain inefficiencies, bottlenecks, and causes of waste within their various departments and processes. This assisted the researcher to gain insights to research the primary research objective of how lean manufacturing principles can be adapted for the organisations.

Information related to the work experience of participants and the type of participants who work at the respective state-owned entities was also relevant data that were sourced. The work experience of participants offered valuable insights into their level of familiarity with lean principles and their exposure to various processes of the organisations, existing strategies, and plans, as well as the tools that are used to improve the processes. As can be seen from table 21, the average experience in years for skilled and semi-skilled employees from each of the state-owned entities is five (5) years. While employees in the managerial positions reported significantly more experience than the skilled and semi-skilled employees. The relevance of work experience to this study lies in the valuable insights and context that the participants brought to the research. For example, research question 1 of the study was to identify the value components from the standpoint of the public sector. Participants with more work experience possessed a deep understanding of the organisation's strategies, operational plans, processes, that supported the value creation. Furthermore, employees with more years of experience possessed a heightened comprehension of some of the continual improvement tools, that the organisations utilise and also exert an influence on the organisation's capacity to embrace and execute the tools with efficacy. The experience they possess alsopossess also serve as an indication of the level of competence that is accessible for providing insight in the current study.

Determining eligibility criteria and academic background of the participants in this study was necessary because the employees in the state-owned entities hold technical positions, and possessing educational qualifications is crucial. These qualifications serve as an indicator of the participants' level of knowledge and skills, which in turn can impact their comprehension and involvement in the adaptation of lean manufacturing principles and tools to their organisational context. Furthermore, Participants with relevant qualifications around the specified systems of the SOE such as logistics, procurement, plant systems and other specialised areas in the SOEs provided accurate and informed responses, enhancing the quality of the research findings. This allowed the researcher to establish the expertise of the participants, adding credibility to their perspectives and insights shared during the interviews as it related to the objective of this research to understand the critical factors that determine the applicability of lean tools to their specific organisation.

5.11.2 Provision of labels for the SOEs, participants, and documents

The study adhered to ethical standards by providing pseudonymised labels to state-owned entities, which are considered cases, namely, SOE1, SOE 2 and SOE3. In SOE 1, the participants selected for interviews are given labels #1 to #12, and the corporate plan used for document review is #D1. In SOE 2, the corresponding interview participants are given labels #A to #I, and the integrated report used for document review is #D2. Finally, in SOE 3, the interview participants were given labels #I to #IX, and the corporate plan used for document review was #D3. These labels are meant to safeguard the identities of the research participants and the respective organisations, as presented in Table 21

Table 21: Summary of demographic information (**Source:** Interview data).

State-Owned Entities Labels	Participants' Labels	Participants' Positions	Participants' Years of Experience	Participants' Qualifications
SOE 1	**#1**	Safety Manager	10	Btech Safety Management
	#2	Senior Advisor Risk Management	9	Btech Electrical Engineering
	#3	Production Manager	10	BSc Electrical Engineering
	#4	Senior Advisor Quality Assurance	9	Btech Quality
	#5	Quality Officer	5	Btech Quality
	#6	Technician (Snr Plant Operator)	3	National Certificate
	#7	Officer Business Services	5	BSc Finance
	#8	Artisan	3	N6 Mechanical
	#9	Boiler Engineer	5	BSc Electrical Engineering
	#10	Mechanic	5	N6 Mechanical
SOE 2	**#A**	Communications Officer	3	BA Communications
	#B	Procurement Manager	10	Bcom Finance
	#C	Manager Quality Audit support	7	MTech Quality
	#D	Program Manager Critical projects	8	Master of Business Administration
	#E	Engineer	8	BSc Industrial Engineering
	#F	Warehouse Supervisor	3	National Diploma Logistics
	#G	Continual Improvement specialist	15	Btech Industrial Engineering
	#H	Senior Project Engineer	8	Btech Industrial Engineering
	#I	Supervisor Operations Control Centre	12	Bachelor of Commerce
	#J	Maintenance planner	3	N6 Electrical Engineering
SOE 3	**#I**	Branch Manager	8	Bachelor of Business Administration
	#II	Logistics Manager	10	Bachelor of Operations Management
	#III	Quality Manager	9	Btech Quality
	#IV	Quality Assurance Specialist	8	Master's Operations Management
	#V	Supervisor	5	Certificate logistics
	#VI	Supply chain advisor	7	Bachelor's Degree Logistics and Supply chain
	#VII	Front End Teller	8	Senior Certificate
	#VIII	Safety Officer	4	Btech Safety Management
	#IX	Maintenance Planner	18	N6 Mechanical
	#X	Projects Assistant Officer	5	Btech Project Management

5.11.3 Data analysis process

In analysing the interview data, the researcher followed the data analysis process posited by Adu (2018). An appropriate coding strategy was selected to identify relevant information called empirical indicators and assign labels (called codes) to them (Strauss, 1989). After critically examining the research approach used in the original study (which was a case study), the interpretation-focused coding technique was the most suitable coding technique. Interpretation-focused coding is used to create codes that portray the meaning the researcher derives from the data.

Using the interpretation-focused coding strategy, the researcher examined each empirical indicator, gaining an understanding and constructing a brief response to address the indicator's associated research question. The answer to the question was then transformed, creating a phrase called a code to represent the empirical indicator selected (see Table 22). The codes were then grouped into clusters called categories from which themes and aggregated themes were formed. Figure 39 outlines the steps taken in the analysis of the interview data from the three SOEs.

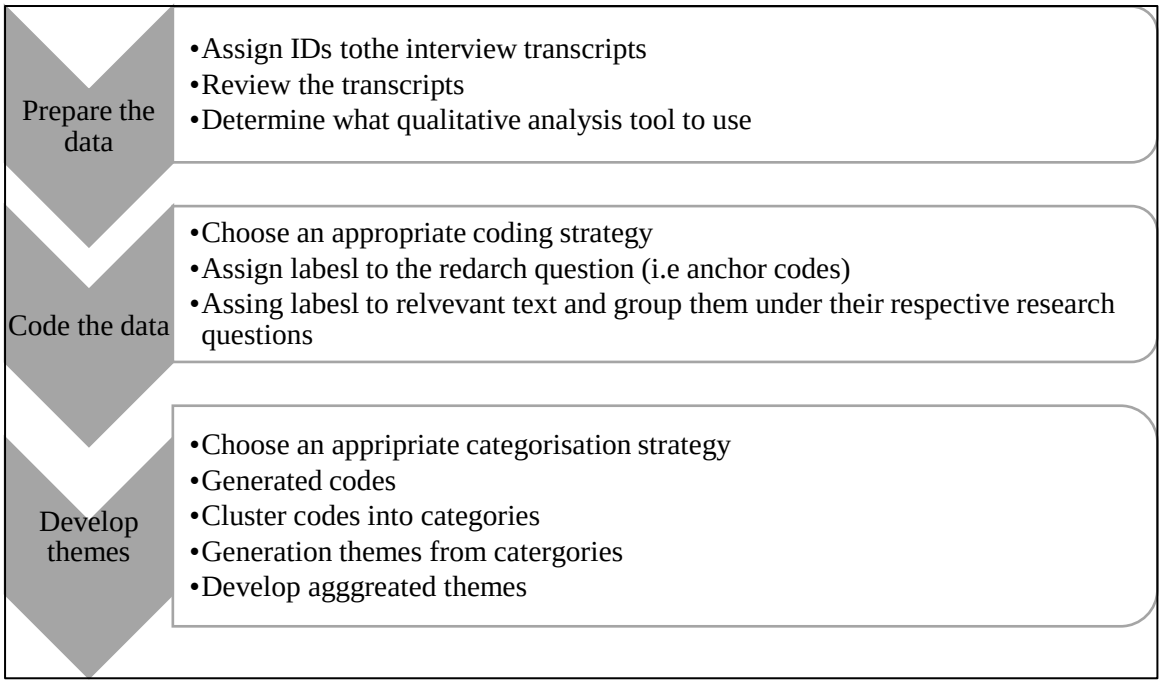


Figure 39: Data analysis steps employed in the study (**Source:** Adapted from Adu, 2018)

5.11.4 Leadership creating customer value.

The first question sought to identify what constitutes customer value from a public sector perspective. To fulfil this objective, four interview questions were asked from participants across SOE 1 to SOE 3, as depicted in Appendix 1 A to C. With respect to this interview question, two main themes emerged from the data, namely, strategic leadership and customer centricity. These themes are discussed below:

5.11.4.1 Strategic leadership

SOE 1: Strategic leadership involves strategic customer focus, strategic planning, and communication according to the categories that emerged from the data. The data from the interviews converge with the results from the document analysis on the pivotal role that the leadership of the organisation plays in creating value for the customers. Interviewees #1 and #10 affirmed a customer-centric approach within leadership sessions, outlining how key performance indicators (KPIs) are directly linked to assessing and fulfilling customer requirements.

> *We need to be customer driven. So, to create value, the leadership has a strategic session that outlines KPIs, and during the session, we look at and provide input on each KPI to assess the value that is needed as per customer requirements. **(#1)***

> *...by listening to the voice of the customer and the needs of the customer, we create customer value. **(#10)***

However, while the document analysis (**#D1** p.47) emphasises strategic planning as fundamental to strategic leadership and highlights alignment with government objectives, the interviews did not significantly bring forth discussions or codes pertaining to government policy and national plans.

Another participant refers to strategic leadership as leaders who communicate mandates and plans to employees, as demonstrated by participant (#12), who states, “I think leadership creates customer value by communicating the objectives and the requirements of the customers.

SOE 2: Findings from the interviews echo and reinforce the documented emphasis on the leadership role in driving value creation aligned with customer needs. Participant #B mentioned that the new leadership's strategic focus is on organisational transformation and the implementation of new strategies. This view resonates with the documented emphasis

on the strategic role that leadership plays in creating customer value *(**#D2**, p. 06)*. This convergence suggested coherence between the participant's observation and the documented strategic direction.

> *The new leadership, which started in 2020, is focused on transforming the organisation and implementing new strategies to add value **(#B)**.*

Furthermore, it is obvious from the responses at SOE 2 that leadership is critical for the introduction and communication of strategies throughout the organisation. References to the visibility of leadership and clear communication from top to bottom also highlight an active and open leadership approach. Interviewees specifically mentioned how informing employees of the corporate plan enables them to align their activities, accordingly, thereby fostering a positive organisational culture. Talking about this issue, one interviewee said:

> *The leadership of the organisation ensures value creation for the customer through various strategies. They demonstrate commitment through visibility and clear top-down communication, cascading corporate strategy to all employees as the original mouthpiece for the organisation **(#A).***

SOE 3: The finding from the interview data in SOE 3 revealed a theme of strategic leadership. Regarding the aspect of strategic leadership ensuring value creation at SOE 3, the finding from participant #IV acknowledges the critical link between leadership behaviour and organisational culture. However, the participant expressed reservations about leadership consistency in upholding these values consistently. This finding implies that, at times, leadership might not consistently demonstrate the expected behaviors necessary for fostering a culture that adds value, which appears to be incongruent with the intended strategy, as documented:

> *I think they try to create value by improving the culture of people through the commitment of leadership. If the leaders don't show examples, how can the people follow? Our leaders need to cover this, but sometimes they don't **(#IV)**.*

In line with the role that leadership plays in creating customer value, other findings align with the documented strategy that emphasises leadership's pivotal role in shaping the organisational framework to enhance performance and create value. Specifically, the strategy's intent to provide resources, address talent gaps, and ensure stability in leadership echoes the participant's emphasis on these aspects.

Like I said, the leadership must make sure that they come up with strategies, and they do so by providing resources such as budget and equipment. They also try to close the vacancy rate, particularly in critical skills and leadership stability ***(#III).***

5.11.4.2 Customer Centricity

SOE 1: The interview responses highlight a perspective on customer value creation within the organisation, particularly emphasising the departments being served as the primary recipients of value. The focus seems to be on internal customers rather than external walk-in customers. The interview data revealed an emphasis on providing outputs to the departments being serviced, which reflects a focus on internal customers. The organisation tailors its services and outputs to meet the needs and requirements of these departments, considering them the primary customers. Furthermore, the participants' viewpoint (see quotation below) suggested that the organisation's definition of customer value revolves around meeting the specific needs and demands of the departments they serve. This might involve delivering specialised services, outputs, or solutions that directly cater to the requirements of these internal stakeholders.

There are different ways that we create customer value, but mainly that value is created for the departments that we are servicing by giving them the outputs because we don't deal with walk in customers ***(# 2).***

Some interviewees emphasised that in addition to meeting contractual obligations, creating customer value also requires fostering departmental cooperation and customising strategies to consider the unique requirements and inputs of internal customers. From the interviewee's remarks, the organisation's focus on meeting specific targets outlined in contracts reflects a customer-centric approach. By adhering to these targets related to production and electricity output, the organisation aims to fulfil its commitments and meet the needs of its customers, ensuring that contractual obligations are met. The interviews highlighted collaboration between departments, particularly between engineering and maintenance. The engineering department identifies new methods or strategies available in the market to enhance plant operations, catering to the needs of the maintenance department. This collaboration illustrates a customer-centric approach by understanding and addressing the needs of internal customers (departments) within the organisation. Developing strategies based on the inputs and needs of various departments indicates a tailored approach to value creation.

Yeah, well, from the inputs and needs of the customers. For example, the station gets contracted to meet certain targets in terms of production, units of electricity sent out etc. Also, for example maintenance department needs input from form engineering department on what new methods are available on the market to enhance plant operation, so engineering department develops those strategies and maintenance implements the strategies ***(#4)***

Overall, the alignment between document analysis and interviews underscores a robust commitment to customer centricity within the organisation. The convergence of themes such as listening to the voice of the customer, including customer requirements, service provision, reliability, continuous improvement, and energy availability substantiates a consistent dedication to meeting customer needs across both sources. For example, the documents emphasise the importance of listening to the voice of the customer, incorporating feedback, and including customer requirements in value creation strategies. Interview corroboration: statements from interviewees #1, #2, #5, #8, #6 and #12 validate this focus, elucidating how customer needs analysis is conducted and how leadership communicates customer objectives and requirements to drive value.

SOE 2: Similarly, in SOE 2, participant #D, #F, and #I emphasised the organisation's commitment to customer-centric approaches, stating that customer value creation is central to the organisation's strategies. This includes actively listening to customer feedback and tailoring planning processes accordingly and encouraging innovation and the adoption of cutting-edge technologies to enhance customer experiences.

The business model is centred on customer needs, and customer value is created through strategies that support the organisation's value proposition. As an organisation, we also listen to the voice of the customer and tailor our planning based on customer input ***(#D).***

Customer value is created from our planning, so the leadership ensures that there is a strategy in place that is linked to the objectives of freight rail. For instance, what are the key projects, who are our main customers, and what is the value that the customer is looking for ***(#F).***

Leadership encourages innovation and the adoption of cutting-edge technologies to enhance customer experiences, such as implementing digital

platforms for booking and tracking shipments and leveraging data analytics for predictive maintenance and route optimisation ***(#I).***

SOE 3: The findings from the interview data on SOE 3 revealed the theme of strategic leadership. Regarding the aspect of strategic leadership ensuring value creation at SOE 3, the finding from participant #IV acknowledges the critical link between leadership behaviour and organisational culture. However, the participant expressed reservations about leadership consistency in upholding these values consistently. This finding implies that, at times, leadership might not consistently demonstrate the expected behaviors necessary for fostering a culture that adds value, which appears to be incongruent with the intended strategy, as documented:

I think they try to create value by improving the culture of people through the commitment of leadership. If the leaders don't show examples, how can the people follow? Our leaders need to cover this, but sometimes they don't ***(#IV).***

In line with the role that leadership plays in creating customer value, other findings align with the documented strategy that emphasises leadership's pivotal role in shaping the organisational framework to enhance performance and create value. Specifically, the strategy's intent to provide resources, address talent gaps, and ensure stability in leadership echoes the participant's emphasis on these aspects.

Like I said, the leadership must make sure that they come up with strategies, and they do so by providing resources such as budget and equipment. They also try to close the vacancy rate, particularly in critical skills and leadership stability ***(#III).***

5.11.5 Resources required for customer value creation.

The second question sought to understand what resources are needed to create value for the customers of the organisations. Three main themes emerged from the data, namely, human resources, training resources and financial resources. These themes are discussed below:

5.11.5.1 Human resources

SOE1: Resources such as human resources, which include the recruitment of skilled staff as well as training and development programs, emerged as reliable contributors to the creation of customer value. When asked to expand on how the resources in terms of training budget and training needs are allocated throughout his department, participant #8 responded as follows:

*"Currently, the further study is a problem, not enough funds are allocated to training, and we can't all get the training that we need on new technologies" **(#8)**.*

Participants stressed the multifaceted nature of resources, encompassing human resources, budget allocations, skilled manpower, materials, and strategic departments such as human resources and finance. One interviewee mentioned the necessity of resources such as safety officers, budgets for safety initiatives, and training programmes. This reflects an acknowledgement that ensuring a secure work environment requires dedicated allocations for personnel, training, and safety equipment, based on the interview quote from participant #1:

*Certainly, as the manager my role primarily focuses on ensuring the safety of our employees, contractors. To effectively manage safety, I need a lot of resources like human resources like safety officers who are experienced in construction regulations, budget for safety initiatives, training programs, safety audits, and the purchase and maintenance of safety equipment **(#1)***

Some participants emphasised substantial budget allocation for engineering projects, maintenance, and research and development, while other participants voiced concerns regarding resource shortages, particularly in terms of operational staff, critical skills, and planners. This scarcity poses a significant challenge to the organisation's ability to execute projects effectively, manage operations, and maintain safety standards.

*The Technician highlights the shortage of operational staff, indicating a gap that directly impacts the organisation's ability to deliver on its operational commitments, potentially hindering value creation **(#6).***

SOE 2: These participants stressed that a shortage of skilled staff may impede crisis communication and decision-making. In addition, participants #C, #D, #E, #F, and #G all emphasised the need for skilled professionals, whether in quality assurance, project management, engineering, or continual improvement. Each stresses the significance of having the right expertise and skill sets within their departments.

*We need skilled and trained quality professionals to oversee quality control and assurance activities, as well as to lead process improvement initiatives. **(#C)***

We need critical resources, to help us to manage projects, a competent and motivated project team with the necessary skills, helps me to manage the projects management portfolio a lot easier. The are also tools and technologies for project planning and management, such as primavera which we have access to ***(#D)***

Well, we need more engineers, as you know the organisation has lost on more critical skills that most of the older engineers that resigned have and the gap the process of the skills transfer is not working, unfortunately the engineers are now running to the private sector or more into engineering consulting because there they feel they can add the most value ***(#E)***

As a warehouse supervisor, the key resources needed for processes in my department is adequate storage capacity, so that we can do away with issue of satellite stores and our inventory management system needs more trained staff to run with it ***(#F)***

Highly skilled and diverse project management team, specialised software and tools for project planning, scheduling, and performance tracking, access to substantial budgetary allocations to support large-scale projects ***(#G)***

However, divergent views surfaced in highlighting department-specific challenges regarding the training provided by the organisation to enhance skills development. For instance, while most participants emphasised the need for skilled professionals, the other participants uniquely highlighted the challenge in skills profiling and the adequacy of the budget for training:

It appears we can go on training as not enough budget is allocated for our training, this is sometimes unfair as the manager are supposed to make sure that during year end budget reviews, the training budget for our department is factored in. ***(#B)***

This assertion by participant B highlights a perceived discrepancy between the need for training and the actual budgetary allocations provided for such purposes within the SOE. Furthermore, the interviewee expresses frustration over what seems to be insufficient funding earmarked for training initiatives. Although none of the other interviewees shared similar frustrations, there seems to be an expectation within the SOE that managers should advocate for adequate training budget allocations during year-end reviews. This finding indicates that such budgetary

provisions should be a managerial priority to ensure continuous skill development and organisational growth.

SOE 3: The participants emphasised the criticality of skilled and adequate personnel in various capacities. These include administrative staff, service staff, tellers, logistics coordinators, drivers, warehouse staff, operations managers, maintenance planners, and quality champions. A shortage of personnel, especially in customer-facing roles such as tellers, poses a constraint on effective service delivery. Additionally, the need for skilled employees and their training is highlighted, emphasising the value of expertise and competence within the workforce. The following interview quotes support this assertion:

> *We have a big issue in terms of resources with our warehouses." This highlights the need for skilled warehouse staff and the importance of proper infrastructure to support logistical operations* ***(#II)***.

Without skilled warehouse staff, the smooth flow of operations can be disrupted, leading to delays, errors, and inefficiencies. A lack of proper infrastructure, such as well-maintained storage systems and equipment, can further compound these challenges within SOE 3. In addition, the necessity for trained personnel in critical operational areas to ensure proper maintenance and functionality of the infrastructure was also highlighted by other participants: "We need skilled and trained people on the maintenance side to do routine maintenance, inspections, and repairs." (#IV). Skilled maintenance personnel can help identify and address potential issues before they disrupt operations, reducing the risk of delays and errors. Additionally, routine maintenance and inspections can help extend the lifespan of equipment, improve efficiency, and reduce the likelihood of breakdowns. By investing in training and staffing for maintenance roles, organisations can proactively address resource constraints and maintain smooth logistical operation.

5.11.5.2 Financial Resources

SOE 1: Two divergent and often conflicting discourses concerning adequate financial planning and strategies for enhancing customer value emerged among employees. Some interviewees expressed an understanding of the need for adequate resource planning. They emphasised the importance of enough manpower and budget and completing critical skills. These employees perceived these resources as key drivers of an organisation’s ability to create value.

*We always need to look at resources such as manpower, budget, the filling of all critical skills, policies, documents, and equipment **(#5)**.*

*We must have adequate resources. We need water, fuel, and oil, so we plan around that **(#3)**.*

*…make sure that there is enough manpower who is skilled to execute the project, our planning factors this **(#2)**.*

SOE 2: Moreover, the findings also mention that access to a substantial budget is needed for specific software and tools for project planning, scheduling and performance tracking. These views surfaced mainly in terms of what respects the budget is, as it enhances efficiency, collaboration, and decision-making, ultimately contributing to the successful planning, execution, and completion of projects.

*We need budget to be allocated for specialized software and tools for project planning, scheduling, and performance tracking, and access to substantial budgetary allocations to support large-scale projects **(#H)***

SOE 3: The SOE data indicate the need for financial resources to create value for their customers. Some of the codes that emerged for financial resources included infrastructure investments, finances for service downtime mitigation and financial resources to enhance service delivery and operational excellence. This encompasses well-maintained warehouses with proper infrastructure for inventory storage and vehicle management. There is a call for upgraded and properly equipped warehouses, which include adequate storage space and a fleet of vehicles in good condition. Additionally, infrastructure for routine maintenance, inspections, and repairs is deemed crucial, indicating the importance of a robust maintenance framework that needs financial resources. The following quotes were obtained from the interviews:

"We need finances to ensure a well-maintained warehouse equipped with necessary infrastructure for inventory and vehicles" (#IX). There seems to be agreement among the participants interviewed at SOE 3 regarding the budget needed for infrastructure, making this an issue of concern about the systems and infrastructure required for efficient supply chain coordination. These participants highlighted the potential challenges of managing services without proper infrastructure, such as delays in transportation and difficulties in coordinating postal orders. They stressed the importance of investing in supportive systems and infrastructure to ensure smooth operations and minimise disruptions in the supply chain.

5.11.6 The roles of the departments in customer value creation

In answering interview question three on the roles that the departments play in ensuring customer value creation, three main themes emerged, namely, internal issues, external issues, and fit/alignment. These themes are not discussed separately but will be discussed under the aggregated theme of viability.

5.11.6.1 Viability

SOE 1: The findings from the interviews, in conjunction with the documented emphasis on government collaboration and external issue mitigation for value creation within SOE 1, illustrate the organisation's concerted efforts towards integrated communication and collaborative goal alignment across various departments and stakeholders. Furthermore, a common view among interviewees was that the interactions between the departments and activities in the organisation make it possible to fulfil objectives. This was clear when one participant highlighted the following:

> *We are servicing the whole station, so we always ask the departments to give us their needs prior to servicing so that we can create interdepartmental value like internal customers. It's important that we collaborate to create value* ***(#6)***

In addition, participant #7 highlights the comprehensive communication approach, disseminating expectations from the different subsystems within the organisation; for example, key performance indicators are derived from the shareholder (government) compact and then communicated to the leadership of the organisation. This inclusive communication strategy extends not only to employees but also to contractors, recognising their role within the value chain. This strategy communication is flexible because new strategic components can be easily inserted into any level of the organisation without having to make dramatic changes to its surrounding structures.

> *We communicate the expectation first from the shareholder compact to the various levels of the organisation. This communication goes to all the employees and the contractors because they are also part of our value chain. We continually monitor our progress throughout the financial year* ***(#7)***.

Participant #5 underscores the importance of aligning departmental objectives with the overarching goal of maintaining operational efficiency ("keeping the lights on"). This aligns

with the strategic goal of reducing waste on the plant, demonstrating a synchronised effort toward value creation through waste reduction initiatives.

> *We cascade it down to our objective of keeping the lights on in the other department. So, for us to also reduce the waste on the plant, we check in terms of feeding into that area.* ***(#5)***.

The findings from participant #11 highlighted a collaboration among departments, which reflects an alignment with the organisation's broader strategies, reinforcing the principle of viability and aligning internal operations with external contingencies.

> *We work collaboratively and contribute to the organisation's overarching goals* ***(#11)***.

Overall, #7, #5, and #11 underscore the importance of integrated communication, cross-departmental alignment, and collaborative efforts within the organisation. These insights complement the documented emphasis on collaboration by showcasing internal synchronisation and collaborative goal contribution.

SOE 2: The data from the interviews indicated that different departments play pivotal roles in facilitating effective internal and external communication, as highlighted by the themes of communication and engagement. Ensuring robust communication channels and mechanisms is essential for conveying customer needs, internal collaboration, and addressing external stakeholder expectations. This aligns with the broader context dimension, emphasising the significance of internal and external communication for understanding customer requirements and aligning organisational efforts accordingly.

Participant A mentioned the importance of internal and external communication as extending beyond employee communication to shaping the organisational narrative within communities, highlighting the significance of effective communication for external stakeholders' perceptions and engagement.

> *In my in my department, what we do is communication with the employees, so like I said we communicate on anything that takes place within the organisation and communities surrounding us. We use different platforms to communicate with the employees on any important matters that they need to know about and what the business is doing and all time. And we are also the*

*media eye that is key in doing media report and how the organisational footprint is within our communities **(#A)** .*

In addition to this communication, cross-functional collaboration, as emphasised by participant #C, elucidates the importance of departments working collectively to reduce waste and improve processes. However, challenges in garnering buy-in across departments often hinder this collaborative effort.

*We encourage cross-functional collaboration to identify opportunities for process improvement. Departments work together on projects that span multiple functions to reduce waste although with some department it's hard to get the buy in, but it all depends on the manager **(#C)***

There was also concern among some participants about the silos in which other departments operate. The participants' viewpoint stressed the importance of breaking silos and fostering innovation through collaborative workflows. This finding resonates with the need for interdepartmental collaboration and efficient workflows to enhance value creation.

*Departments are encouraged to collaborate and not work in silos, viewing themselves as important contributors to value creation. If departments can see themselves as an important part of value creation, innovation becomes an opportunity for continuous improvement and then workflow, informing the right person to action the respective task, milestone, phase, or gate approval **(#E)**.*

SOE 3: At SOE 3, the interviews consistently revealed a recurring pattern of coordination difficulties among departments, which impeded smooth operations and eventually affected the generation of customer value. Participants from different departments stress the need for improved coordination to avoid unnecessary repetition, simplify procedures, and enhance the quality of service. There is a widely held belief that the presence of departmental silos hinders the ability to communicate and coordinate effectively, resulting in inefficiencies and missed chances. Examples, such as the use of distinct trucks for various types of mail or the absence of cooperation in project contingencies, highlight the necessity for more interdepartmental communication. Participants emphasised that these isolated behaviours result in disturbances, influence the quality of service, and hinder responsiveness to consumer requests.

The interaction between department is currently missing, the thing that bothers me is, the overhead activities that you can't tie to a specific department, for instance when it comes to contingencies, in projects this is solely left to money not to the anticipated change in cost and in time and you don't have quality and engineering directing these issue, To me maintenance planning is well and good but we are missing the collaboration because each department track something that is important and real ***(#IX)***

Furthermore, the interviews emphasised the crucial need for coordination and teamwork in bolstering and improving the quality of services. Participants from different departments mentioned that they collaborate with many divisions within their operations to establish quality benchmarks, perform risk evaluations, and implement proactive measures. Nevertheless, they articulated apprehensions regarding the fragmented approach and emphasised the imperative for more unified endeavours. Ensuring alignment and cooperation within divisions, both internally and with external stakeholders, is essential for enhancing service offerings and overall customer satisfaction. In summary, the general agreement highlights the importance of synchronised endeavours, efficient communication, and streamlined procedures among departments to improve operational effectiveness and, as a result, customer satisfaction.

I am in quality specialisation, so this is where we work with all the departments and set thresholds in terms of guiding quality into the processes to give early warnings, this mobilised the teams proactively to make corrective actions and to recover schedules back to quality specifications, so in all we support departments by coordination along the mail delivery and production process. So, we track implementation of BU strategic initiatives, if there are affective and standardised to the other processes and communicated (#VII)

5.11.7 Factors for improving customer value creation.

Last, in response to the fourth question, which sought to understand important factors for improving customer value creation to answer research objective 1, two key themes emerged: coordination (encompassing understanding of customer needs) and operations (comprising proper planning and performance monitoring).

5.11.7.1 Coordination

SOE 1: Several issues were identified regarding coordination. First, understanding customer needs is one aspect of coordination that was mentioned by one interviewer. The coordination guides various departments in aligning their activities with customer needs. Furthermore, the interview data revealed prominent insights regarding project planning and operational plans within the organisation's operational strategies, illuminating aspects that were not prominently highlighted in the document analysis. Ensuring minimal disruptions to customers requires effective coordination between maintenance planning activities and customer expectations. Coordination helps in aligning the maintenance schedule with the needs of both the organisation and its customers.

> *In the maintenance planning section, we try to minimize disruptions to customers and schedule maintenance activities during off-peak hours whenever possible. We also communicate maintenance schedules in advance through various channels, such as customer notifications, our website, and local media, so customers can plan accordingly* ***(#11).***

> *I look at project plans to achieve customer needs, and the risks that may arise during project execution are identified and addressed* ***(#2)***.

SOE 2: Interview data from SOE 2 revealed that managers develop strategies that incorporate customer needs and align capital projects with meeting customer expectations. This reflects a coordinated effort to ensure that different components of the organisation work in harmony.

> *Business unit managers develop strategies that incorporate the needs of customers and service plans, and the delivery of capital projects is aligned with meeting customer expectations* ***(#C).***

Other participants pointed out proactive engagement with customers through information sharing sessions and negotiations. This engagement demonstrates a coordinated effort to understand and address customer needs and concerns. This coordination ensures that information flows smoothly within the organisation, helping individuals adapt to changes in the external environment (customer needs) and maintaining coherence.

> *To improve customer value creation, we try to understand the needs of the customers and engaging with them through breakfast sessions and negotiations helps to gauge and address their needs and concerns* ***(#D).***

SOE 3: The interviews emphasised the crucial need for coordination and teamwork in bolstering and improving the quality of services. Participants from different departments mentioned that they collaborate with many divisions within their operations to establish quality benchmarks, perform risk evaluations, and implement proactive measures. Nevertheless, they articulated apprehensions regarding the fragmented approach and emphasised the imperative for more unified endeavours. Ensuring alignment and cooperation within divisions, both internally and with external stakeholders, is essential for enhancing service offerings and overall customer satisfaction. In summary, the general agreement highlights the importance of synchronised endeavours, efficient communication, and streamlined procedures among departments to improve operational effectiveness and, as a result, customer satisfaction.

> *I am in quality specialisation, so this is where we work with all the departments and set thresholds in terms of guiding quality into the processes to give early warnings, this mobilised the teams proactively to make corrective actions and to recover schedules back to quality specifications, so in all we support departments by coordination along the mail delivery and production process. So, we track implementation of BU strategic initiatives, if there are affective and standardised to the other processes and communicated (#VII)*

5.11.7.2 Operations

SOE 1: In line with operational planning, the findings from the interviews align with the SOE 1 written strategy, which highlights the incorporation of customer requirements into important decision-making platforms such as leadership planning meetings and quality management reviews. This statement supports the organisation's dedication to incorporating consumer viewpoints into essential operating procedures. As #D5 stated,

> *We include customer needs in our leadership planning sessions or quality management review sessions **(#5).***

> *We have an operational plan where we have identified and set our station objectives (which are taken from the needs of our customer, who in this case is the transmission division). We make sure that when we set our objectives, they are customer focused **(#5**).*

SOE 3: SOE 3. Participants from different departments stress the need for improved coordination to avoid unnecessary repetition, simplify procedures, and enhance the quality of service. There is a widely held belief that the presence of departmental silos hinders the ability to communicate and coordinate effectively, resulting in inefficiencies and missed chances. Examples, such as the use of distinct trucks for various types of mail or the absence of cooperation in project contingencies, highlight the necessity for more interdepartmental communication. Participants emphasised that these isolated behaviours result in disturbances, influence the quality of service, and hinder responsiveness to consumer requests.

> *The interaction between department is currently missing, the thing that bothers me is, the overhead activities that you can't tie to a specific department, for instance when it comes to contingencies, in projects this is solely left to money not to the anticipated change in cost and in time and you don't have quality and engineering directing these issue, To me maintenance planning is well and good but we are missing the collaboration because each department track something that is important and real* ***(#IX)***

Table 22: Mapping findings on value constituents from the public sector perspective from SOE 1

RESEARCH QUESTION 1: What constitutes value from the public sector perspective?													# SOE 1				
Doc label	**Participants Labels**												**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D1	**#1**	**#2**	**#3**	**#4**	**#5**	**#6**	**#7**	**#8**	**#9**	**#10**	**#11**	**#12**						
*	*									*			*Customer-driven*	Strategic customer focus	Strategic leadership	Leadership ensuring value creation based on customer needs	Leadership	Theory 1
*													*Value creation and addition*					
			*						*				*Customer satisfaction*					
	*		*										*Setting key performance indicators (KPIs) and targets*	Strategic Planning				
											*		*Aligning departmental objectives with organisational goals*					
*													*Agility, business strategy, corporate social responsibility strategy*					
*													*Government policy and national plans*					
*													*Leadership and staff empowerment*	Transformational leadership and communication				
*													*Responsiveness, sustainability, ethics, risk assessment, transparency, and quality control*					
				*									*Coordination of internal customers*					
						*	*	*				*	*Communicating customer requirements with stakeholders*					
*													*Data analytics*	Technology adoption				
*					*								*Technology*					
*						*		*		*			*Listen to voice of customer and feedback*	Customer requirements gathering	Customer-Centricity			
*	*	*								*			*Inclusion of customer requirements into value creation*					
									*				*Cost effectiveness*	Reasonable pricing				
*									*				*Affordability and verified pricing*					
*		*	*		*		*						*Provision of customers services and service reliability*	Service delivery				
*													*Continuous improvement*					
			*		*				*				*Ensuring enough energy availability*					
	*	*			*	*			*			*	*Skilled staff acquisition*	Recruiting skilled staff	Human resources	Resources required for customer value creation	Complexity	Theory 2
		*									*	*	*Adequate number of skilled laborers*					
*	*				*								*Training*	Training and development programs				
				*				*					*Research and development*					
	*			*							*		*Maintenance of safety equipment*	Establish maintenance culture	Strategic leadership			
												*	*Support services*					
												*	*Policy direction and innovation*	Strategic policy and partnerships				
*								*					*Partnerships*					
	*							*					*Technology acquisition*	Infrastructure investments	Financial resources			
			*	*	*	*			*				*Equipment's investments*					
				*									*Budget for safety initiatives*	Budget allocation				
	*			*	*				*				*Budgets for spares*					

RESEARCH QUESTION 1: What constitutes value from the public sector perspective?													# SOE 1				
Doc label	**Participants Labels**												**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D1	**#1**	**#2**	**#3**	**#4**	**#5**	**#6**	**#7**	**#8**	**#9**	**#10**	**#11**	**#12**						
	*			*									*Reducing employees' risk of injuries*	Safeguard employee's safety	Internal Issues	The roles of the departments in customer value creation	Context	Theory 1
				*									*Reducing employee fatality*					
		*							*				*Recruit of highly skilled employees*	Provision of skilled resources				
*													*Competent and skilled workforce, and capacity building*					
									*				*Motivate employees*					
					*		*						*Top-down communication strategy*	Interdepartmental communication	External Issues			
	*												*Leadership by example*					
							*						*Creating organisational awareness*					
						*					*		*Achieve organisation's goals together,*	Interdepartmental collaboration				
*					*	*		*			*	*	*Ensure collaboration among the departments*					
*													*Achieving stakeholder expectations*					
*													*Commitment, corporate responsibility, sustainability, and transparency*					
*	*												*Adherence to procedures, standards and benchmarks*					
*												*	*Proper planning and sustainability*	Planning and performance monitoring	Fit and alignment			
*													*Programs and initiatives*					
*													*Quality management*					
*													*Operations management and performance optimisation*					
			*	*									*Quick response to breakdowns*					
		*					*					*	*Monitor performance*					
		*											*Provision of funds and materials*	Financial management				
		*											*Controlling spendings*					
	*										*		*Project scope based on customer needs*	Customer needs inclusion	Coordination	Important factors to improve customer value creation	Viability	Theory 2
*													*Understanding customer needs and preferences*					
*	*			*					*				*Customer-focused/centricity and target setting*					
		*								*	*		*Problem solving*	Service delivery				
*	*									*		*	*Customer expectations and satisfaction*					
				*								*	*Value performance*					
											*		*Minimise service disruptions,*	Quality of service				
											*		*Avoid customer surprises*					
											*		*Adoption of off-peak hour maintenance activities*					
		*							*	*			*Project planning*	Proper planning	Operations			
*													*Business goals and technologies*					
*													*Agility and data analytics*					
									*				*Operational plans*					
			*										*Departmental alignment and collaboration*	Performance monitoring				
		*		*						*			*Risk management,*					
*													*Sustainable business*					
				*									*Performance measuring*					

Table 23: Mapping findings on value constituents from the public sector perspective from SOE 2

RESEARCH QUESTION 1: What constitutes value from the public sector perspective?										# SOE 2				
Doc label	**Participants Labels**									**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D2	**#A**	**#B**	**#C**	**#D**	**#E**	**#F**	**#G**	**#H**	**#I**						
			*	*		*				*Customer-centred approach, and economic value creation*	Strategic customer focus	Strategic leadership	Leadership ensuring value creation based on customer needs	Leadership	Theory 1
				*						*A customer-focused business model*					
*						*		*		*Customer value, and segmentation*					
*										*Business model and development*	Governance				
*										*Sustainable development*					
*										*Risk management*					
*										*Management structures*					
*	*					*		*		*Corporate strategic planning*	Strategic planning				
										Value addition strategies					
*	*		*				*			*Goal setting, design, and operational planning*					
*										*Care for people, mutual respect and trust*	Leadership and communication				
*										*Transparent financial disclosure*					
	*									*Top-down communication strategy*					
*	*									*Commitment and collaboration through visibility*					
*		*				*			*	*Transformation leadership and innovative leadership*					
*		*	*		*			*		*Stakeholder engagement, and value creations*					
			*							*Infrastructure value, machine manufacturing, equipment, and vehicle*	Infrastructure	Value supportive system and infrastructure			
			*							*Upgrade, repair and maintenance*					
									*	*Cutting-edge technologies*	Technology adoption				
									*	*Digital platforms*					
					*					*Perception survey*	Predictive system				
									*	*Leveraging data analytics*					
									*	*Predictive maintenance*					
*				*				*		*Customer inputs, customer expectations and customer needs*	Customer requirements gathering	Customer-Centricity			
								*		*Market demand analysis*					
*								*		*Different needs of stakeholders and stakeholder value*					
*				*	*				*	*Service reliability, and service excellence*	Service delivery				
*							*			*Process improvement, and efficiency*					
*				*					*	*Customer service, and customer experience*					
*	*	*	*		*	*	*	*		*The need for skilled staff*	Recruiting skilled staff	Humana Resources (**Training and competence)**	Resources required for customer value creation	Complexity	Theory 2
	*			*	*					*Competent and motivated project team*					
			*		*	*		*		*Trained quality professionals*	Training programs				
								*		*Skilled management team*					
									*	*Organisational culture that supports employee engagement*	Employee engagement culture	Communication			
									*	*Employee feedback mechanisms*					

*									*	*Avenues for value addition, and collaboration*				
*										*Partnerships, and business strategy*	Leadership, and communication channels			
*										*Market segmentation, and portfolio optimisation*				
							*			*Management with leadership*				
									*	*Effective communication channels*				
		*								*Unavailability of spares in the market*	Infrastructure investments	Financial resources		
*										*Network infrastructure*				
*	*	*		*	*					*Critical resources (e.g., technology, capability enhancement)*				
						*				*Adequate storage capacity*				
								*		*Project management software*				
							*			*A correct budget forecast*	Budget Allocation			
*								*		*Capital, and budgetary allocations,*				

CON'T: RESEARCH QUESTION 1: What constitutes value from the public sector perspective? **# SOE 2**

Doc label	Participants Labels									Codes	Sub-Codes (Categories)	Themes	Aggregated Themes	Theoretical Dimensions	Specific Theory
#D2	#A	#B	#C	#D	#E	#F	#G	#H	#I						
	*								*	*Internal organisational communication, and information sharing*	Internal and external communication	Interdepartmental and external engagement	The roles of the departments in customer value creation	Context	Theory 1
	*							*	*	*Top-down communication, and transparent communication*					
	*									*Media relations with communities*					
			*		*	*		*		*Cross-functional collaboration, and knowledge sharing*	Interdepartmental collaboration				
								*	*	*A holistic understanding of operations*					
		*					*			*Supply of materials and right spare parts availability*	Infrastructure allocation	Resource planning and management			
							*			*Technology utilisation, and resource allocation*					
		*								*Recruit highly skilled employees*	Provision of skilled resources				
		*					*			*Personnel management*					
		*		*	*			*		*Strategic planning, workflow and service excellence*	Planning and performance monitoring	Operations management			
		*	*		*					*Quality assurance, and process improvement*					
			*	*						*Reporting, and Waste reduction*					
					*					*Innovation for continuous improvement*					
							*			*Budgeting*	Financial management				
		*								*Monitoring of funds and controlling spending*					
*	*									*Competitive analysis, and enhanced service delivery*	Customer needs inclusion	Customer satisfaction	Important factors to improve customer value creation	Viability	Theory 2
			*	*		*				*Customer needs and preferences*					
			*		*					*Customer expectations, and engagement*					
	*							*		*Changing customer needs, meeting and enhancing customer needs*	Customer service				
*		*	*	*				*	*	*Customer-centric approach, and value creation*					
*		*			*	*			*	*Customer service excellence, and service delivery*					
*		*	*					*		*Segment strategy, resources planning and strategic planning*	Leadership and Proper Planning	Strategic leadership			
*										*Leadership, accountability and organisational transformation*					
*										*People safety, and innovation*					
		*								*Turnaround times and service plans*					

*										*Customisation strategy*				
*				*				*		*Setting up KPIs and long-term plan initiatives and performance management*				
		*								*Demand analysis and business continuity*				
									*	*Employee engagement*	Workplace dynamics			
										Cost optimisation and asset utilisation				
*										*Business environment and business operations*				
*									*	*organisational culture*				

Table 24: Mapping findings on value constituents from the public sector perspective from SOE 3

RESEARCH QUESTION 1: What constitutes value from the public sector perspective?														**# SOE 3**
Doc label	**Participants Labels**									**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D3	**#I**	**#II**	**#III**	**#IV**	**#V**	**#VI**	**#VII**	**#VIII**	**#IX**						
							*			*Customer satisfaction.*	Strategic customer focus	Strategic leadership	Leadership ensuring value creation based on customer needs	Leadership	Theory 1
*										*Customer centricity*					
*										*Excellent customer services*					
*										*Community/citizen focused*					
										Organisational objectives	Strategic Planning				
						*				*Unity of purpose and direction*					
	*									*Organisational policies*					
		*	*							*Strategy development.*					
			*							*Provision of critical skills*					
*										*Integrity and honesty*	Transformation Leadership and Communication				
*		*		*		*	*	*		*Leadership by example*					
*			*							*Leadership development and stability*					
*				*						*Commitment to leadership and performance management,*					
	*	*								*Effective communication with stakeholders*					
				*						*Creating an organisational culture that supports value creation*					
			*							*Management representatives and quality champions*					
			*							*Closing vacancy rate*	Recruiting skilled staff	Human resources	Resources required for customer value creation		
	*			*		*		*	*	*Recruit adequate skilled employees (e.g., tellers, admin staff, logistics coordinators, drivers)*					
	*			*						*Capacity building and skill development.*	Training and Development				
								*		*Provide continuous employee training and equipment.*					
*										*Talent and improvement forum*					
	*					*				*Employee engagement*	Employee Engagement and welfare				
							*			*Ensuring employee happiness*					
							*			*Provision of employee support*					
								*		*Prioritise employee safety and well-being*					
		*								*Approval of employee actions*					
*										*Good working relationship*					
*										*Environmental safety*					

*										*Employees recognition and reward*					
			*							*Provision of equipment*	Infrastructure investments	Financial resources			
			*						*	*Resource allocation.*					
									*	*Ensuring that facilities and vehicles are in optimal condition*					
*				*						*Physical infrastructure and branch network*					
*		*								*Well-maintained warehouses and vehicles*					
	*		*							*budget allocation*					
									*	*Preventing service disruption*	Service downtime mitigation				
									*	*Reducing downtime*					
				*						*Operational and process efficiencies*	Service delivery and operational excellence				
								*		*Ensure reliability and quality of our services*					
*										*Provision of service delivery*					
*										*Affordable pricing*					
*										*Government services*					

CON'T: RESEARCH QUESTION 1: What constitutes value from the public sector perspective? **# SOE 3**

Doc label	Participants Labels									Codes	Sub-Codes (Categories)	Themes	Aggregated Themes	Theoretical Dimensions	Specific Theory
#D3	#I	#II	#III	#IV	#V	#VI	#VII	#VIII	#IX						
				*						*Effective communication,*	Collaboration	Coordination	The roles of the departments in customer value creation	Context	Theory 1
					*					*Broader stakeholder, and community engagement*					
	*	*	*		*	*		*	*	*Interdepartmental collaboration and avoiding silos within departments*					
				*	*	*				*Improved coordination and alignment*					
						*				*Teamwork*					
										Infrastructure and funds	Infrastructure	Operations			
*										*Provision of funds*					
*										*Technology adoption*					
*										*Digital platform utilisation*					
*										*Logistical infrastructure*					
*										*Acquire skilled employees,*	Provision of skilled resources				
*										*Capacity building*					
*				*						*Strategic initiatives and Government policy*	Planning and performance monitoring				
								*		*Leadership*					
			*							*Risk management*					
			*	*						*Quality management*					
				*						*Process improvement and standardisation*	Operational Excellence				
	*									*Elimination of redundant steps*					
*							*			*Prompt customer service delivery*					
							*			*Reduction of customer complaints*					
							*			*Quality improvement*					
								*		*Service improvement*					
*										*Trade competitiveness*					
	*		*				*			*Listening to customer requests and feedback*	Customer needs inclusion	Customer satisfaction		Viability	Theory 2

		*							*	*Alignment with customer needs and expectations,*			Important factors to improve customer value creation	
		*								*Customer user guides and surveys to solicit feedback.*				
*										*Tracking customer dynamics and customer changing needs,*				
			*	*			*	*	*	*Customer centricity and engagement*				
					*	*				*Analyse market and social trends*				
		*				*		*		*Customer value and satisfaction*	Customer service			
	*					*				*Customer product offerings and service delivery*				
			*				*			*Product customisation to suit customer requirements*				
				*						*Prompt customer service*				
									*	*Employee engagement*	Employee Engagement	Strategic leadership		
									*	*Employee morale*				
	*			*						*Operational hours and efficiency*	Operational efficiency			
					*					*Reach and relevance*				
								*		*Secure environment*				
					*			*		*Customer convenience and service reliability*				
*										*Reduction in operational expenditure*				
*										*Reduction in losses*				
*										*Ensuring sufficient revenue generation*				
*		*				*				*Adaptability of technological advancement*	Technology adoption			
				*	*					*Technology adoption and digitalisation*				

5.12 CRITICAL FACTORS THAT DETERMINE THE APPLICABILITY OF LEAN TOOLS IN THE PUBLIC SECTOR

5.12.1 Lean Tools

SOE 1: The findings from the interviews revealed a comprehensive emphasis on root cause analysis, risk assessments, internal audits, and fault tree analysis, among other tools employed in the organisation for problem solving and problem investigations. This finding, coupled with the findings from the document analysis, suggest that there is an association between the organisation's documents and organisational practices.

> *We use different tools for different plant investigations in the form of QIM (quality issue management). This is the system that we used to investigate things like unit trips, technical failures, and other failures in the plant. We also look at the root cause of that issue and address all the findings that come from that sort of investigation. We've got tools, such as our risk assessment, that we use to register all* ***(#3).***

The codes for problem investigation and problem solving recurred throughout the dataset. This theme came up, for example, in discussions of which specific lean tools are used for continual improvement. A common view among interviewees was that there is already an awareness in the organisation concerning lean tools. For example, one interviewee said, ….

> *Regular Gemba walks have become a standard practice for our management and risk department teams. They help us stay connected to the shop floor, understand the challenges, and gather insights from our front-line employees. Also, root cause analysis, corrective action, and specifically, as a catering office, we also issue non-conformance reports from suppliers that provide us perishables that do not conform to our specification or preservation quality. We also use a checklist to monitor all components and report on their functionality status* ***(#6).***

While a minority mentioned other tools that were not mentioned in the corporate planning document, the participants agreed that the tools were recorded in the specific process-related procedure and departmental procedures. The extract/comment below mentions the use of tools like check sheets:

> *We use operating check sheets that embedded in our operating procedure to monitor defects in and around the plant, making it easier for teams to track progress and make data-driven decisions* ***(#8).***

SOE 2: During the interviews, the participants expanded upon the findings derived from the document analysis, particularly concerning process improvement and the utilisation of specific lean tools. Participant B mentioned the utilisation of kaizen events and corrective action methodologies. This aligns closely with the emphasis on the organisation's document on process improvement strategies within the organisation.

> *We utilise Kaizen events to continuously improve our operations, involving cross-functional teams in problem solving. We also employ corrective action methodologies to reduce defects and errors, ensuring the quality of the goods and services we procure* ***(#B).***

Furthermore, other participants referred to digital tools and software programs, specifically mentioning lean six-sigma principles to enhance customer value creation, echoing the document's emphasis on utilising lean principles for process improvement and value creation. This alignment signifies the integration of lean methodologies into operational practices, aiming to optimise processes and enhance customer value—a consistency with the documented strategies.

> *We have some digital tools and some software programs that look to improve the way we create value for the customer, such as lean six-sigma principles* ***(#D).***

However, some tools were identified by the participants during interviews expanding on the application of lean tools, specifically mentioning the adoption of lean six-sigma principles and DMAIC methodology, whereas the documents primarily highlighted broader process improvement strategies without explicit references to specific lean tools.

> *We use SAP systems for standardising and consolidating project management tools, continuous improvement, and DMAIC methodology* ***(#A)***

SOE 3: However, issues related to digitalised tools were not particularly prominent in the interview data. The participant interview introduced a contrasting perspective by revealing the practical application of just-in-time (JIT) tools within postal services. As one interviewee said,

*The Just in time (JIT) tool has been introduced to postal services **(#VI).***

5.12.2 Effectiveness of the lean tools used for continual improvement in customer value creation.

SOE 1: Findings from the interviews show the multifaceted nature of oversight and regulation by various government departments, involving audits, parliamentary committees, and regulators to assess operational effectiveness. While the quote does not explicitly reference lean tools, its implications suggest an environment where the effectiveness of operational processes is subject to scrutiny and evaluation.

> *We are also subject to oversight or regulation by several other government departments through audits, parliamentary committees, and regulators to ascertain operational effectiveness **(#1).***

Other participants highlighted that through audits and self-assessment, the effectiveness of lean tools can be assessed; in particular, the interviewees mentioned that the use of lean tools such as Gemba walks enhances the effectiveness of process assessment by providing real-time insights into how work is conducted. This on-site observation promotes a deep understanding of operations and facilitates the immediate identification of improvement opportunities.

> *We use audits, self-assessment, peer review, and root cause analysis. They have now also introduced Gemba plant walks, where we group ourselves into different teams that go on a plant walk to different areas of the plant and assess the work being done with a view to noting issues. (#2)*

SOE 2: The participant interview also revealed the challenges encountered while implementing JIT tools within postal services. *"JIT's focus on minimising inventory gives us a lot of issues and complaints with the need for timely deliveries and has led to a lot of delays, because it was not explained nicely so we need to find a way of fitting it nicely to the unique challenges of postal services" **(#VI).***

This discrepancy underscores the challenge where the theoretical benefits of certain lean tools, such as JIT, might encounter operational challenges in specific contexts, requiring adaptation and alignment with unique operational requirements.

SOE 3: The findings demonstrate a widespread acknowledgement of the effectiveness of lean tools within SOE 3. From operational efficiency gains and cost reductions to customer satisfaction and safety improvements, the organisation leverages different platforms to

systematically measure, assess, and enhance various facets of its operations. The emphasis on aligning lean tools with organisational goals reinforces the strategic integration of lean methodologies to drive continuous improvement and overall effectiveness.

> *As a branch manager, we sit in the review meetings where we measure the effectiveness of the tools by tracking key performance indicators (KPIs) such as reduced processing times and improved customer satisfaction scores and by regularly soliciting feedback from both employees and customers to gauge their experiences and identify areas for further improvement* ***(#I)***

> *We recently evaluated the effectiveness of our corrective action process by assessing metrics such as the reduction in error rates and the timely resolution of customer complaints* ***(#III).***

5.12.3 Assessment and monitoring (Monitoring Deviations)

SOE 1: The themes of assessment and monitoring recurred throughout the dataset. Assessments, encapsulating inspections and performance reviews, serve as essential components of the organisation's monitoring framework. The Safety Manager's statement aligns with the findings from the document analysis that emphasised the use of audits to monitor deviations within SOE 1's processes. Specifically, the Safety Manager mentions safety audits, external auditors, and self-assessments as mechanisms utilised for monitoring deviations.

> *Deviations from the processes are monitored through audits, i.e., safety audits, external auditors, and self-assessments* ***(#1****); We do performance reviews, audits, and man-job inspections* ***(#2****); There are people that are monitoring 24/7 at the control room* ***(#3****); We monitor process deviations through audits and self-assessment* ***(#5)****.*

Overall, the alignment between the interview responses and the document analysis highlights the importance of strong monitoring, assessments, and control systems as crucial aspects that determine the suitability and efficacy of lean tools within the business. These mechanisms are fundamental elements that enable the effective deployment and integration of lean methodologies within an organisation's operational framework.

SOE 2: The findings from the documents highlighted that there is consideration of specific lean tools based on root cause risk reviews and cost–benefit analysis. Similarly, the findings from the interviews highlighted the utilisation of corrective action management processes, audits, inspections, and assessments as tangible monitoring mechanisms for deviations specifically related to the application of lean tools within the organisation. This finding illustrates a more operational view, supplementing the broader managerial considerations outlined in the document and thereby providing a more comprehensive understanding of the monitoring mechanisms applied in the context of lean tool implementation at SOE 2.

> *We conduct regular audits and inspections of processes to ensure compliance with established procedures. Also, we have internal audits, external audits, or third-party assessments (#D).*

SOE 3: The absence of explicit mentions or emphasis on monitoring deviations in the document review contrasts with the practical insights provided by the participants during the interview. The interview highlights the operational strategies and the significance of monitoring deviations through KPIs and staff feedback, which appears to be more hands-on and operationally focused than the broader strategic perspectives documented**.**

> *We monitor key performance indicators (KPIs) like delivery rates, vehicle maintenance, and inventory accuracy and promptly investigate deviations. We also encourage open feedback from logistics staff on process deviations or operational challenges they encounter* ***(#II).***

The discrepancy between the lack of representation in the document review and the operational insights revealed through participant interviews underlines the need for a more comprehensive approach to capturing operational monitoring mechanisms for deviations within the organisation's customer value creation processes. Incorporating these operational insights could enrich the understanding of practical monitoring approaches and strengthen the organisation's deviation detection to ascertain the extent to which lean tools are effective as applied throughout the organisation.

Table 25: Mapping findings on critical factors that determine the applicability of lean tools in the public sector from SOE 1

RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector?													# SOE 1				
Doc label	**Participants Assigned Labels**												**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D1	**#1**	**#2**	**#3**	**#4**	**#5**	**#6**	**#7**	**#8**	**#9**	**#10**	**#11**	**#12**						
*		*	*	*	*	*			*	*			*Root cause analysis*	Troubleshooting/assessment	**Problem investigations**	**Lean tools used for continual improvement in customer value creation**	**Fit/Adapt**	**Theory 1**
*													*Incident investigations*					
*	*		*										*Risk assessment*					
*													*Fault tree analysis*					
*				*	*				*				*Corrective actions form activities*	Corrective actions				
*				*	*					*			*Addressing findings from inspectorate*					
*		*				*	*						*Internal auditing (Peer review, self-assessment)*	Waste reduction and quality control	**Problem solving**			
*													*Automated procurement systems*					
*	*	*											*Task monitoring and digitalisation of stock control*					
*													*Remote Monitoring and Diagnostic Centre (RMDC)*					
*								*					*Checklist and price check*					
											*		*Safety score*					
						*							*Nonconformance reports*					
*													*Risk management and performance evaluation*					
							*						*SAP notification*	Continuous process improvement				
						*							*Primavera*					
												*	*Financial tools*					
*													*OMO standards*					
					*								*Trip reduction meetings*					
*													*Benchmarking*					
			*										*QIM*					
								*					*Data-driven decision*					
						*							*Gemba plants walks*					
	*	*											*Improvements in audit scores*	Defect reduction	**Customer satisfaction and employee's safety**	**The effectiveness of the lean tools used for continual improvement in customer value creation**	**Fit/Adapt**	**Theory 1**
			*	*	*	*							*Reduction in quality issues*					
		*											*Elimination of problems*	Problem-solving				
				*	*			*	*				*Implementation of solutions*					
					*								*Nonconformances preventions*					
								*					*Positive change in employee morale*	Safeguard people's safety				
	*	*				*	*						*Improvements in safety incidents*					
*													*Learning from past events*	Improved Operational efficiencies	**Continuous improvement**			
													Adaptability					
*													*Cost reduction and revenue optimisation*					
*													*Operational enhancement and efficiency*					
*													*Improvement in system performance*					
*													*Reduction in wasteful expenditure*					

			*			*					*		*Reduction in plant downtimes*				
*			*								*		*Reduction in technical/technology disruption or failures*				
*	*			*	*					*			*Self-assessment/demand-centric assessment,*	Inspections	**Assessments**	**Monitoring deviations in the customer value creation processes**	**Complexity**	**Theory 2**
*		*				*							*Job inspection and value adding inspections*					
					*								*Plant walks checks*					
*		*											*Performance evaluation, and procurement compliance*	Performance reviews				
*													*Sustainability and energy efficiency*					
							*						*Quality review meeting*					
*									*				*Voluntary reporting/misconduct(reporting)*					
*			*									*	*Automated monitoring system*	Monitoring Systems	**Monitoring and controlling**			
*										*			*Quality control activities/internal controls*					
*													*Risk management*					
						*			*				*job observation*					
*	*				*		*			*			*Safety Audits*	Auditing				
		*		*						*			*External Auditors*					

Table 26: Mapping findings on critical factors that determine the applicability of lean tools in the public sector for SOE 2

RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector?										**# SOE 2**					
Doc label	**Participants Assigned Labels**									**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D2	**#A**	**#B**	**#C**	**#D**	**#E**	**#F**	**#G**	**#H**	**#I**						
			*			*	*			*Root cause analysis*	Troubleshooting	**Problem-solving**	**Lean tools used for continual improvement in customer value creation**	**Fit/Adapt**	**Theory 1**
			*							*Fault trees*					
						*				*Fish bone*					
						*				*5 WHYs*	Corrective actions				
		*								*Corrective action plan*					
							*			*Audits*	Waste reduction and Optimal quality control	**Process improvement**			
				*	*		*	*		*Lean Six Sigma principles*					
					*			*		*Project Management Tools*					
*	*		*					*		*SAP software*	Process improvement				
		*								*Kaizen events*					
*										*Agility, innovation, strategic partnerships*					
									*	*Gemba walks*					
	*									*DMAIC methodology*					
	*				*			*		*Waste and defect reduction*	Defect reduction	**Customer satisfaction and operational efficiencies**	**The effectiveness of the lean tools used for continual improvement in customer value creation**	**Fit/Adapt**	**Theory 1**
					*					*Reduction of scrap and rework*					
	*							*		*Problem-solving*	Problem-solving				
									*	*Customer satisfaction*					
			*							*Reduction in customer complaints*					
									*	*Good customer feedback*					
		*								*Reduction in procurement cycle times*	Improved Operational efficiencies				
			*			*				*Continuous improvement in operation*					
	*	*		*		*				*Streamlined and efficient processes*					
							*			*Trained employees and effective tool utilisation*					
					*					*Root cause analysis*	Inspections	**Assessments**	**Monitoring deviations in the customer value creation processes**	**Complexity**	**Theory 2**
*				*		*				*Assessments*					
	*		*	*			*	*		*Peer reviews and review meetings*	Performance reviews				
*										*Cost–benefit analysis*					
							*	*		*Process adherence review*					
*										*Control effectiveness, assurance and monitoring*	Monitoring and Controlling Systems	**Monitoring and controlling**			
		*	*							*Online monitoring systems*					
		*							*	*Tracking performance*					
	*		*	*		*				*Internal audits*	Auditing				
			*	*		*				*External audits*					

Table 27: Mapping findings on critical factors that determine the applicability of lean tools in the public sector for SOE 3

RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector?										# SOE 3					
Doc label	**Participants Assigned Labels**									**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D3	**#I**	**#II**	**#III**	**#IV**	**#V**	**#VI**	**#VII**	**#VIII**	**#IX**						
	*									*Automation tools*	Troubleshooting	**Problem-solving**	**Lean tools used for continual improvement in customer value creation**	**Fit/Adapt**	**Theory 1**
					*					*Root cause analysis*					
								*		*Risk assessment*					
*										*STB (set top boxes) technology*	Corrective actions				
					*			*	*	*Corrective action and maintenance*					
*								*		*Observations and customer insights*	Waste reduction and Optimal quality control	**Process improvement**			
	*									*Real-time management reporting tools*					
		*								*Key performance indicators*					
*		*								*Business performance monitoring*					
				*						*SAP tool optimisation*	Process continuous improvement				
							*			*Total Quality Management*					
						*				*JIT tool*					
	*									*Process improvement tools*					
			*							*ISO standards*					
*			*							*Quality tools, training and broadband*					
	*	*								*Reductions in mail processing times and costs*	Defect reduction	**Customer satisfaction and operational efficiencies**	**The effectiveness of the lean tools used for continual improvement in customer value creation**	**Fit/Adapt**	**Theory 1**
			*							*Reduction in error rates*					
					*					*Reduction in waste resources*					
									*	*Reduction in equipment downtime*					
									*	*Reduction in maintenance costs*					
	*									*Improved customer satisfaction scores*	Problem-solving				
				*						*Problem-solving*					
							*			*Effective customer service delivery*					
			*							*Timely resolution of customer complaints.*					
*										*Provision of value-add services,*					
				*						*Service delivery effectiveness and efficiency*	Improved Operational efficiencies				
				*						*Optimising resource utilisation.*					
					*					*Fewer complaints from employees*					
						*				*Alignment with goals and capabilities*					
								*		*Reduction in safety incidents and improved safety scores*					
									*	*Improved asset reliability*					
*										*Processes efficiencies*					
*										*Data analytics for assessment*					
			*						*	*Root cause analysis*	Inspections	**Assessments**	**Monitoring deviations in the customer value creation processes**	**Complexity**	**Theory 2**
									*	*Issue investigation*					
			*							*Self-assessment*					
		*								*Performance evaluation*	Performance reviews				

		*				*		*		*Organisations encourage employees to report deviations*				
							*			*Customer satisfaction surveys*				
							*			*Customer complaints' feedback*				
			*							*Regular employee reporting systems*	Monitoring and Controlling Systems			
						*				*Log systems*				
						*				*Deviation management*		**Monitoring and controlling**		
	*		*							*Process auditing*	Auditing			
							*			*Service evaluation*				

5.13 Factors that can impede the successful implementation of lean practices within the public sector environment.

The third research question sought to identify factors that can impede successful implementation of lean principles within the public sector environment. The theme that emerged from the interview data was the context of the organisation.

5.13.1 Context of the organisation

SOE 1 Several issues in the context of the organisation that can impede the successful implementation of lean principles within the organisations. These factors aligned with other factors that emerged from the organisational documents. The document highlighted human resource challenges, such as talent gaps and high employee turnover, as factors that can deter organisations from achieving customer value creation. This was reaffirmed by participant number ten, who stated that financial constraints and insufficient training hinder critical plant support. This finding is consistent with the assertion of the document that improvement projects and maintenance are being impacted by liquidity issues, corroborating the lack of resources required to resolve plant failures. Participant ten stated the following:

> *We have issues such as lack of resources, training that is not adequate to address the needs, and financial issues such as lack of funding to support key critical failing plants* ***(#10).***

Interviewees expressed concerns about operational inefficiencies caused by aging plant infrastructure as an internal issue that can impact the implementation of lean principles. This reflected the organisational document's mention of plant obsolescence leading to maintenance challenges, including scarcity of spare parts, skills, and increased costs.

> *One internal issue is plant obsolescence due to aging; plant obsolescence makes maintenance problematic in terms of spares, skills, and cost* ***(#2).***

The interviewees highlighted the operational risks impacting plant operations, including potential plant failures and the unavailability of critical spares. This risk factor was not explicitly outlined in the documents but emerged as a concern during the interviews, indicating potential threats to the organisation's operational efficiency. One interviewee noted,

> *The risk of plant failures, the risk of critical spares not being available to support plant operation* ***(#3).***

Some interviewees emphasised the difficulties associated with bureaucratic laws that impede procurement processes, particularly the delays in acquiring essential spare parts caused by multiple approval procedures. The absence of detailed documentation on this element highlights the influence of regulatory obstacles on operational effectiveness.

> *The procurement turnaround times are hindered by the extensive number of signatures required to approve the purchase of a single spare part necessary for a crucial plant **(#12**).*

Furthermore, the documentation identified certain internal difficulties, such as limited access to funds and outdated facilities, while the interviews uncovered further intricacies encountered by the organisation. The interviews provided detailed and subtle viewpoints on other internal issues that the organisation confronts, which were not included in the documents.

Turning now to the external factors, as emphasised in the document analysis. The environmental factors impacting the organisation were indicated. However, during the interviews, there was a lack of emphasis on these factors, suggesting that they might not be operationally relevant or understood by the interviewees. The interviewees highlighted the influence of political and community factors as external issues affecting operations. Participants noted that certain issues might be politically motivated or arise from the local community due to the remote locations of power stations, highlighting a disconnect between these external influences and operational understanding.

> *Some of the external issues might be politically influenced, and some of them are coming from the community. The power stations are situated far from the towns and cities **(#2).***

In their accounts of external issues, labour-related challenges and the impact of escalating fuel oil prices emerged during interviews as external issues affecting operations. These concerns were raised by the interviewees, indicating their significance in influencing operational aspects but were not explicitly documented. This is illustrated by the following quote:

> *External issues such as the strikes we had and the escalating fuel oil prices **(#6).***

SOE 2: Organisational internal issues include some human resource challenges, operational challenges, and infrastructural challenges. These challenges, as identified in the documents, serve as contingencies that could hinder the effective implementation of lean principles within the organisation. The corporate planning document highlighted workforce demobilisation affecting operational sustainability. A reduced workforce impacts the implementation of plans and strategies within an SOE, as a committed and adequately skilled workforce is required to adopt and sustain such strategies. This observation is illustrated by the following excerpts from the integrated report:

> *Workforce demobilisation contributes to non-delivery of supply* ***(SOE 2, Integrated Report, 2022, p. 23)***.

In addition, the document highlighted the inadequacies in infrastructure, such as the unavailability of critical port equipment, technological issues, maintenance problems, and issues with the railway asset base. This is illustrated by the following quote:

> *Unavailability of critical port equipment due to poor reliability, aging, and sourcing issues impedes operational efficiency* ***(Integrated Report, 2022, p. 44)***.

From the qualitative interviews of SOE 2, internal issues regarding port infrastructure constraints, deteriorating infrastructure due to climate change, and extreme adverse weather conditions were identified. As Participant #D stated:

> *Some of the internal issues we identify are port infrastructure constraints, deteriorating infrastructure due to climate change, and extreme adverse weather conditions* ***(#D).***

Additionally, interviews shed light on similar internal concerns, particularly highlighting a lack of initiatives to improve productivity and employee morale within the human resource space. The interviews also emphasised internal issues such as port infrastructure constraints and critical skills shortages, recognising the importance of this analysis in decision-making and strategy enhancement. The text is illustrated below:

> *One frustration that we have identified within the HR space is a lack of initiatives to address improved productivity and employee morale. (**#I**)"; "Internal issues, such as port infrastructure constraints or critical skills shortages. This analysis helps in decision-making and finding strategies to*

*enhance strengths, overcome weaknesses, control threats, and take advantage of opportunities. (**#B**)*

The alignment of the document analysis and interview findings emphasises a shared theme of internal issues, namely, limitations in infrastructure, climate-induced deterioration, and obstacles in productivity and morale among the workforce. The alignment represents the organisational recognition and acknowledgement of these internal challenges, highlighting their importance in decision-making and strategic planning. Recognising these concerns across various positions within the organisation through the interviews conducted implies a collective comprehension of the obstacles that must be approached for efficient decision-making and enhancement techniques.

The excerpt from the interviewees highlights the utilisation of the PESTEL framework to assess various external factors that might affect the organisation, including political, economic, social, technological, environmental, and legislative issues. This approach aligns with strategic analysis practices commonly employed by organisations to understand the impact of the external environment on their operations. The interview quotes are as follows:

*We use the normal PESTEL to sort of get a bird's eye view, so the PESTEL is political issues, economic issues, social issues, technological issues, environmental issues, and legislative issues that can affect our business **(#A)**.*

Furthermore, some participants reflected on the external factors monitored by intelligence departments and corporate affairs. Political, environmental, and market share issues involve thorough monitoring of various external elements that can significantly impact an organisation. These findings correspond to the document analysis results, which emphasised the surveillance of political, environmental, and market share concerns. Both sources highlight the significance of monitoring external factors that can influence the business environment. This is illustrated by the following extract from the document:

*External issues, including intelligence departments and corporate affairs, which monitor political, environmental, and market share issues (**#G**).*

The observation that once customers migrate to digital alternatives, they are unlikely to revert suggests a fundamental change in customer preferences. This migration to digital platforms poses a challenge for organisations to adapt and cater to evolving customer needs and preferences in the digital landscape. Additionally, the interviews highlighted the importance of

conducting situational analyses and environmental scans, which are shared and reviewed during management reviews. This practice involves assessing how traditional business models are lagging rapid technological advancements and evolving social trends. Such analyses enable the organisation to understand its position within the changing market landscape and identify areas requiring adaptation or innovation.

> *Externally, we closely monitor market trends, customer feedback, and industry developments to identify factors such as changing customer preferences, competitive pressures, and regulatory changes that could influence our ability to achieve our goals (**#I**).*

***SOE 3**:* From the document analysis, several internal issues within the organisation have been highlighted, namely, logistic reliability issues, funding constraints, organisational restructuring for operational enhancement and digital transformation. The document notes challenges with the chrome and magnetite channels due to locomotive reliability issues. This is attributed to the nonavailability of original equipment manufacturer (OEM) spares and a high incidence of theft and vandalism, indicating logistical and security challenges affecting operational efficiency.

> *The chrome and magnetite channels are also experiencing locomotive reliability issues due to the non-availability of OEM spares and high incidents of theft and vandalism **(SOE 3, Strategic Plan, 2022, p. 28).***

Furthermore, the strategic plan indicates that new business initiatives face delays or are not brought to market due to funding constraints. The cost of development is high, while the return on investment (ROI) is uncertain, indicating that financial challenges hinder the development and launch of new products.

> *New business initiatives are not taken to market or extensively delayed because funding is not available to develop the product, and the cost of development is exponential, while the return on investment (ROI) is not realised **(SOE 3, Strategic Plan, 2022, p. 10).***

While the document emphasises the need for organisational restructuring and digital transformation, the interviews focused more on issues related to reporting, communication gaps, and inconsistencies in issue resolution methodologies. There seems to be less emphasis in interviews on the documented plans for infrastructural enhancements. For example, a

common view among interviewees was the lack of feedback from managers, communication issues, organisational culture, system obsolescence, and lack of skilled employees. The following interview extract was used:

> *The issue of determining issues in the organisation is unclear due to numerous issues on the floor that are reported to managers without receiving feedback. The organisational culture within the organisation is challenging, along with system obsolescence.* ***(#V)***

The interviewee highlighted that numerous issues are reported but not effectively addressed due to the lack of feedback from managers. This issue of unclear communication channels or insufficient feedback loops regarding reported problems is not explicitly highlighted in the organisational documents. Furthermore, one interviewee noted challenges related to the organisational culture affecting communication. However, the documents might not explicitly outline these cultural challenges as internal issues impacting communication within the organisation. This is illustrated by the following:

> *We don't sit and discuss it from the point of view of the customer, and unless it's discussed at the management meeting, the feedback is never given to us unless you have an action to take. This is really a culture that will need to change so that we can implement the strategies* ***(#VIII).***

Table 28: Mapping findings on the implementation of lean principles within the public sector environment from SOE 1

RESEARCH QUESTION 3: What factors can impede the successful implementation of lean principles within the public sector environment?												**# SOE 1**					
Doc label	**Participants Assigned Labels**												**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D1	**#1**	**#2**	**#3**	**#4**	**#5**	**#6**	**#7**	**#8**	**#9**	**#10**	**#11**	**#12**						
*												*	*Inadequate employee training*	*Human resource challenges*	**Organisational Internal Issues**	*Factors impacting organisational goals*	***Context***	***Theory 1***
*													*Attract and retain critical skills*					
*													*Skill gaps*					
*													*Employee turnover*					
	*												*Employee complaints*					
*													*Fraud*	*Integrity issues*				
*													*Criminality*					
*													*Corruption*					
							*						*Performance-related issues*	*Operational efficiency challenges*				
			*						*				*Operational risks*					
													Policy and procedure modification					
*													*Water usage*					
*													*Leadership challenges*					
*													*Culture of accountability*					
*													*Safety prioritisation*					
*													*Cost-cutting measures*					
*													*Financial planning and budgeting*	*Financial challenges*				
*													*Liquidity challenges*					
*													*Financial support*					
*	*			*							*	*	*Lack of/inadequate funding*					
								*					*Inadequate log writing*	*Infrastructure and resources challenges*				
												*	*bureaucratic regulations*					
									*				*Unavailability of critical spares*					
				*		*					*		*lack of resources*					
*		*											*Maintenance issues*					
*													*Infrastructure development*					
		*											*Plant obsolescence*					
								*	*				*Risk of plant failures*					
*													*Weather*	*Environmental factors*	**Organisational external Issues**			
													Negative emissions					
*													*Climate change with a risk of load losses*					
*													*Economics and environmental requirements*					
*	*												*Power accessibility issues and outages*					
*													*Loadshedding due to wet coal from the rain*					
*													*Security of supply*					
*	*												*Political influence*	*Regulatory and political factors*				

*													*Government cooperation*				
*													*Legislation*				
*													*Stakeholder requirements*				
						*						*	*Fuel/oil prices escalation (Inflation)*				
												*	*National treasury regulations*				

Table 29: Mapping findings on the implementation of lean principles within the public sector environment from SOE 2

RESEARCH QUESTION 3: What factors can impede the successful implementation of lean principles within the public sector environment?										**# SOE 2**					
Doc label	**Participants Assigned Labels**									**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D2	**#1**	**#2**	**#3**	**#4**	**#5**	**#6**	**#7**	**#8**	**#9**						
		*				*				*Critical skills shortages*	Human resource challenges	**Organisational internal Issues**	*Factors impacting organisational goals*	***Context***	***Theory 1***
*										*Workforce demobilisation*					
								*	*	*Lack of initiatives and employee morale*					
										Competitive strength	Operational challenges				
*										*Operational sustainability*					
*										*Supply quality and reliability*					
*										*Availability of resources*					
*										*Loadshedding impact*					
*										*Supply chain issues*					
*	*				*					*Technological issues (advancement, adoption etc.)*	Infrastructural challenges				
*										*Maintenance problems*					
*										*Unavailability of equipment*					
*										*Railway asset base, and terminal operator licences*					
*		*		*						*Port infrastructure contraints, and Infrastructure issues*					
*										*Vandalism*					
*										*Theft*					
										Illegal connections					
*	*									*Social issues*	Social environmental factors	**Organisational external Issues**			
			*		*		*			*Environmental issues*					
	*						*			*Political issues*	Regulatory and political factors				
	*									*Economic issues*					
	*							*		*Legislative issues*					
*										Trading conditions	Market and weather challenges				
*				*						*Extreme adverse weather condition, and infrastructure deteriorating effect*					
							*			*Market share issues*					

Table 30: Mapping findings on the implementation of lean principles within the public sector environment from SOE 3

RESEARCH QUESTION 3: What factors can impede the successful implementation of lean principles within the public sector environment?										**# SOE 3**					
Doc label	**Participants Assigned Labels**									**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D3	**#I**	**#II**	**#III**	**#IV**	**#V**	**#VI**	**#VII**	**#VIII**	**#IX**						
	*						*			*Knowledge gaps*	Human resource challenges	**Organisational Internal Issues**	*Factors impacting organisational goals*	**Context**	**Theory 1**
					*					*Lack of skilled employees*					
*										*Security concerns*					
*										*Supply chain issues*	Operational efficiency challenges				
*										*Return on investment (ROI) not realised*					
*										*Delayed projects*					
*										*Instant and reliable operations challenge*					
*										*Integration issues*					
*										*Business unit collaboration issues*					
*	*									*Resources required to serve customers*					
	*									*Bottlenecks and Resource constraints*	Infrastructure and resources challenges				
*										*Optimisation challenge*					
					*					*System obsolescence*					
*										*Equipment reliability and maintenance issues*					
*										*Infrastructure challenges*					
		*								*Commitment of leadership*	Leadership and communication challenges				
					*			*		*Lack of feedback from managers*					
*					*			*		*Communication issues*					
*										*Lack of funding*					
		*			*					*Organisational culture*					
						*	*			*Lack of employees' involvement*	Employee engagement challenge				
								*		*Lack of customer-centric approach*					
									*	*Problem reporting and escalation*					
*				*						*An adoption of digital technologies and e-commerce challenge*	Technology advancement challenges	**Organisational external Issues**			
*		*		*						*Embracing technological advancement*					
	*									*Regulatory changes*	Regulatory and political factors				
			*							*Political issues*					
*										*Labour unrest*					
	*									*Competitive pressures*	Market challenges				
	*	*								*Market trends*					
*										*Customer behaviour change*					

5.14 LEAN STRATEGIES USED TO ELIMINATE WASTE IN THE PUBLIC SECTOR

The fourth research question aimed to determine appropriate lean strategies that can be used to eliminate waste in the public sector. In answering this research question, the study has two interview questions, namely, identifying waste or non-value-adding activities in customer value creation processes and identifying lean strategies used to eliminate waste in customer value creation.

5.14.1 Waste or non-value-adding activities

SOE 1: The interview data showed that both the document review and interviews highlighted waiting as a significant form of waste. Document review mentions waiting/delays as a subcategory of waste, while interviews emphasise instances where people are waiting to be told what to do or where processes lead to idle time. Participant 1 stated the following:

> *I describe it as working with people who are always waiting to be told what they should do **(#1).***

Some of the wastes that were mentioned by the interviewees were not necessarily mentioned in the documents of the organisation; one of the participants highlighted the efficiencies related to meetings that do not add value and are seen as time-wasting. In addition, multiple interviewees mentioned redundant or ineffective meetings that contributed to waste.

> *We also have many meetings that deal with the same issues...this doesn't add value to the way we run things **(#4)**.*

> *We have long lead times and meetings that really don't add a lot of value **(#6).***

Furthermore, while both the document and interview findings show agreement on waiting and ineffective meetings as forms of waste, the document review focuses on broader operational inefficiencies such as inventory mismanagement, plant breakdowns, and noncompliance with norms. On the other hand, interviews delve more deeply into specific examples such as spillage and duplicative processes.

SOE 2: Findings from interviews emphasised the association between increased inventory levels and the impact on expenses, highlighting the cost implications of maintenance activities and supply lead times. Other interview participants identified regulatory red tape within procurement processes as a form of waste, resonating with the document's discussion on

inefficiencies stemming from inadequate planning and management processes. Some interviewees linked delays, cost overruns, cable theft, and vandalism to waste within the organisation, aligning with the document's mention of operational challenges due to external factors such as vandalism and maintenance backlog. Others identified process inefficiencies such as email errors and improper resource allocation.

> *Red tape for me within the procurement processes that I feel like at times it is become. It is a waste in the sense that some of the other processes that we are undertaking to me; they don't add value* ***(#D)***.

In general, these interviews confirm and enhance the conclusions of the document by providing direct insights into different waste factors within SOE 2. The importance of tackling operational inefficiencies, technological obsolescence, integrity challenges, and connecting lean tactics with organisational goals to effectively eliminate waste and boost performance is emphasised.

SOE 3*:* Interestingly, the interviews revealed that the duplication of applications was not limited to a specific department or team within the organisation. Instead, they were found across multiple departments, often leading to confusion and delays in making critical decisions. As the participant noted,

> *There are so many unnecessary steps and delays across the departments, and some of the duplications of the processes really don't add value and ends up confusing the employees* ***(#VII)***.

Some participants highlighted issues such as excessive wait times, redundant paperwork, and low employee productivity, aligning directly with the challenges of inefficient sorting processes and high error rates mentioned in the document analysis. Similarly, other participants emphasised the impact of obsolete technology and long waiting times, echoing concerns about outdated hardware/software and power outages detailed in the strategic plan. Their response to identifying some of the nonvalue activities was as follows:

> *…long queues for grant collection are a waste of people's time; and many citizens complain about waiting time for vehicle license disks; they wait for a long time, over 4 weeks, for disks to arrive; other branches only have a few tellers working; missing parcels; and the system is glitched, leading to late processing of grants* ***(#II)***.

*Waste within the branch includes excessive wait times for customers, a lot of redundant paperwork, inefficient sorting and delivery processes, customer complaint feedback, long queue times, low employee productivity, delivery delays, high error rates, and excess inventory **(#I)**.*

5.13.2 Lean strategies used to minimise waste in customer value creation.

SOE 1: The interviews emphasise that operational plans are influenced by customer needs and objectives derived for a given year, as well as by divisional plans communicated from the head office. This aligns with the document review, which mentions that the operational plan is influenced by external factors such as customer requirements and the objectives set for the year. Interview quote from participant 2:

*The operational plan is influenced by customer needs as well as the objectives that are derived for that year. The operational plan is also influenced by the divisional plan that is communicated from the head office **(#2).***

The interviews also delved deeper into operational strategies such as production planning, resource planning, and project planning. In contrast, the document review primarily highlights broader organisational strategies such as ISO implementation, supplier segmentation, and warehouse management system implementation. Furthermore, a discrepancy between top-down strategy formulation and the lack of involvement or awareness among operational staff, as highlighted by the artisan in the interview, suggests a significant challenge within SOE 1's strategic implementation. The participants' sentiment of not being made aware of strategies until auditors are present underscores a communication breakdown within the organisation. :

*Most of the strategies are coming from our managers, and we are not even made aware, so we find out when the auditors are here. I feel that we as artisans are not even given a chance to weigh in on the strategies **(#8)**.*

SOE 2: The Integrated Report of SOE 2 emphasises a strategic approach to customer value creation, focusing on an ethical and safety-focused culture, a sustainable work environment, and a resilient response to external factors such as the COVID-19 pandemic. The strategy prioritises operational stability, investor confidence, and short-term priorities. It also emphasises strategic partnerships and a renewed shareholder compact, aiming to streamline operations, ensure sustainability, and deliver value to customers. This is illustrated by the following extract:

*Strategies to create or sustain value Potential trade-offs. Driving an ethical culture to support the company's long-term viability. Embedding a zero-harm safety culture across operations: follow 100% of our safety rules, 100% of the time (**SOE 2, Integrated Report, 2022, p. 18).***

*The Board held a strategy workshop in 2022 to accelerate the delivery of the Growth and Renewal Strategy, focusing on restoring rail and port assets, prioritising investment resources for high-margin flows, and facilitating partnerships. The strategy relies on stable operations and investor confidence **(SOE 2, Integrated Report, 2022, p. 25).***

The interview insights from SOE 2 offered a more granulated view of the strategies in place to enhance customer value creation. A variety of perspectives were expressed that highlight a decentralised strategy framework in which each department aligns its strategies with the overarching organisational goals, emphasising a tailored approach for optimal alignment. This echoes the organisation's emphasis on port strategies, as documented and aligned with the organisation's broader objectives. For example, one participant emphasised the cascading nature of strategies from a business enablement standpoint, focusing on relationship management and the adoption of commercial best practices across divisions. This aligns with the strategic emphasis on fostering strong relationships with corporate customers and rolling out commercial best practices, as outlined in the document analysis.

*Our business enablement leg develops strategies and then cascades to other divisions. This strategy includes managing the relationship with our corporate customers and rolling out commercial best practices across the group **(#C)**.*

Additionally, other participants reflected on strategies aimed at tackling external challenges such as cable theft through policy enforcement and technological investment, consistent with the document's focus on addressing challenges in infrastructure and combating theft through technological advancements. This is illustrated by the interview quote below:

*The organisation has formulated policies to enforce security and works with external law enforcement agencies to tackle cable theft **(#E).***

Finally, a common view among interviewees highlights the involvement of engineers in resource allocation for capital projects, ensuring adequate funding and execution, resonating

with the document's focus on strategic funding allocation and execution for operational improvement.

> *Engineers provide input on resource allocation for capital projects, including budget estimates, resource requirements, and timelines, to ensure adequate funding and execution **(#I)**.*

SOE 3: Insights from the interviewees articulated apprehensions voiced by Participants III and VII. Their discourse highlighted a disconnect between the strategic plan and the current state of the organisation's ICT infrastructure. Interviewee #III expressed concerns about the lack of resources allocated to upgrading hardware and software, which could hinder the successful implementation of new technologies and impede service delivery. These concerns notably revolve around the top-down approach arising from strategic plans not aligning adequately with the everyday operational realities experienced within the organisation. This difference contrasts with the Strategic Plan's clear focus on technology adoption and new initiatives, which seem to put more weight on big-picture technological advances without considering real-world effects and operational details at the same time.

> *The leadership team in our organisation makes strategic decisions without input from employees, leading to a top-down approach that limits the effectiveness of strategies. This top-down approach results in strategies that don't align with the realities of our work, leading to unnecessary hurdles and inefficiencies. Employees are expected to follow these decisions without question **(#III)**.*

Furthermore, insights from the interviews underscored the importance of aligning strategies with customer interactions. This perspective also highlights the value of involving frontline employees, such as tellers, in the strategic formulation process, given their direct and substantial interactions with customers. This emphasis echoes the document's strategic direction focusing on the establishment of digital platforms to strengthen global competitiveness and signifies the alignment between the frontline perspective and the organisational strategic intent highlighted in the document analysis. By involving frontline employees in the strategic formulation process, the organisation can tap into their valuable insights and experiences to better understand customer needs and preferences. The comment below shows that the alignment between the frontline perspective and strategic intent not only ensures that customer interactions are in line with the overall business objectives but also

enhances the organisation's ability to deliver a seamless and personalised customer experience through digital platforms. This highlights the recognition that frontline employees are not only the face of the organisation but also key contributors to its success in the increasingly competitive global market.

> *In my view, a lot of strategies are used, such as communication strategies and training people on what adds value and what does not add value, but that cannot come as a strategy from the managers without talking to us as tellers, because the customers talk to us* ***(#VII)***

Table 31: Mapping findings on wastes and lean strategies that can be used to eliminate waste in the public sector from SOE 1

RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector?												**# SOE 1**					
Doc label	**Participants Assigned Labels**												**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D1	**#1**	**#2**	**#3**	**#4**	**#5**	**#6**	**#7**	**#8**	**#9**	**#10**	**#11**	**#12**						
						*						*	*Long lead times/poor planning*	Waiting/delays	**Waste of lean**	**Identification of waste or non-value-adding activities in the customer value creation processes**	**Fit/Adapt**	**Theory 1**
*	*	*		*			*				*		*Work/tasks delay*					
		*											*Project timeline delays*					
			*	*		*							*Meetings that do not add value*	Unnecessary motion				
*													*Deferring scheduled maintenance*					
				*									*Duplication of roles*					
										*			*Redundant inspections*					
	*						*						*Lack of initiative and Idle workers*					
		*											*Unreliable stakeholders*					
												*	*Poor communication*					
							*			*			*Excessive steps and bottlenecks*	Operational inefficiency				
				*		*							*Process complexity and duplication*					
						*	*						*Inefficient workflows*					
*		*											*Financial waste/mismanagement*					
*													*Lack of visibility of spend*					
*													*Lack of data and trends analysis*					
*													*Inventory management and supply chain management issues*					
*													*Litigation challenges*					
*													*Lack of compliance*					
*													*Lack of service availability*					
*													*Logistics challenges*					
*													*Procurement irregularities*					
*													*R5 billion fruitless and wasteful expenditure*					
*													*Reputational damage*					
*													*Regulatory noncompliance*					
*													*Criminal conduct and theft*					
*													*High financial losses*					
*													Capacity constraint	Plant breakdowns				
*													*Infrastructure challenges*					
*													*Equipment failure and deterioration*					
											*		*Lack of critical plant spares*					
		*			*	*		*					*Incidents of plant defects*					
											*		*Load shedding*					
		*			*				*				*Poor quality/Non-conformances incidents*	Defects				
*													*Coal-related load losses*					
												*	*Outage slips*					
*													*Wasteful production*					
			*		*								*Spillages*					

*												*Performance shortfall*				
											*	*Costly mistakes*				
				*					*			*Rework*				

CON'T: RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector?													# SOE 1					
Doc label	**Participants Assigned Labels**												**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D1	**#1**	**#2**	**#3**	**#4**	**#5**	**#6**	**#7**	**#8**	**#9**	**#10**	**#11**	**#12**						
						*	*						*Identify critical areas that can hinder success*	Environmental strategy	**Continuous performance measurement**	**Lean strategies used to eliminate waste in the customer value creation**	**Strategy**	**Theory 1**
							*						*Identification of organisational strengths, weakness, opportunities, threats,*					
										*			*Generation turnaround strategy*	Mitigation strategy				
					*								*Capacity loss reduction strategy*					
*													*Reducing nontechnical losses*					
*													*Use of blockchain technology*					
*													*Revenue generation and assurance, and cost savings*					
*													*Oversight and transparency*					
*									*				*Addressing issues and price verification*					
									*				*End load shedding*					
												*	*Utilising Mean time between failures (MTBF) tool*					
		*											*Risk management plan*	Risk management strategy				
		*											*Project risks matrix*					
*													*Price variances report*					
									*				*Declining energy unavailability*					
									*				*Unplanned energy loss factors*					
					*								*Unplanned capability loss factor*					
			*										*Adequate resources availability*	Resource planning strategy	**Continuous performance improvements**			
			*			*							*Resource planning*					
								*					*Securing quality materials*					
								*					*Negotiation focused on favorable terms*					
											*		*Cost optimisation*					
				*					*				*Long term and short-term strategies,*	Operational excellence strategy				
*													*Minimising interfaces with multiple suppliers*					
		*										*	*Setting organisational KPIs and objectives based on customer needs*					
						*							*Production planning and project planning*					
	*					*				*			*Developing sound business and operations plans*					
				*								*	*Assessment of current performance*					
*													*Effective stock/ inventory management*					
*													*Warehouse management system*					
*													*Business operations, policy and efficiency*					
*													*Billing & customer interface Analytics*					
*													*Supply chain and contract management*					
												*	*Regular monitoring*					
	*												*ISO Standard*					
				*									*Plant life plan alignment*	Maintenance strategy				
					*								*Reduce loss of capacity incidents*					
											*		*Assurance of equipment uptime and safety*					
										*		*	*Maintenance efforts*					

	*	*											*Leadership and communication from top to different sections of the organisation*	Strong relationship strategy			
	*							*					*Building strong interdepartmental relationships*				
*													*Strengthening suppliers' relationship and shared value approach*				
*													*Augmentation with external capacity*				
								*					*Creating support culture*				
											*		*Organisation broader goals alignment*				
*													*Control fraudulent transactions*	Security Strategy			
*													*Robust fraud analytics platform*				
*													*Reporting (misconduct)*				

Table 32: Mapping findings on wastes and lean strategies that can be used to eliminate waste in the public sector from SOE 2

RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector?										**# SOE 2**					
Doc label	**Participants Assigned Labels**									**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D2	**#A**	**#B**	**#C**	**#D**	**#E**	**#F**	**#G**	**#H**	**#I**						
	*	*								*Long queues, and waiting times for customers*	Waiting/delays	**Waste of lean**	**Identification of waste or non-value-adding activities in the customer value creation processes**	**Fit/Adapt**	**Theory 1**
*										*Procurement delays*					
	*	*		*						*Delivery delays and customer complaints*					
	*									*Low employee productivity*	Unnecessary Motion				
					*					*Frustration*					
					*		*			*Inefficiency in tool usage*					
			*							*Projects that don't provide value for money*					
					*	*				*Lack of communication*					
	*						*			*A lot of redundant paperwork and unnecessary steps*	Operational inefficiency				
*										*Inefficient processes, and system*					
*										*Operational challenges*					
*										*Cost increase*					
*										*Maintenance backlog*					
										Ineffectiveness value chain					
									*	*Disruptions in postal operations.*					
	*	*								*Inefficient sorting and delivery processes*					
*		*	*							*Criminal conduct leading to loss of parcels*	Integrity issues				
*										*Cable theft*					
*										*Vandalism*					
*										*Inventory demand management*	Poor leadership				
*										*Poor inventory planning*					
*										*Non-delivery of strategic objectives*					
*										*Irregular expenditure*					
*			*							*Fruitless and wasteful expenditure on corrupt contracts*					
							*			*An unsupportive culture*					
		*							*	*System glitches, and asset reliability*	Plant breakdowns				
*										*intermittent power cuts*					
		*								*Obsolete technology*					
*									*	*Equipment downtime and system breakdown*					
*										*Turnaround time*	Defects/Mistakes				
	*			*						*High error rates*					
	*									*Excess inventory*					
				*				*		*Rework levels*					

CON'T: RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector?										**# SOE 2**					
Doc label	**Participants Assigned Labels**									**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D2	**#A**	**#B**	**#C**	**#D**	**#E**	**#F**	**#G**	**#H**	**#I**						
							*			*Addressing resistance to change*	Mitigation strategy			**Strategy**	**Theory 1**

										Remedial plans		**Continuous performance measurement**	**Lean strategies used to eliminate waste in the customer value creation**	
								*		*Lean Six Sigma principles*				
								*		*Quality improvement*				
*										*Safety procedures*	Risk management strategy			
				*				*	*	*Timely and cost-efficient project completion*				
*										*Risk assessment*				
							*			*Change management*				
						*				*Environmental scan and analysis*	Environmental scan strategy			
*						*				*Competitive analysis*				
						*				*Market trend analysis*				
						*				*Regulatory change analysis*				
*						*				*Economic conditions*				
									*	*Resource allocation*	Resource planning strategy	**Continuous performance improvements**		
									*	*Resource requirements*				
									*	*Budget estimates*				
							*			*Training*				
					*					*Technology utilisation*				
					*					*Technology investment*				
	*						*			*Process and efficiency improvement*	Operational excellence strategy			
	*									*Standardisation, and efficiency*				
*	*		*				*			*Organisational strategy*				
				*						*Application of project management tools*				
			*							*Top-down communication*	Strong relationship strategy			
			*							*Relationship management*				
		*					*			*Goal alignment and mending gaps*				
				*						*Project transparency*				
					*					*Countering theft*	Security Strategy			
					*					*Security measures for vandalism*				
					*					*Collaboration with law enforcement*				
*										*Improving working environment and conditions*	Inclusive culture			
*										*Safety culture and management*				
*										*Building culture of inclusivity and accommodating*				
*										*Employee well-being and safety*				
*										*Performance excellence and innovation*	Strategic leadership strategy			
*										*Investment prioritisation*				
*										*Financial position improvement*				
*										*Facilitating partnerships*				
*		*	*							*Strategic and initiative planning*				

CON'T: **RESEARCH QUESTION 4:** What lean strategies that can be used to eliminate waste in the public sector?											# SOE 3				
Doc label	**Participants Assigned Labels**									**Codes**	**Sub-Codes (Categories)**	**Themes**	**Aggregated Themes**	**Theoretical Dimensions**	**Specific Theory**
#D3	**#I**	**#II**	**#III**	**#IV**	**#V**	**#VI**	**#VII**	**#VIII**	**#IX**						
				*						*Waste reduction*	Mitigation strategy	**Continuous Performance Measurement**	**Lean strategies used to eliminate waste in the customer value creation**	**Strategy**	**Theory 1**
				*			*			*Continuous improvement and efficiency improvement*					
				*						*Process optimisation*					
*										*Remedial action*					
*										*Assessment of issues through strategic forums*	Risk management strategy				
										Change management					
*										*Safety strategies and management*					
				*						*Inventory management*					
							*			*Data-driven decision-making strategies*	Resource planning strategy	**Continuous performance improvements**			
			*				*	*	*	*Employees skills and strategy training*					
					*					*Digital transformation strategy*					
					*					*Modernisation strategy*					
*										*Innovation*	Operational excellence strategy				
*										*Global competitiveness*					
	*				*	*	*	*		*Effective Communication strategies*	Strong relationship strategy				
		*	*							*Strategy is cascaded down to different sections of the organisation*					
		*	*			*				*Leadership defines strategy and operation plan*	Strategic leadership strategy				
	*		*		*					*Leadership*					
*										*Digital markets and transformation*	Technology Adoption strategy				
*										*E-commerce*					
*										*Fourth Industrial Revolution*					
*										*ICT investment*					
*										*Infrastructure development*					

5.15 CHAPTER SUMMARY

This chapter thoroughly examined the data collected from three state-owned enterprises that were included in the study. First, it examined documents originating from the three SOEs and interviews conducted with the participants. The document analysis instrument, as outlined in Appendix 1, illustrates the intercorrelations between the layers of lean that support the study. The study topics aim to explore several aspects of lean manufacturing by utilising the feasible systems theory and the contingency theory. Research question 1 aimed to examine the components of value as the public sector perceives them.

The research instrument consisted of two sub-questions pertaining to the contingency theoretical framework of leadership and two sub-questions concerning the viable theoretical framework of viability. Research question 2 sought to understand the key factors that determine the appropriateness of lean technologies in the public sector. The inquiry included three subordinate inquiries that were linked to the contingency theoretical notion of fit or adaptation. Research question 3 sought to examine the barriers that may impede the successful implementation of lean concepts in the public sector. The inquiry consisted of two sub-questions pertaining to the contextual facets of contingency theory and three sub-questions concerning the intricacy features of viable systems theory. Research question 4 sought to examine the lean tools that can be utilised to reduce waste in the public sector. This research subject comprised two interrelated investigations, which were examined within the framework of contingency theory and strategy. In general, each theory contains specific yet interconnected research questions that investigate the worth, obstacles, tactics, and elements that influence the implementation of lean practices in the public sector. The subsequent segment of the investigation delineates the categories of documents scrutinised for this research. The study identifies themes based on the analysis of documents and the content of the interviews. The next chapter discusses the findings, focusing on the interpretation of the data supplied in this chapter and its connection to relevant literature and the completed document analysis.

CHAPTER SIX

SUMMARY OF FINDINGS

6.1 INTRODUCTION

The preceding chapter described the collection of qualitative data obtained from three state-owned entities through interviews and document analysis. This chapter extensively explores the emergent themes structured around the research questions that guided the study. It employs contingency theory and viable systems theory as frameworks to interpret the findings, integrating these insights with comparisons to the literature review that underpinned the research. Triangulating the emergent themes with information from document analysis, literature review, and interviews further enriches the analysis and results in a thematically categorised discussion. The discussion is structured according to the four research questions that formulated this study. The arguments are grouped according to the themes identified in the primary data for each research question. Finally, the chapter presents a framework for the adoption of lean manufacturing principles for state-owned entities in South Africa.

6.2 RESEARCH OBJECTIVES AND QUESTIONS

The main objective of this study was to develop a framework for the adoption of lean manufacturing principles for state-owned entities in South Africa. The study was guided by four research objectives:

6.2.1 Research objectives

To achieve the main objective, the following secondary research objectives were used:

a) To identify the constituents of customer value from a public sector perspective.
b) To explore the critical factors that determine the applicability of lean principles in the public sector.
c) To determine lean strategies that can be used to eliminate waste in the public sector.
d) To identify factors within public sector structures that can potentially impede the successful elimination of waste and thus hinder lean implementation.

6.2.2 Research questions

The study was guided by four research questions as follows:

i. What constitutes value from the public sector perspective?

ii. What factors can impede the successful implementation of lean practices within the public sector environment?

iii. What lean strategies can be used to eliminate waste in the public sector?

iv. What are the critical factors that determine the applicability of lean tools to new settings?

To answer these questions, which were drawn from an extensive literature review, the researcher conducted a review of six documents from the respective state-owned entities (SOEs) and followed it with thirty (30) qualitative interviews with purposively selected participants from the three SOEs.

6.3 DISCUSSION OF THE FINDINGS

This section discusses the main themes that emerged under each research question to achieve the main objective of the study.

6.3.1 What constitutes value from the public sector perspective?

The investigation into the value constituents for the public sector has yielded valuable insights that shed light on the complexities and distinctions involved in successfully implementing lean principles for public sector organisations. The study engaged three SOEs that seek to adapt lean manufacturing principles, uncovering multifaceted challenges and considerations that impact the successful application of lean principles and tools. In Section 3.8.1 of this study, the researcher explored through the literature the prominent concerns raised by other researchers regarding the specification of customer value within the public sector framework. Researchers contend that when lean principles are extended to broader applications such as the public sector, the notion of customer value must transition to that of public value (Elias, 2014; Bateman et al 2013; Radnor et al 2011; Maarse & Janssen, 2012).With government customers also being taxpayers, there is an inherent need for public sector organisations to strike a balance between service delivery and efficiency. This dual role necessitates a balance between the government mandate for service delivery and the organisational mandate for efficiency, making the creation of customer value a complex process (Maarse & Janssen, 2012).

Furthermore, a broader perspective of public value has been adopted in Chapter 3, Section 3.8.1 of this study, which presented a summary of public value measurements, encapsulating dimensions such as outcome achievement, trust and legitimacy, service delivery quality, and efficiency (Benington, 2011; Bannister & Conolly, 2014; Karkin & Janssen, 2014). These dimensions have significantly enriched the comprehension and assessment of public value across diverse contexts (Faulkner & Kaufman, 2017). However, these measures of public value lack validation. Hence, in this section, the aim of this research is to ascertain the extent to which these dimensions contribute to value creation from the perspective of the public sector. In the current study, the primary themes that emerged regarding value creation are as follows: leadership ensuring value creation based on customer needs, resources required to create value, and departments working together to create value and important factors to improve customer value creation. These themes will be expounded upon in detail in the subsequent section, providing a comprehensive exploration of their implications within the context of our study.

6.3.1.1 Theme 1: Leadership ensuring value creation based on customer needs.

The observable emphasis within the SOEs reveals a deliberate focus from the leadership of the organisation to create customer value. According to the interviews conducted across the SOEs, as detailed in Chapter 4, Section 4.5 of the research, the leadership within these organisations comprises the board of directors, executives, organisational top management, and middle managers. The board of directors and executives are more involved in strategy definition, and senior and middle management are more involved in strategy cascading and operational alignment, laying the foundation for value creation. The findings reveal that the board of directors and executives are more involved in strategy definition and senior and middle management more involved in strategy cascading and operational alignment, laying the foundation for value creation. Furthermore, the study identified that leaders of operational units and business areas across the three state-owned entities translate business-unit-specific plans, strategies, and balanced scorecards and align their organisations with the corporate strategy. The interview data provided insights into how middle managers within the SOE's connect various levels of the organisation to achieve customer value. These finding aligns with Bodhanya's (2015) insights from the viable systems theory, which suggest that middle managers act as intermediaries between senior management and operational teams and thus function as the "internal eye," that coordinates operations in core business units to facilitate efficient communication and interactions. This oversight helps avoid bottlenecks, suboptimal production planning, and internal

conflicts within the organisation and thus aids value creation, as noted by Garcia, Reyes, and Garcia (2018).

Finding 1: Middle managers in the SOE's are responsible for breaking down complex strategies from top management into manageable tasks and ensuring that they are effectively communicated to employees. By serving as a link between top management and staff, middle managers help streamline complex organisational structures, bureaucracies, and government oversight towards value creation.

Another issue regarding leadership creating customer value that emerged from the data is that of complex stakeholder landscape within the state-owned entities. Some participants from the SOE's voiced their concerns about multiple stakeholders within their environment will often delay some approvals due to national treasurer requirements, or signatures from other internal stakeholders that are higher up in the rank in their value chain. In reviewing the literature, researchers agree that the process of value creation by the leadership of an organisation requires the involvement of all internal and external stakeholders (Chay et al 2015; Gülyaz et al 2019). In addition, Moore (2014) agrees that the pursuit of public value requires the support of key external stakeholders, such as government, partners, users, interest groups and donors. Public sector decision makers must be accountable to these groups and to engage them in an ongoing dialogue and build a coalition of support to create this platform of legitimacy. Hence, the value stream should cover all the interested parties in order to provide value and eliminate waste (Ramly, 2020). The data also provided substantial evidence in support of the viable systems theoretical view which states that, an overview or acknowledgement of the key stakeholders in the leadership approaches to create customer value reflects the policy subsystem in the viable systems model, which defines the policy of the organisation according to the objectives planned by the shareholders, board, CEO and other stakeholders (Dominici & Palumbo, 2012).

In addition, it was observed that the leadership approaches to value creation tend to focus on the strategies that are driven from the top part of the organisation, where the middle managers enable execution of the corporate plan throughout the organisation, while the bottom part which involves employees and other stakeholders that need to be involved to ensure value creation is largely ignored. This concern was evident across the three SOE's and raised by 18 out the total of 30 participants which mostly was from the skilled and semi-skilled workers. Contrary to earlier findings, however no

evidence which emphasises the importance of involving internal stakeholders, including shopfloor workers, in strategic decisions related to lean manufacturing principles as pointed out by previous studies was found across the cases. The findings did not show that that strategic decisions to create customer value in the SOE's are linked to the internal stakeholders (including shopfloor workers) although in instances employees were informed of the strategies that have already been developed. This observation is unfortunate, considering that several authors have highlighted that a critical success factor for value creation in lean has often been achieved by seeking input from employees at every level of the organisation, where leaders acquire vital insights into the issues and possibilities confronting the organisation. (Shah & Ward, 2007; Campen & Hertzberger, 2009; Gülyaz, 2019; Alnadi & McLaughlin, 2021).

Finding 2: The leadership of the organisation do not structure their strategies to consider the multiple stakeholder context, especially bottom level employees to ensure buy in and alignment on their evolving business models and strategies.

Another important finding in this study was related to specifying value from the standpoint of the end customer. The interview data revealed that participants did not demonstrate sufficient knowledge and understanding of who the customers are. The findings particularly in SOE 1 and SOE 2 indicated that they do not have walk in customers, but their customers are other departments and other key project stakeholders. It was also quite clear in the findings that the issue of defining the customer is a common problem in SOE 1 and SOE 2 not because they did not know who the customer is but because the customer base is diverse and has needs that are difficult to fit into just one category. For example, the issue of internal and external customers came out quite strongly. Internal customers being the internal departments and other business units that are being serviced, while the external customers will be project managers, consumers, citizens, government as shareholder etc.

Finally, the complexity of each SOE is another factor to consider. Oftentimes, the customer on the other end is an anonymous individual represented solely by numerical data. The services deal with intricate human beings who are not mechanical components and exhibit unpredictable behaviour, thoughts, and actions. This result corroborates the ideas of Simonsen, Herrera and Atencio (2023), who pointed out that it is important to try to define customer expectations, needs and wants since public sector organisations cannot be seen only as businesses; the customers are both citizens, business units,

project stakeholders within the microenvironment of the organisation (Simonsen, Herrera & Atencio, 2023).

The recognition of internal customers within the SOEs indicates an understanding that various departments within each SOE operate as service providers to each other. Therefore, the leadership plays a role in ensuring efficient interdepartmental services, contributing to the overall organisational value chain in meeting the needs of the external customers. Moreover, the perspectives of the participants indicate that the organisation's conception of customer value centres on fulfilling the requirements and desires of the divisions. Viable Systems Theory (VST) offers a useful framework for understanding the intricacy of the SOE value chain and their focus on internal customers as arbitrators of value. Proponents of VSM posits that the Viable System Model (VS Model) provides the chance to scientifically design any organisation as a system with the training, regulatory, and adaptive capabilities required to guarantee its survival (viability) in the face of potential changes in its environment over time, but which have not been included in its design (Fedotova & Bocharova, 2020).

Finding 3: Defining the customer is a common problem because the customer base is diverse and has needs that are difficult to fit into just one category.

Finding 4: Customers of the SOE's are not always described as the end user, but customers are also defined as internal customers for services received interdepartmentally, and external customers which include the payers of the products, or services rendered by the organisations.

The findings revealed that the leaders in the organisation link key performance indicators (KPIs) to customer value factors to ensure that organisational efforts are focused on areas impacting customer value. These findings support the assertion that management involvement, in developing a formal strategic approach is necessary to focus the lean implementation within a particular environment/organisation and thus lead to creating value for the customer (Veiga, Lima, Angelis, Eduardo & Costa, 2011). The emphasis on middle managers' sense of accountability and ownership in

developing key performance indicators was another noteworthy finding. The responses of different levels of management within the SOE's to their strategic mandates and challenges varied significantly due to their roles, responsibilities, and the scope of decision-making authority. The organisational documentation highlighted the role of top management, including CEOs and board members, in setting strategic direction, making high-level policy decisions, and ensuring the overall financial and operational health of the SOE's.

This also accords with earlier observations, which showed that system 5 of the viable plays a crucial role in upholding the system's identity by formulating its guiding principles and objectives. It also makes policy decisions inside the organisation to strike a balance between the demands and requirements of the different departments within the organisation and the management of the organisation (Fedotova & Bocharova, 2020). Middle management acts as the bridge between the strategic directives set by top management and the operational execution carried out by lower management and frontline employees. Data from the interviews also highlighted that middle managers are responsible for translating high-level strategies into actionable plans and overseeing their department's day-to-day operations. This ownership plays a crucial role in aspects of value creation such as understanding customer needs and translating them into measurable goals. In this way managers can drive the organisation towards delivering products or services that meet or exceed customer expectations.

Studies have observed that in addition to top managers, middle managers are also recognised as important drivers of successful lean implementation (van Dun, Hicks & Wilderom, 2017). This supports the views provided by the viable systems theory in providing a clear link to the middle managers function, which serves as the interface between top management and operational units. One interviewee claimed, "The middle managers have a crucial function in converting the strategic vision and values into tangible plans, policies, and initiatives that can be executed at the operational level". Mid-level managers analyse the strategic goals established by senior management and formulate practical strategies and methods to accomplish them. The finding further supports the idea of the viable system theory where middle managers as the "internal eye" coordinates operations in primary units, ensuring effective communication and interaction to prevent bottlenecks, ineffective production planning, and conflicts within the organisation (Garcia, Reyes & Garcia, 2018).

One aspect highlighted in the data was the leadership's awareness of the organisational culture. SOE 3 emphasises how important a leader's behaviour can be to the overall effectiveness and performance of the organisation. As indicated in the operational planning document. In addition, most of those interviewed seem to reinforce the practical implications of the lack of good leadership behaviour within the organisation, emphasising the need for leaders to actively cover and embody cultural improvements for the entire organisation to follow. The implication from the organisations document and the indication by the participant seemed to suggest an occasional inconsistency in leadership behaviour. Leaders may make efforts to create value, but if these efforts are not consistently applied, employees may perceive a lack of continuity or commitment These results are similar to the assertion in previous studies (Van der Voet, 2014; VanDun, Hicks & Wilderom, 2017) that have highlighted that organisational value creation is intricately linked to the combination of leadership practices and managerial principles. Notably, leaders are depicted as orchestrators of value creation by ensuring that the organisation is resilient, adaptable, and culturally aligned to prioritise and meet the needs of its customers.

Finding 5: Ownership for driving key performance indicators, value creation and possibly the implementation of lean strategies is centred around middle management involvement.

Finally, effective communication emerges as a cornerstone within an organisation to encourage value creation, serving as a channel to unify employees and align their efforts towards executing overarching organisational goals (Scheeres, 2011). Employees who understand how to contribute to the organisation's strategic goals feel a sense of belonging and fit, as they work in alignment with the organisational strategies for creating customer value. Finally, strategic leadership practices are selected according to the specifics of the organisation and may enable employee participation in reduction of waste, process improvement and organisation wide value creation.

Finding 6 Leadership behaviour plays a crucial role in cultivating organisational culture by shaping the values, beliefs, assumptions, and norms though communication and exemplary leadership that guide activity and mindset within the organisation.

Figure 40 depicts the key elements or variables relevant to the organisation's value creation process and their relationships. In this case, the figure illustrates a conceptual framework linking middle manager commitment, employee involvement, stakeholder definition, and leadership to the overarching goal of value creation. Each box represents a distinct factor or aspect of the value creation process, while the arrows indicate the directional influence or relationship between these factors.

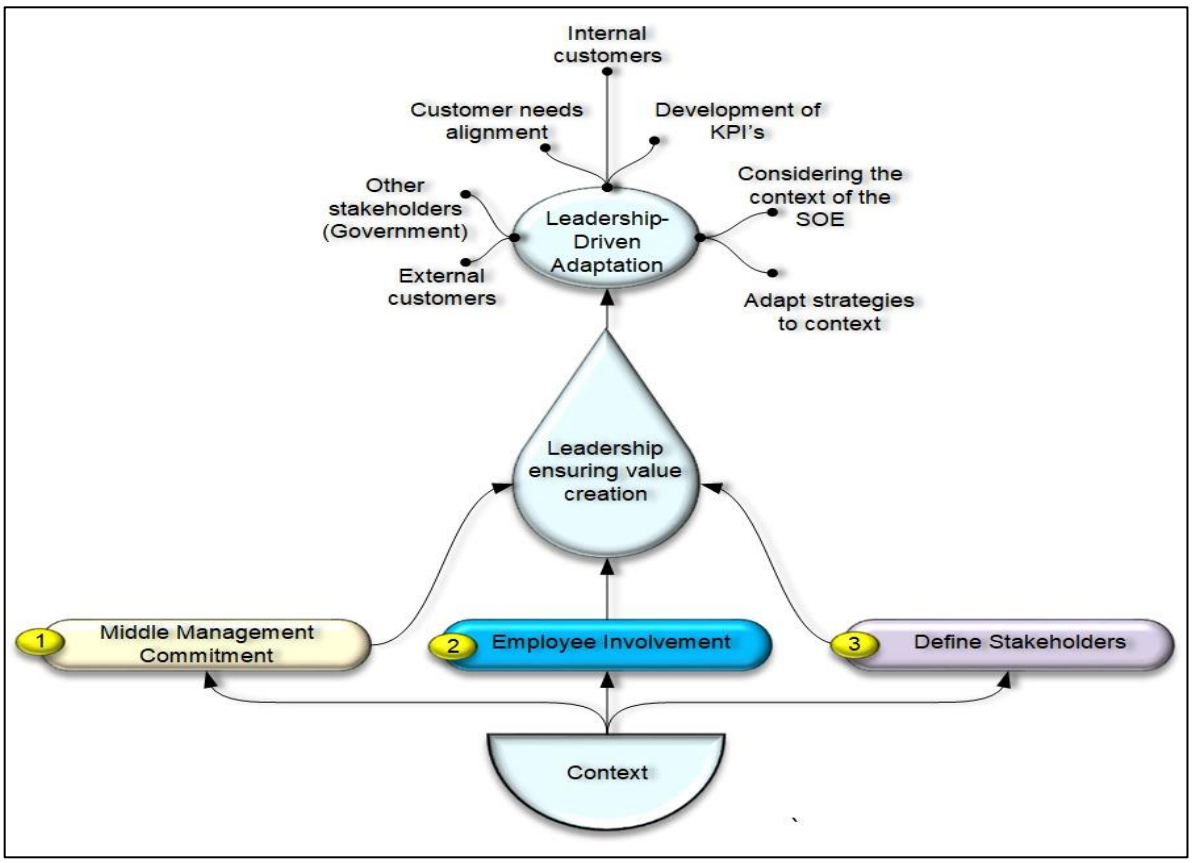


Figure 40: Leadership role in value creation (**Source**: Own)

The depicted conceptual framework represents a holistic approach to value creation within the SOE context, emphasising the interconnectedness of various components and their collective impact on organisational performance. At the core of this framework lies the notion of leadership as the driving force behind value creation efforts. In this context, leadership encompasses not only top-level executives but also middle managers, who play a crucial role in translating strategic directives into actionable plans and fostering a culture of commitment and accountability throughout the organisation.

Middle manager commitment serves as the foundation upon which the value creation process is built. Middle managers, situated at the intersection of strategic intent and operational execution, embody the

organisation’s values and priorities, and their unwavering dedication is instrumental in driving employee involvement and stakeholder engagement. They act as catalysts for change, breaking down complex strategies into practical steps and cascading them throughout the organisation, thereby ensuring alignment with organisational goals and objectives.

Employee involvement emerges as a critical determinant of organisational success, representing the extent to which employees are engaged, empowered, and motivated to contribute to value creation efforts. Empowered employees not only drive operational efficiency and effectiveness but also serve as ambassadors for the organisation, fostering positive relationships with internal and external stakeholders. By harnessing the collective expertise and creativity of their workforce, organisations can innovate, adapt, and differentiate themselves in competitive markets, thereby enhancing their value proposition and market position.

The stakeholder definition underscores the importance of understanding and responding to the needs, expectations, and interests of all stakeholders, including customers, suppliers, employees, shareholders, and the broader community. Effective stakeholder engagement is essential for building trust, fostering collaboration, and mitigating risks, thereby enhancing organisational resilience and sustainability. By aligning organisational strategies with stakeholder expectations and societal values, organisations can create shared value, generating positive outcomes for both the organisation and its stakeholders.

Leadership-driven adaptation represents the organisation's capacity to anticipate and respond effectively to changes in its internal and external environment, ensuring continued relevance and competitiveness. Adaptive leadership involves proactively monitoring market trends, customer preferences, and technological advancements and adjusting strategies and operations accordingly. This includes developing KPIs to measure progress, evaluating the effectiveness of strategies, and making data-driven decisions to optimise organisational performance. By fostering a culture of continuous improvement and learning, organisations can enhance their agility, resilience, and capacity for innovation, thereby driving sustained value creation and long-term success.

6.3.1.2 Theme 2: Resources required to create value.

When asked what resources are needed for value creation within the SOEs, themes related to skilled staff acquisition collected the most responses (12), followed by training and development programmes

(8) and financial resources (8). Throughout the interviews conducted at SOE 1, SOE 2 and SOE 3, there was an equally clear focus on the allocation and utilisation of both people and financial resources. Employees at these SOEs believe that training and development initiatives give them the essential competencies, skills, and knowledge required to execute their duties with efficacy. However, a lack of resources hinders the creation of value and prompt response to customer needs.

The data collected indicate that not having adequate resources and filling all the vacant positions in various departments may result in poor quality, waste, and negative impacts on value creation. This finding is supported by other researchers who highlighted some of the weaknesses of SOEs, such as agency problems (Musacchio & Lazzarini, 2014) and inefficient use of resources (Wang &Wang, 2013; Liu & Zhang, 2018; Jian, Meng & Zhao, 2020; Szarzec, Totleben & Piatek, 2020). Highly motivated employees with adequate skills are the foundation of any improvement programme to achieve their objectives (Chay et al., 2018).

Finding 7: The state-owned entities are operating under strained conditions, with shortages of resources impeding their ability to meet operational demands and regulatory requirements.

Regarding training and development programmes, the data from the interviews reveal that training and development are important aspects of value creation. In the context of tailoring training programmes to meet the diverse needs of SOEs and to foster value creation, the results were consistent with the literature showing that a one-size-fits-all approach to lean training is inadequate (Childs, Turner, Sneed & Berry, 2022). The findings indicate that training and development approaches differ among the three organisations considering the unique context, culture, and objectives of each organisation. For example, within SOE 2, a significant barrier to lean has been identified: employees in skilled positions have voiced concerns that despite the organisation's verbal commitment to enhancing skills, the process for obtaining further study bursaries is restrictive. They are required to demonstrate that their proposed studies align directly with their current job roles, a stipulation that can stifle broader learning and development.

In contrast, SOE 1 adopts a more flexible approach to training and development, which recognises the value of a broader skill set that – while not immediately applicable – can contribute to long-term

organisational resilience and innovation. This difference in approach points to the necessity for SOEs to prioritise training that not only addresses immediate operational needs but also fosters an environment of continuous learning and adaptability based on the changing need to ensure the long-term sustainability of the organisation.

A common challenge across all three SOEs, however, is the implementation of their training matrixes. Despite having structured plans for employee development, attendance and participation in all planned training activities remain inconsistent. Furthermore, budgetary constraints consistently emerge as a significant hurdle in supporting employees' aspirations for further development. Participant IV, while discussing the issues around training needed for customer value creation, mentioned, “There's a disconnect between what's on the training matrix and what happens. I've signed up for several sessions that were cancelled last minute due to lack of resources or scheduling conflicts.”

This scenario highlights a critical gap between the intention of training programmes and their alignment with employee needs, skills gaps and dynamics in the public sector, with a focus on developments that may impact the organisation. This finding is inconsistent with the study of Farrell (2021), who indicates that internal and external contexts influence the adoption of continual improvement processes, including lean training, in organisations. In view of this finding, this study argues that extensive training for and organisational resources are required to adopt lean, making it difficult for SOEs if training programmes are not tailored based on the contextual analysis that links the SOE strategy to operations and informs them of what training to apply at each stage of the strategy execution cycle. This finding confirms the association between training and empowering employees, managerial support, and the provision of necessary resources by top-level management for successful lean implementation (Shamah, 2013; Valentina & Giovanna, 2014; Mahajan, 2016).

Finding 8: Management have put training matrixes in place; however, training programs are not adapted to meet the diverse needs of the SOE’s and to foster value creation.

Moreover, the strategic allocation of financial resources towards effective budgeting is important for creating customer value, as was apparent in all three SOEs. Specifically, the use of financial resources for effective budgeting, which is another crucial component in creating value for customers, is

emphasised. These findings are consistent with those of previous studies, which indicate that by carefully analysing their budgets and making strategic decisions, managers in organisations may optimise their resource allocation strategies and generate significant value for their customers (Arshinder et al 2009; Kumar, Singh & Shankar, 2015).

Finally, the findings indicate that all three SOEs currently face a challenging position characterised by budget cuts while simultaneously being expected to maintain the delivery of necessary products and services. One of the managers indicated, "Financial sustainability and budget cuts is one of the internal issues, but during business review meetings, we discuss a lot about cost centre management and how resources can be managed, but cost is not improved (#4). The significance of budget cuts for SOEs lies in their mandate to maintain the delivery of essential products and services despite financial constraints. This situation is particularly challenging for SOEs because it directly impacts service delivery to customers and the public. For example, Participant II at SOE 3 mentioned, "We have a big issue in terms of resources in our warehouses. Our warehouses are not equipped with the necessary infrastructure so that we can operate well due to budget cuts and prioritisation." These data indicate that, with limited budgets, an SOE may struggle to meet operational demands, potentially leading to delays, without the necessary infrastructure and resources in warehouses, while operations may be hindered. This inefficiency may lead to bottlenecks in the supply chain, affecting the timely delivery of products or services to customers. Moreover, the literature argues for the need for SOEs to embrace reforms and operational efficiencies to overcome challenges posed by budget cuts (Wong, 2018). This study argues that in the face of budget cuts, SOEs might navigate the delicate balance between financial constraints and the need to maintain service delivery.

The literature suggests that budget cuts can prompt a re-evaluation of operational practices and potentially strengthen a bottom-up approach within the organisation. Budget constraints often necessitate finding creative and innovative solutions to operational challenges where frontline employees who have intimate knowledge of day-to-day operations may propose novel ideas for cost savings, process improvements, or resource optimisation. This fosters a culture of innovation and encourages employees to think critically about how to maximise value with limited resources (Chay et al 2014; Bedford, Spekle & Widener, 2022). Furthermore, in the context of VST, this integration of employees into cost-saving initiatives ensures that policy decisions are not detached from financial realities but are shaped by a re-evaluation of operational processes to identify areas of inefficiency or waste. (Puche, Ponte,Costas & Pino, 2016).

6.3.1.3 Theme 3: Complexity

The findings of the study revealed that all three SOEs place a high value on interdepartmental collaboration as a crucial factor in creating value navigating through intricate pathways of complexity. These findings regarding the importance of interdepartmental collaboration align with the focus of viable system 2 on integrating various operational components for the overall viability and functionality of the organisation (Schmidt, Elezi, Tommelein, Berghede & Lindemann, 2014). Furthermore, the Corporate Plan from SOE 1 mentioned the significance of interaction and coordination between the process and business units of the organisation in achieving operational excellence and meeting stakeholder expectations.

This aligns with the viable system model proposed earlier in this study, which advocates for a cohesive organisational structure where various systems work together in a mutually supportive manner (Espinosa, 2023). This cohesiveness involves numerous interconnected subsystems and regulatory compliance functions. Each subsystem within the organisations' value chain must effectively interact and coordinate with others to ensure customer value creation. Based on the interviews conducted, it was evident that interdepartmental collaboration within SOEs is significantly influenced by bureaucracy and the size of the organisation, corroborating the findings from the document analysis excerpt from the SOE 1 corporate plan:

Among the interviewees, a notable proportion made references to the issue of complexity, emphasising its importance. While some interviewees provided details of how these challenges manifest, for example, the complexities arising from multiple departments, divisions, and layers of management within the organisation, others highlighted the broader implications of these complexities for collaboration efforts. Moreover, these challenges were not confined to a single SOE but were observed across the cases, indicating that a systemic issue was prevalent within the SOEs.

This finding is consistent with findings by other researchers that indicate that interdepartmental collaboration in large-scale organisations may be challenged by rigidity and bureaucracy (Rui & Zhong, 2023). This complexity can create barriers to communication, decision-making, and collaboration between departments. Bureaucratic processes, such as lengthy approval chains and rigid hierarchies, further exacerbate these challenges by impeding the flow of information and coordination across organisational boundaries.

According to six out of the 12 managers interviewed across the three SOEs, there are mandates given by the shareholders that call for the redesign of the structures around the organisation to address some of the complexity that results in challenges within the SOEs. The following two excerpts illustrate this perspective: Complexity entails multiple departments, divisions, and layers of management who may experience challenges in communication, coordination, and collaboration due to the intricacies of their organisational hierarchy (Behdani, 2012; Jaradat, 2015). Complexity can be reduced by analysing the process at each systematic level (Fedotova & Bocharova, 2020). For example, the engineering manager expressed that the unbundling of some of the operational units into separate entities has been a strategic move to alleviate some of the complexities associated with the organisational value chain.

The unbundling of operational units into separate entities, as mentioned by participant #2, at SOE 1 aligns with the viable systems model emphasis on autonomous operational units that interact in a mutually supportive manner to form a larger, cohesive system (Zargham & Nabben, 2022). In parallel, SOE 2 has announced plans to separate its network and nonnetwork businesses, allowing third-party access to the network infrastructure (SOE 2, Integrated Report, 2022:09).

In the context of VST, the restructuring efforts at both SOE 1 and SOE 2 represent strategic moves towards enhancing organisational effectiveness and addressing complexities within their respective operations. The restructuring of SOE 1 can be seen as an effort to enhance the autonomy and focus of each operational unit (System 1) while also improving coordination (System 2), control (System 3), strategic planning (System 4), and policy alignment (System 5) across these units. This restructuring can help to alleviate the complexities associated with the size of the SOE, as each operating unit can focus on its specific tasks while still contributing to the overall goals of the organisation (Rezaee, Azar, Erz & Nayeri, 2018). The findings linked to the viable systems model are illustrated in Figure 41.

The data also highlighted the presence of bottlenecks across all three SOEs. The bottlenecks prevail in these areas within their operations where efficiency is hindered and have led to delays such as long outages due to the unavailability of plant spares, missed deadlines and other wastes such as waiting for approvals in regard to the scope of works or other documentation. Some of the bottlenecks highlighted by the interviewees (#11, #F, #IX) were bureaucratic delays that had a significant negative impact on project timelines.

The findings regarding the presence of bottlenecks in their operations are supported by the literature that highlights that bottlenecks hinder the operational flow within departments. The information flow

is needed to exchange flows of energy, resources, raw materials, and information with the environment for an organisation to survive and be "viable" (Golinelli, 2018). Excerpts from interviews and document analysis validate the importance of information flow for organisational viability.

While collaboration and cross-departmental working were acknowledged as essential aspects of addressing these issues, they were not always sufficient to fully mitigate the impact of bottlenecks. Despite efforts to promote collaboration, bureaucratic procedures, organisational complexities, and other systemic factors often contribute to the persistence of bottlenecks within SOEs.

Finding 9: While collaboration initiatives may have helped to alleviate some bottlenecks, they were not always able to fully address the underlying issues causing inefficiencies across the SOEs. This may hinder the application of the lean principles of flow within the SOEs.

Figure 41 is adapted based on the findings and provides a comprehensive approach to organisational design that emphasises the importance of interconnected systems and real-time information flow, which are key to eliminating silos and fostering effective interdepartmental collaboration.

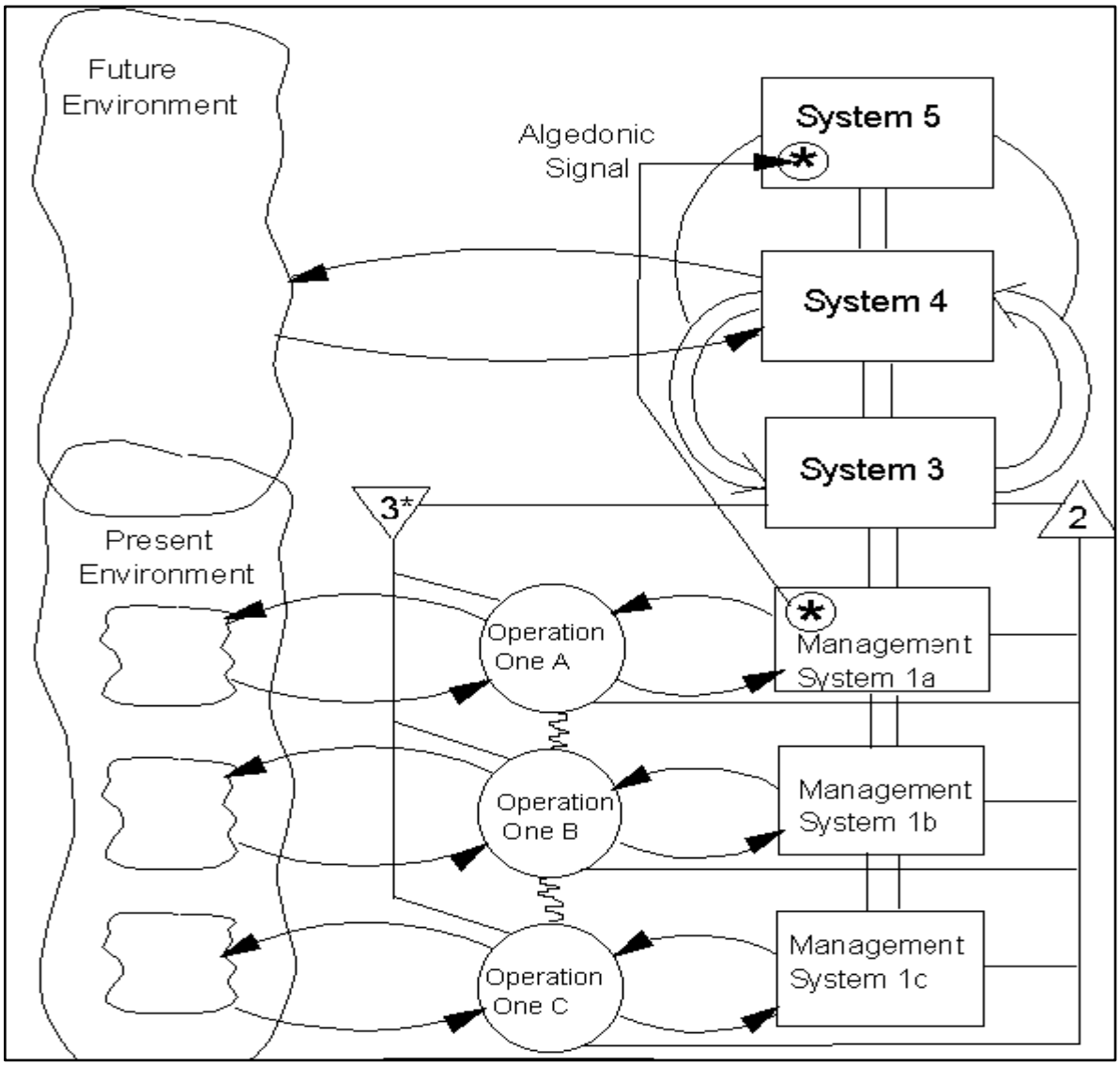


Figure 41: Leveraging interdepartmental collaboration through VS Model (**Source:** Adapted from Ahmad & Yusoff, 2006).

The Stafford Beer's VS Model offers a comprehensive framework for comprehending how complex organisations operate and remain effective in changing settings (Hakiki, 2023). The significance of real-time information flow and organisational agility is highlighted for efficiently addressing external pressures and internal obstacles. Figure 41 illustrates the modified VS Model designed for the particular organisational setting of the SOEs in this research. The adaptation integrates ideas and findings from the study, emphasising the crucial components and processes necessary for organisational sustainability and efficiency. First, the SOEs' subsystems encompass departments, divisions, and operational units. Figure 41 demonstrates the interaction and collaboration of different

subsystems to achieve customer value creation and reduce waste (lean goals), highlighting the significance of smooth coordination and integration. Second, Figure 41 emphasises the significance of real-time information interchange for facilitating prompt decision-making, swift responsiveness to changes, and efficient collaboration among departments. This is consistent with the study's results about the importance of information flow for organisational sustainability and cooperation. Finally, Figure 41 depicts how the concept helps to remove silos by encouraging shared objectives, clear communication pathways, and interconnected feedback mechanisms.

Finding 10: Interdepartmental collaboration within the SOEs may be achieved by focusing on value streams instead of functional areas, which is essential for organisational lean leadership.

Finding 11: The Viable System model may be adopted as an effective tool to apply value stream mapping and to bring together all the aspects of lean principles relevant to the SOEs.

6.3.2 What factors can impede the successful implementation of lean practices within the public sector environment?

The purpose of this question is to ascertain the key factors that can impede the successful implementation of lean practices within the public sector environment. The findings of this research identified three key factors that influence the implementation of lean practices in public sector organisation. They include the specific lean tools used to continuously improve customer value creation, the effectiveness of these lean tools in improving customer value creation, and the monitoring of deviations in customer value creation processes. The coded density by theme of the factors that emerged in each SOE is depicted in Figure 42.

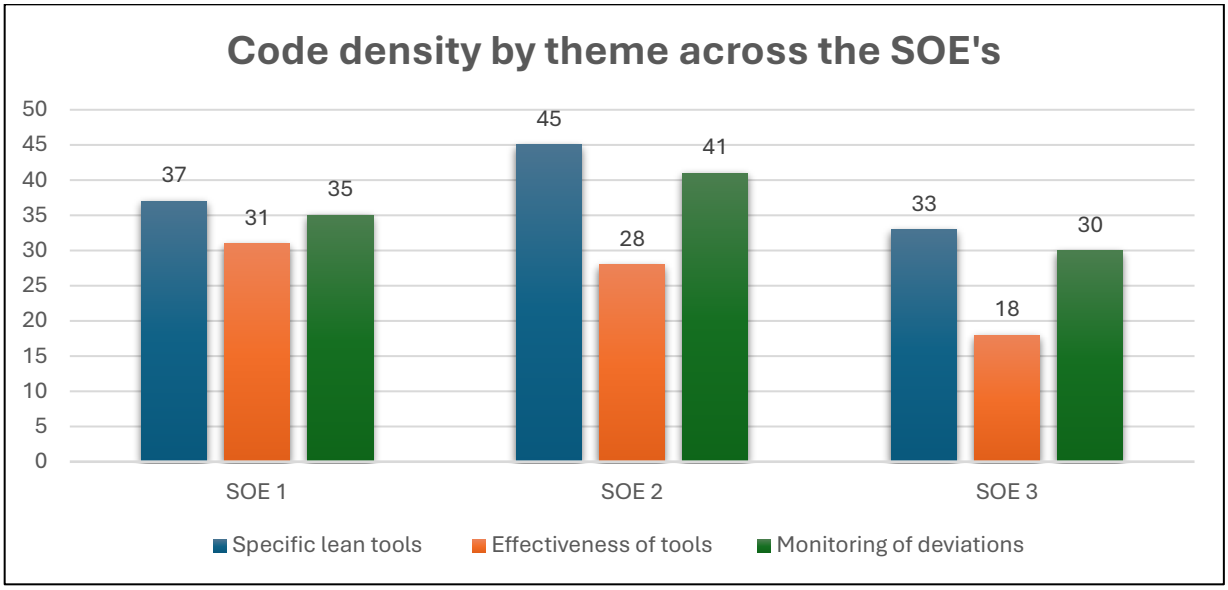


Figure 42: Code density by themes across the SOEs (**Source:** Interview Data).

Figure 42 provides a visual summary of the qualitative data analysis findings and offers insights into the thematic trends and variations observed across SOEs**.** The variation in code density across SOEs indicates differences in the adoption and emphasis placed on various lean tools. For example, SOE 2 shows the highest code density for specific lean tools, suggesting a stronger emphasis on implementing and utilising a wide range of lean techniques compared to SOEs 1 and 3**.** The data on the use of specific lean tools for customer value creation within SOEs highlight the strategic implementation of lean manufacturing tools tailored to the unique operational contexts of these entities. This study further revealed the importance of selecting lean tools that not only facilitate effective problem-solving and waste reduction but also promote organisation-wide learning and employee participation in continuous improvement efforts. For example, the tools that were common among the SOEs were audits, total quality management, Gemba walks, corrective action, kaizen or continual improvement and 5S tools. The evidence from the interviews is highlighted below for the three SOEs:

> *We use audits, self-assessment, peer review, and root cause analysis. They have now also introduced Gemba plant walks, where we group ourselves into different teams that go on a plant walk to different areas of the plant and assess the work being done with a view to noting issues* ***(#2)***

> *We utilise Kaizen events to continuously improve our operations, involving cross-functional teams in problem-solving. We also employ corrective action methodologies*

to reduce defects and errors, ensuring the quality of the goods and services we procure. ***(#B)***

We use total quality management because, as a front-end teller, we need to collect information from customers about their postal experiences to identify areas that need improvement. We need to customise TQM for postal operations, which will help us deliver even higher levels of service quality and customer satisfaction ***(#VII)****.*

This approach is in line with Al-Titi and Al-Abdulhadi's (2016) argument, emphasising the customisation of lean tools to fit the specific needs of an organisation, thereby enhancing efficiency and fostering a culture of continuous improvement. For example, in the case of SOE 1, the findings reveal that Gemba walks are implemented for process improvement and waste reduction in their workshops. Gemba exemplifies a hands-on approach to lean management that involves direct observation of work processes at the place where work is done (the "Gemba") to identify inefficiencies and opportunities for improvement (Ranjan & Shinde, 2018). The Gemba tool aligns with the lean principle of "going to see" to understand the current state of processes and engage with employees on the front lines, thereby facilitating real-time problem-solving and idea generation.

Regular Gemba walks have become a standard practice for our management and risk department teams. They help us stay connected to the shop floor, understand the challenges, and gather insights from our frontline employees ***(#6)***

Similarly, the data highlighted the predominant use of the 5S tool for sorting in maintenance workshops by SOE 2 and SOE 3. This observation is consistent with the current literature and demonstrates the application of lean principles to create organised, efficient, and safe work environments, as asserted by previous scholars (Jasti & Sharma, 2014). These data illustrate how different SOEs are leveraging lean tools to address specific operational challenges within their context and improve their processes.

Furthermore, the selection and implementation of these tools are guided by specific operational contexts, challenges, and goals. For example, one interview at SOE 1 stated, “We started with Gemba as a sorting tool to improve safety scores and housekeeping (#7)”. Contingency theory posits that the selection of lean methodologies is influenced by specific factors such as the size of the organisation, its structural composition, and external elements such as regulatory requirements and environmental conditions (Chavez et al., 2015). Contrary to expectations, the interview data did not explicitly

highlight the need to adapt lean tools in those exact terms. However, the interview responses provided insights into how lean tools were utilised within the operational context of each SOE, showcasing a natural adaptation to suit the unique characteristics and challenges of each organisation.

SOE 1 places much emphasis on root cause analysis, and SOE 3 places much emphasis on troubleshooting. This indicates that lean tools were selected to fit the needs and practices of each SOE. The interviews demonstrated how specific lean tools, such as root cause analysis and troubleshooting, were chosen and applied in response to the unique challenges and operational contexts of each SOE. The interaction approach looks at how pairs of organisational contexts–response variables work together to impact performance (Lemos & Junior, 2013). The discussions on problem-solving, waste reduction, and continuous improvement methodologies indicate a nuanced interaction between the organisational context and the chosen lean tools.

Finding 12: Interdepartmental collaboration within the SOEs may be achieved by focusing on value streams instead of functional areas, which is essential for organisational lean leadership.

6.3.3 What lean strategies can be used to eliminate waste in the public sector?

To answer the research question on the lean strategies that are used to eliminate waste in the public sector, the types of waste that are inherent within SOEs were investigated, and the data are presented in Section 5.4 of this research.

6.3.3.1 Theme 5: Waste

The data indicated that all three SOEs share common challenges, reflecting waste in their operations. This waste includes delays in processes, long waiting times, excessive paperwork, delivery delays, low employee productivity, and high error rates, among other types of waste across various stages of operations in these organisations.

Furthermore, obsolete technology contributes significantly to waste, hindering service delivery and causing extended waiting times. Other waste-related issues, such as obsolescent spares affecting plant availability, financial mismanagement, irregular expenditures, fruitless spending, and procurement bottlenecks, have been identified. This finding confirms the classification of waste by Mungovan

(2009), who categories waste into eight categories, namely, transportation, inventory, motion, waiting times, overproduction, unutilised talent, and defects.

These categories provide a comprehensive framework for understanding the various sources of waste in organisations. Transportation waste, for example, refers to the unnecessary movement of goods or materials within an organisation, leading to inefficiencies and increased costs. On the other hand, inventory waste highlights the issue of excessive stock levels, which tie up capital and increase the risk of obsolescence. Motion waste refers to unnecessary movement or activities by employees, such as walking long distances to retrieve tools or supplies. Waiting time waste is a common issue in many organisations, where delays and bottlenecks in processes result in wasted time and decreased productivity. Overproduction waste occurs when goods or services are produced more than demand, leading to excess inventory and increased costs. Unutilised talent waste refers to the underutilisation of employees' skills and abilities, which can result in decreased motivation and productivity. Finally, defect waste refers to errors or mistakes in the production or delivery of goods or services, leading to rework, customer dissatisfaction, and increased costs.

This table provides a comparative analysis of waste classifications in three SOEs and their corresponding classifications according to lean manufacturing principles. By identifying and categorising different types of waste, SOEs can effectively target areas for improvement and streamline their operations to enhance efficiency and value creation.

Table 34: Comparison of lean waste classifications in state-owned entities (**Sources:** Own).

Types of waste	SOE 1 waste classification	SOE 2 waste classification	SOE 3 waste classification	Lean manufacturing waste classification
Operational Inefficiencies	Delays in processes; Long waiting times; Excessive paperwork; Delivery delays; Low employee productivity; High error rates	Delays in processes; Delivery delays; Maintenance backlog; System inefficiencies	Delays in processes; Rework due to errors; Cable theft; Train cycle delays	Waiting; Overproduction; Unnecessary Motion; Overprocessing; Defects
Technology Obsolescence	Lack of involvement in strategy formulation; Tools not aligned with employee needs	Obsolete technology causing delays; IT hardware failures	Outdated systems leading to delays; System glitches	Defects
Financial Mismanagement	Lack of transparency in strategic planning; Ineffective resource allocation	Irregular expenditure; Procurement delays	Irregular expenditure; Inefficient inventory planning	Waiting; Overprocessing; Defects
Lack of Employee Productivity	Limited input in strategy; Inefficient processes affecting productivity	Maintenance backlog affecting capacity; Delays impacting productivity	Error rates affecting efficiency; Lack of effective tools	Waiting; Overprocessing; Defects
Customer Service Delays	Strategies not aligning with customer needs	Procurement red tape affecting efficiency	Train cycle delays impacting customer service	Waiting; Overproduction; Unnecessary Motion;

				Overprocessing; Defects

This table was compiled by examining waste classifications in three distinct SOEs and aligning them with corresponding classifications in lean manufacturing principles. The waste classifications in SOEs were identified based on common operational inefficiencies, technology obsolescence, financial mismanagement, lack of employee productivity, and customer service delays observed in these organisations. These categories were then compared with the waste classifications in lean manufacturing, which include waiting, overproduction, unnecessary motion, overprocessing, and defects. The goal of this comparison is to highlight areas of overlap and divergence between SOE practices and lean manufacturing principles, thereby informing strategies for waste reduction and process improvement within SOEs.

Finding 13: The Viable System model may be adopted as an effective tool to apply value stream mapping and to bring together all the aspects of lean principles relevant to the SOEs.

6.3.3.2 Theme 6: Strategies

Although there was a common approach involving a series of steps that are crucial for setting the direction and ensuring that the organisational purpose is realised, there were considerable differences in the three case studies' choices of strategies. The differences showed that some of the heterogeneous strategies that SOEs apply in a way that is mostly the same. These differences help in understanding the factors that affect the adoption of lean strategies. The adaptability of the strategy was emphasised from the perspective of the organisational context (i.e., the broader objectives of the organisation, risk perception, cost, and internal and external stakeholders). For example, SOE 1 uses revenue collection strategies to reduce waste in terms of overdue payments and improve operational efficiency. Nonvalue-adding activities (waste), such as delays, extended waiting periods, and high error rates, were also evident, as discussed in Section 6.3.3.1. Therefore, strategies that are employed across SOEs to reduce waste are aligned with operational challenges and waste. These strategies were not often described as

lean strategies, and they included implementing flexible payment plans, focusing on recovery plans for ageing infrastructure, aligning maintenance strategies with organisational goals, optimising revenue collection through automated systems and incentives, and diversifying revenue streams through digital payment solutions.

Similarly, SOE 2 implements strategies to optimise revenue collection, such as implementing automated billing systems and offering incentives for prompt payment. Furthermore, the interview data revealed the organisation's alignment with the overall strategy of the organisation and then cascading this down to the team level. The top-down approach to strategic alignment, according to four of the participants surveyed at SOE 2, is demonstrated by the lack of employee involvement in the strategy development process. While this approach can ensure that departmental strategies are in line with overall goals, it may negate the benefits of employee involvement in the strategy development process, which can lead to increased buy-in and more effective implementation. Additionally, SOE 3 adopts innovative approaches to revenue collection, such as diversifying service offerings and expanding digital payment options.

To some extent, the findings are in accordance with those of Romero-Silva, Santos, and Hurtadoa (2017), who considered the importance of alignment and “fit” of strategy with the context for all organisations, with a special emphasis on SOEs. Strategic alignment, or 'fit', was explained using contingency theory in Chapter 3, Section 3.2.1. Strategic 'fit' in the context of lean strategies in SOEs refers to the alignment of SOEs' lean strategy with contextual variables. By acknowledging the significance of contextual factors, contingency theory helps unravel the complex interplay between an organisation's internal structure and its external environment (Apell, 2011; Netland, 2015). The key success factors of a lean strategy outlined in the literature are alignment with the micro and macro environment of the organisation (Kiage, 2013:55), well-defined goals and objectives (Feizabadi et al., 2014:474), support from senior management, alignment with corporate strategy (Pienaar & Vogt, 2012:34), a clear monitoring and review plan, alignment of goals with policies and regulations, and budget availability (Leyh & Thomschke, 2015:1404). When applied to lean implementation in the public sector, tailoring strategies helps in understanding how lean principles need to be tailored to fit the specific structures of public sector organisations (Netland, 2015). These findings are consistent with previous studies indicating that successful implementation of lean activities requires members to mutually understand each other, plan jointly and agree on the effective implementation of the strategy (Arshinder et al 2009; Kumar, Singh, & Shankar, 2015).

Finding 14: Through the selection and interaction approaches, SOEs must consider the fit of specific lean tools will interact with existing processes, culture, and employee capabilities.

Finding 15: The types of waste found across SOE 1, SOE 2 and SOE 3 include but is not limited to, operational inefficiencies; technology obsolescence; financial mismanagement; lack of employee productivity, customer service delays.

6.3.4 What are the critical factors that determine the applicability of lean tools to new settings?

The aim of this question is to determine the primary issues that can hinder the effective adoption of lean practices in the public sector, specifically focusing on objective 2 of the study. This research identified two crucial characteristics that impact the deployment of lean practices in public sector organisations.

6.3.4.1 Theme 7: Context of the organisation

The general assertion across SOEs suggests that the context of the organisation refers to internal organisational issues and external organisational issues. SOE 1 describes issues that are critical internal challenges related to human resources, particularly the turnover of group executives, which impacts leadership stability. The significant rate of employee turnover, as emphasised in both the corporate strategy and the PFMA audit report, suggests a deficiency in maintaining a steadfast dedication to implementing lean practices. SOE 2 highlighted the multiple and quite fragmented stakeholder groups that each place different demands on SOEs and can affect their intended results.

Stated differently, these results support the question of whether consideration needs to be given to adapting lean manufacturing principles to the public sector context (Hines et al 2008) or, indeed, whether this is necessary. In SOE1, for example, the operational sustainability and continuation of some critical projects are halted due to long back-and-forth engagements with labour unions and other political stakeholders to understand their concerns and negotiate mutually beneficial agreements that can help to prevent strikes and mass action as #6 opined. (see appendix). One result that was

predominant across the 3 SOEs as it relates to the context is the issue of ageing infrastructure that hinders the value creation capabilities of the SOEs. One interviewee mentioned that “some of the internal issues we identify are port infrastructure constraints and deteriorating infrastructure (#D)”. Similar issues around the ageing of the plant were highlighted in SOE 1, which was attributed to outages that were different (interview, #2).

Some researchers believe that these constraints can stem from the requirement that SOEs fulfil social and strategic objectives beyond profitability, such as providing employment or serving remote areas, which may not generate sufficient returns to fund infrastructure renewal (Ferrari, Mare & Skamnelos, 2017). The issue of ageing infrastructure presents a contextual problem within SOEs that may not be as prevalent or impactful in the private sector due to several key factors related to governance, financial constraints, and strategic priorities. The literature also highlights distinctions between private and public sector environments (Pedersen & Huniche, 2011; Suarez-Barraza, Smith & Dahlgaard-Park, 2009). These distinctions encompass governmental influences (Pedersen & Huniche, 2011; Suarez-Barraza, et al 2009), equal access and rights, the absence of competitors, transparency and accountability, fragmented decision-making, and customer value (Bharosa, Feenstra, Gortmaker, Klievink & Janssen, 2008). Hence, it is not surprising that the implementation of lean principles varies significantly between the two sectors. Early studies of lean implementation have been criticised for not considering the internal and external factors that influence an organisational context (Mostafa et al., 2013). Researchers confirm that there are factors from the context of the organisation that are likely to influence all dimensions of lean implementation within an organisation (Punnakitikashem et al 2009; Seidel & Saurin, 2019).

Furthermore, the researcher noted that there are internal issues within the context of SOE organisations that can pose both advantages and disadvantages to adopting lean manufacturing principles in public sector organisations. One disadvantage that can hinder lean adaptation is that all three SOE employees are often not empowered to identify inefficiencies and propose improvement initiatives. This promotes a sense of lack of ownership and accountability among employees, as they cannot actively contribute to improving their work processes (Chay et al., 2013). There is often a lack of empowerment among staff to identify inefficiencies and propose improvement initiatives, as mentioned by Participants VIII and B:

There is also a clear body of evidence identified in the literature that suggests that one of the challenges in implementing lean practices in organisations in the public sector is also a lack of shared empowerment among staff. Within the realm of the public sector, there is a distinct disparity in understanding among managers and staff, as noted by Thirkell and Ashman (2014). This is evident in situations where limited tools and techniques are utilised without incorporating a more comprehensive approach or philosophy, as noted by Thomas et al. (2015). Waterbury (2015) states that lean directly challenges fundamental theoretical frameworks in certain contexts. This finding is consistent with other research findings on the importance of involving employees. For example, researchers have stated that employees most often than not are the drivers of organisational processes; therefore, their involvement is closely related to continuous improvement, which consists of taking small steps to improve process waste. (Campen & Hertzberger, 2009).

When asked to describe the stakeholder landscape within the SOES and how it influences operations, the interview data highlighted a multifaceted stakeholder landscape, which is part of the diverse context of the SOEs. One external issue within state-owned entities is the multiple and quite fragmented stakeholder groups that each place different demands on SOEs and can affect their intended results. Early studies on lean implementation have been criticised for not considering the factors that influence an organisational context (Mostafa et al., 2013). One quote from the interviews:

All three SOEs face challenges in managing the diverse demands of external stakeholders. External stakeholders influence decision-making processes and operational strategies in all SOEs. One difference that was evident in the data across the SOEs was the specific stakeholder groups and their demands based on their industry, market, and regulatory environment. Similarly, the degree of influence that external stakeholders exert on the SOE differs depending on the organisational structure. For example, SOE 1 faces substantial pressure from regulatory bodies, government agencies, and environmental groups to comply with stringent environmental standards and ensure a reliable production supply. This often requires the organisation to balance the demands of various stakeholders while maintaining operational efficiency, as indicated by one participant in the management role.

Overall, the data highlight the importance of considering the influence of external stakeholders and the complexity of stakeholder dynamics in shaping organisational operations and decision-making processes across different SOEs. Customer value in lean areas can therefore be created through an analysis of the context of the organisation, since there are multiple stakeholders that may have

practically overlapping and practically conflicting requirements (Bishop et al 2014; Johansson & Osternab, 2017).

Finding 16: The context of the SOEs, has several driving forces that are outside the control of organisations, yet they could provide both opportunities and threats that could have a significant impact on adopting lean principles to the SOE.

6.4 FRAMEWORK FOR THE ADOPTION OF LEAN MANUFACTURING PRINCIPLES FOR SOES

This section presents a framework that has been developed in line with the findings. This framework aims to address the unique challenges faced by SOEs in implementing lean manufacturing principles, integrating key findings from the study to guide the adaptation process. Contrary to other frameworks that have been reviewed in Chapter 2 of this research, the framework is directly derived from the triangulation of findings derived from the different SOEs and thus considers their unique context, characteristics, and specifications. Figure 43 presents the proposed framework. A step-by-step presentation of the framework is given in the following sections.

First, the findings of the study are consistent with prior studies that have pointed out that SOEs operate in complex environments characterised by diverse stakeholder landscapes, resource constraints, and evolving customer needs (Ahlstrom & Stan, 2015; Shafuda, Lenz & Mirecki, 2020).

Step 1 of the framework proposes that prior to defining customer value, SOEs and their diverse stakeholders, contexts, bottom-level employees, and other stakeholders must be considered to ensure buy-in and alignment with evolving business models and strategies.

Step 2 involves structuring strategies to incorporate inputs from internal and external stakeholders to foster greater collaboration and to enhance organisational effectiveness (Seidel & Saurin, 2019). Therefore, tailoring lean practices, as proposed by contingency theory, to address the varied needs of internal customers (interdepartmental services) and external customers (paying customers) ensures the delivery of value-added products and services.

Steps 3 to 6 encompass leadership involvement in cascading the strategy through the organisational manager and the involvement of employees in a bottom-up approach. Leadership behaviour shapes organisational culture, influencing values, beliefs, assumptions, and norms. Cultivating a lean culture requires exemplary leadership that emphasises communication, empowerment, and continuous improvement. Leadership commitment to lean principles fosters a culture of innovation and excellence within SOEs. This study revealed that middle managers play a critical role in translating complex strategies into actionable steps and cascading them throughout the organisation. Engaging middle managers in lean initiatives ensures effective communication, alignment, and implementation of lean practices at all levels (Januszek, Netland & Furlan, 2023).

Step 7 involves assessing environmental factors and contingencies for the adoption of lean principles and tools to SOEs. SOEs operate under strained conditions and face shortages of resources that impede their ability to meet operational demands and regulatory requirements. Lean implementation in SOEs must be value focused, focusing on maximising efficiency, reducing waste, and optimising resource utilisation to achieve operational excellence within resource constraints. By tailoring tools to address specific challenges specific to the context of SOEs, gaps and operational requirements enhance employee capabilities and support lean implementation efforts. Despite discussions on proper budgeting and cost management, SOEs often face budgetary constraints due to government funding cuts and inefficient resource allocation. Effective budgetary planning and cost management strategies are crucial for prioritising lean initiatives and optimising resource utilisation within budget constraints. Interdepartmental collaboration, focused on value streams rather than functional areas, is essential for organisational lean leadership. While collaboration initiatives may alleviate some bottlenecks, addressing underlying issues causing inefficiencies requires a holistic approach that integrates lean principles of flow and value creation across SOEs.

Step 8 involves applying the VS Model as an effective tool for applying value stream mapping and integrating all aspects of lean principles relevant to SOEs. Adopting this model facilitates organisational alignment, streamlines processes, and enhances overall operational efficiency within SOEs. The types of waste found across SOEs, including operational inefficiencies, technology obsolescence, financial mismanagement, a lack of employee productivity, and customer service delays, must be identified and addressed systematically. Implementing lean principles such as value stream mapping, root cause analysis, and continuous improvement enables SOEs to mitigate waste and optimise performance effectively. By embracing these key elements within the proposed framework,

SOEs can navigate complexities, overcome challenges, and drive sustainable improvements in operational performance and organisational effectiveness. The effective implementation of lean manufacturing principles tailored to the specific context of SOEs fosters innovation, efficiency, and value creation across the organisation.

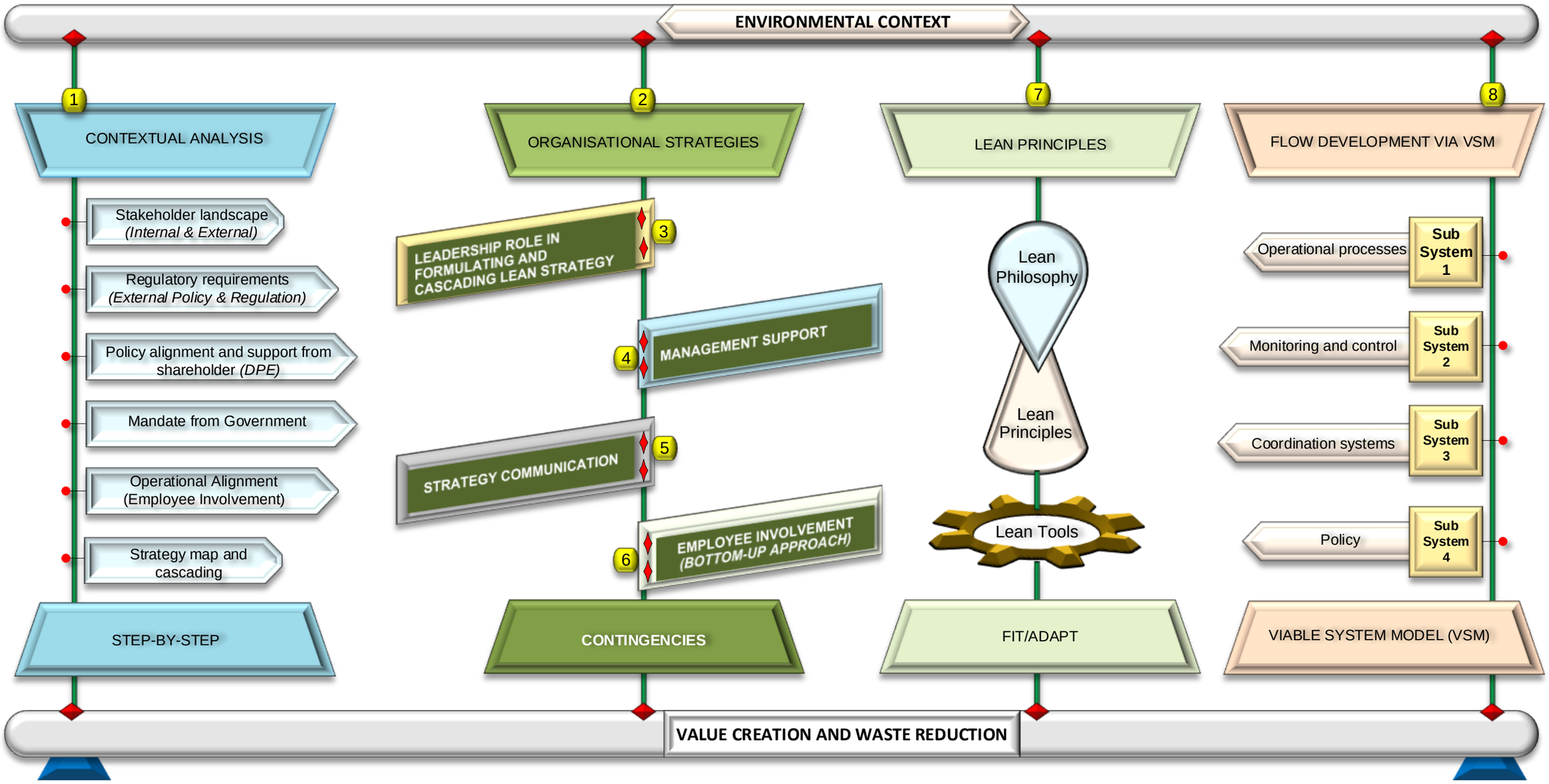


Figure 43: A framework for the adoption of lean manufacturing principles for state-owned entities in South Africa (**Source:** Own)

6.5 SUMMARY

This chapter presented the synthesis of the literature, document analysis, and interview data collected for the study. The data were analysed to draw conclusions related to the research topic and themes. There were eighteen findings from the study. A framework (Figure 43) was developed based on these findings for SOEs to follow when implementing lean manufacturing concepts. The next chapter will include a synopsis of the study, as well as a review of the study objectives, conclusions and recommendations. Potential areas for further studies will also be highlighted.

CHAPTER SEVEN

SUMMARY OF FINDINGS, RECOMMENDATIONS, AND CONCLUSION

7.1 INTRODUCTION

The previous chapter discussed the data collected from thirty participants. The data were combined with the literature and documents that were gathered and examined. Following an in-depth discussion in Chapter 6, this chapter provides an overview of the chapters, presents important findings categorised by secondary aims, and outlines the conclusions and recommendations on state-owned entities, theory, and future study.

7.2 SUMMARY OF THE STUDY AND MAIN RESEARCH OBJECTIVES

This study aimed to develop a framework for the adoption of lean manufacturing principles for state-owned entities in South Africa. The study was broken into seven chapters to achieve this aim. Each chapter explains the significance of the actions taken and how they contribute to the study.

7.2.1 Research objectives

To achieve the main objective, the following secondary research objectives were used:

i. To identify the constituents of customer value from a public sector perspective.

ii. To explore the critical factors that determine the applicability of lean principles in the public sector.

iii. To determine lean strategies that can be used to eliminate waste in the public sector.

iv. To identify factors within public sector structures that can potentially impede the successful elimination of waste and thus hinder lean implementation.

7.2.2 Secondary research questions

The study was guided by four research questions. The findings identified in Chapter 6 are shown per research question to demonstrate how the framework for adopting lean manufacturing principles for state-owned entities in South Africa was developed.

Secondary research question 1: What constitutes value from the public sector perspective?

The following section provides a brief discussion of the findings:

- The organisation's leadership needs to play a crucial role in creating value for customers. The leadership comprises the board of directors, CEO, Exco, business unit leaders, middle managers, and operational managers who are responsible for setting and implementing corporate strategy, vision, and business-specific strategies. The leadership in SOEs must ensure that organisational strategies are aligned with the government's objectives and societal needs, thereby creating customer value. This alignment is crucial because SOEs often implement mandates that balance commercial viability with public service delivery. The leadership needs to navigate these dual objectives, ensuring that strategies are responsive to changes in the external environment and stakeholder expectations so that the value to customers and the public can be maintained.

- Value creation by an organisation's leadership necessitates the participation of both internal and external stakeholders. It is essential to be supported by important external stakeholders, including governments, partners, users, interest groups, and donors, to effectively create value. Through stakeholder consultation, the leadership can gain insights into the needs and expectations of its customers, enabling the organisation to tailor its services and initiatives to meet these needs effectively.

- The organisation must prioritise strategies initiated by the top-level management, with middle managers facilitating the implementation of the corporate plan across the organisation. Middle managers must play a key role in translating strategic objectives into operational reality. They connect the strategic vision of the leadership with the day-to-day activities of the workforce. Their involvement is crucial for the successful implementation of lean initiatives, as they can

facilitate communication, support the adoption of lean tools, and help sustain lean practices within their teams.

- Employees and other stakeholders in the bottom part of the organisation need to be a central part of creating customer value. Employees who grasp how to contribute to the organisation's strategic objectives experience a sense of belonging and alignment, as they operate in accordance with the organisational strategy aimed at generating customer value. Strategic leadership approaches tailored to the organisation's needs can facilitate employee involvement, waste reduction, process enhancement, and organisation-wide value creation.

- Collaboration and cross-departmental working need to be anchored as a way of addressing complexity and bottlenecks, using the viable systems model to improve flow.

The findings to address secondary research question 1 are therefore summarised as follows:

Finding 1: Middle managers of SOEs are responsible for breaking down complex strategies from top management into manageable tasks and ensuring that they are effectively communicated to employees. By serving as a link between top management and staff, middle managers help to streamline complex organisational structures, bureaucracies, and government oversight towards value creation.

Finding 3: Defining the customer is a common problem because the customer base is diverse and has needs that are difficult to fit into just one category.

Finding 4: Customers of SOEs are not always described as end users but are defined as internal customers for services received interdepartmentally and external customers, which include the payers of the products or services rendered by the organisations.

Finding 5: Ownership for driving key performance indicators, value creation and possibly the implementation of lean strategies is centred around middle management involvement.

Finding 6: Leadership behaviour plays a crucial role in cultivating organisational culture by shaping the values, beliefs, assumptions, and norms through communication and exemplary leadership that guide activity and mindset within the organisation.

Secondary research question 2: What factors can impede the successful implementation of lean practices within the public sector environment?

- Rigidity and failure to tailor lean principles, tools and strategies to the unique operational contexts of these entities will impede the successful implementation of lean practices.

Therefore, the importance of selecting lean tools that not only facilitate effective problem solving and waste reduction but also promote organisation-wide learning and employee participation in continuous improvement efforts is needed.

- Poor communication about the lean process and its benefits can lead to misunderstandings and a lack of buy-in from employees and stakeholders.

The findings to address secondary research question 2 are therefore summarised as follows:

Finding 7: The state-owned entities are operating under strained conditions, with shortages of resources impeding their ability to meet operational demands and regulatory requirements.

Finding 9: Even with appropriate budgeting and overall cost management, budget restrictions brought about by government funding cuts and inefficient resource allocation impede value creation.

Finding 10: While collaboration initiatives may have helped to alleviate some bottlenecks, they were not always able to fully address the underlying issues causing inefficiencies across the SOEs. This may hinder the application of lean principles of flow within SOEs.

Secondary research question 3: What lean strategies can be used to eliminate waste in the public sector?

The following section briefly discusses the findings:

- The types of waste that are inherent within SOEs need to be investigated, trended, and documented.
- The need to focus on the importance of alignment and “fit” of strategy with the context for all organisations. The "fit" of strategy needs to involve making trade-offs with relevant stakeholders, including employees, and aligning organisation’s activities to support the chosen strategy.

The findings to address secondary research question 3 are therefore summarised as follows:

Finding 15: SOEs select strategies that are best suited to their specific context and challenges, considering factors such as organisational capabilities, resources, and constraints.

Finding 16: SOEs have not transitioned from a top-down approach to a bottom-up approach in strategy formulation.

Finding 2: The leadership of the organisation does not structure its strategies to consider the multiple-stakeholder context, especially bottom-level employees, to ensure buy-in and alignment of evolving business models and strategies.

Secondary research question 4: What are the critical factors that determine the applicability of lean tools to a new setting?

The following section briefly discusses the findings:

- External and internal issues or factors that are pertinent to the organisation's mission and strategic goals and that impact its capacity to adopt lean tools. The organisation needs to monitor and review information regarding external and internal challenges.
- SOEs need to address the substantial pressure from regulatory bodies, government agencies, and environmental groups to comply with stringent environmental standards and ensure that lean tools are not in conflict with these pressures. This often requires the organisation to balance the demands of various stakeholders while maintaining operational efficiency, as indicated by one participant in the management role.
- Employees need to be trained and empowered to implement lean tools so that the tools and techniques are utilised with knowledge and to understand and incorporate a more comprehensive approach or philosophy. Sharing the gains from improvements with employees can be motivating, but reward schemes must be designed carefully to account for cultural differences.

The findings to address secondary research question 3 are therefore summarised as follows:

Finding 16: The context of SOEs has several driving forces that are outside the control of organisations, yet they could provide both opportunities and threats that could have a significant impact on the adoption of lean principles by SOEs.

Finding 14: Through selection and interaction approaches, SOEs must consider that the fit of specific lean tools will interact with existing processes, culture, and employee capabilities.

Finding 12: Interdepartmental collaboration within SOEs may be achieved by focusing on value streams instead of functional areas, which is essential for organisation's lean leadership.

7.3 SUMMARY OF CONTRIBUTIONS

The contributions of the study may be classified in terms of contributions to theory and contributions to state-owned entities in South Africa.

7.3.1 Contribution to theory

The findings from this study make several contributions to theory. First, this study has demonstrated how the concept of lean has evolved from its application in the Japanese context to becoming a managerial paradigm that applies to different sectors. This heterogeneity of implementations and settings makes the application of lean materials diverse and fragmented, leading to a low level of success in implementing lean manufacturing principles outside its native country, Japan. One of the reasons advocated by this study is the lack of understanding of the strong interactions that exist between the context of the organisations, particularly the public sector environment, and the systematic interactions that result in complexities of the organisations. For example, a lack of understanding of the complex and interconnected nature of organisational dynamics such as SOE value chains, transmission networks, distribution systems, and customer service operations and regulatory frameworks, political influences, and public expectations can pose significant challenges to the successful implementation of lean principles in state-owned entities in South Africa. These aspects may influence each other as well as SOE performance and the use of lean tools to mitigate waste and improve value creation. For example, the interdependencies and bottlenecks that emerged in the data result from aspects of the SOE value chains and from systems that are often interconnected and dependent on each other. A bottleneck or inefficiency in one part of the system ripples through the entire value chain, leading to delays and waste and hindering value creation.

Second, the present study extends the findings of Danese, Manfe and Romano (2018), who encourage the use of various theories in lean studies to understand how different phenomena interact with each other and contributes additional evidence that suggests that integrating two main theories, contingency theory and viable systems theory, to explain lean issues is of paramount importance, as they may help in understanding the organisational dynamics and disentangling the complexity underlying lean when applied to the public sector.

This study combines two perspectives to create a cohesive framework. Firstly, the internal structural analysis of an organisation through the five systems proposed by the viable systems theory (assessing the existing organisational structure of the SOEs using the five systems of viable systems theory, which

include operations, coordination, control, intelligence, and policy). Secondly, the analysis of links to the environmental or contextual supra-systems of the organisations (such as regulatory frameworks, political influences, market dynamics, and stakeholder expectations).

The theoretical framework proposed in this study may address the issue of structuring organisational strategies to consider multiple stakeholder contexts, especially bottom-level employees, to ensure buy-in and alignment, thus reducing non-value-adding activities that lead to waste in state-owned entities. This framework is based on the integration of two major theoretical building blocks: adaptation and interaction. Adaptation may be achieved by conducting regular consultations and feedback sessions with bottom-level employees to understand their perspectives, challenges, and suggestions related to organisational processes and strategies. Specific tools and organisational strategies and operational processes may be adopted based on the feedback received to align with the needs and expectations of employees and other stakeholders. Furthermore, interaction may also be achieved by tailoring specific tools such as visual management boards in control rooms to track real-time operational metrics and conduct daily stand-up meetings involving representatives from different departments to improve communication, coordination, and problem solving.

Finally, this study suggests that the leadership of an organisation should consider those lean manufacturing principles and tools that fit within the peculiar landscape of the state-owned entities in South Africa, in terms of aligning the organisation with the government's social and economic imperatives and the realisation that the value creation proposed by the lean methodology extends beyond the simple choice between fulfilling the government mandate and meeting organisational gains or profits. By developing a framework for the adoption of lean manufacturing principles for state-owned entities in South Africa, the key strengths of this study are its focus on the duration of the interactive processes within each of the two building blocks of viable systems theory and the contingency theory that links the creation of customer value and reduction to the South African SOE context.

7.3.2 Methodological contribution

Cross-country studies considered data from international survey databases without a deep investigation of the national culture of each country. Other studies have employed quantitative analyses to test the frameworks that are already in place for lean implementation (Tyagi et al., 2015). In terms of methodology, the research outcomes from earlier studies (Mihalache & Mihalache, 2015; Spina et al

2013; Wang & Chugh, 2014) expressed doubts about the use of contingency theory for generalisability and testability and suggested the use of qualitative methods for future studies because it adopts a replicable, scientific, and transparent process. This study advances the research on lean towards a mature phase by qualitatively exploring the characteristics and influencing factors of an effective lean process by focusing on contextual and environmental viability aided by the two theoretical lenses of qualitative methodology and providing a systematic investigation of the complex organisational dynamics, processes, and policies within SOEs.

Through the engagement with stakeholders at various levels of an organisation, including managers and frontline employees, this qualitative approach provided rich insights into the challenges, opportunities, and opportunities for adopting lean principles within SOEs. Furthermore, the qualitative exploration of this study provided an in-depth understanding of how to develop tailored, evidence-based strategies and interventions that address the unique challenges and opportunities faced by SOEs, fostering organisational alignment, operational efficiency, and continuous improvement, which may not be fully captured or realised through mixed methods or quantitative approaches alone.

7.3.3 Contribution to government

In addition to its theoretical contributions, this study has also yielded significant practical insights that thus far provide evidence that state-owned entities' reforms and improvement initiatives, as reflected in Chapter 2 (Table 2.1), focus on improving the performance of SOEs through the lens of good corporate governance. However, these initiatives, which are mostly focused on the privatisation and reforms of SOEs, do not pay sufficient attention to whether those models are relevant to the nature of SOE problems such as agency problems, wasteful expenditures, conflicting objectives, and the overall quality of SOE institutions in a particular country or sector such as the public sector in South Africa.

The analysis of value creation undertaken in this study extends the understanding of creating customer value proposed by the lean methodology to public sector organisations by shedding light on how creating customer value can be led by the collaborative focus of the leadership of the organisation, the involvement and participation of employees and the consideration of key stakeholders such as the government and statutory entities. The framework developed by the current study enables the identification of critical adaptation elements such as considering multiple stakeholders, contexts, bottom-level employees, and other stakeholders to ensure buy-in and alignment with evolving business models and strategies that are necessary for state-owned entities in lean implementation. This study

has demonstrated, for the first time, that value creation within the SOE context is embedded in the product or services through a series of value-added steps that are brought about by applying viable systems theory as an effective tool for applying value stream mapping and integrating all aspects of lean principles relevant to SOEs. This is the first time that the viable systems model has been used to explore organisational alignment in state-owned entities to streamline processes and enhance overall operational efficiency within SOEs.

By employing the steps proposed in the framework, this study has provided a structured approach to the consideration of the critical adaptation elements (i) the identification of key stakeholders, (ii) delineation of organisational strategies, (iii) recognition of systemic dynamics, (iv) involvement of employees from the bottom, and (v) adaptation of lean principles and applicable tools. This practical insight emphasised the need for participatory approaches from bottom-level employees that foster inclusive decision-making processes for SOEs.

This research contributes to policy makers for state-owned entities with particular emphasis on shareholding ministries, such as the Department of Public Enterprise (DPE), which is the main shareholding ministry for schedule 2 organisations. The structured application of lean manufacturing principles, as proposed in the framework insights within the intelligence system of the viable system model, may enable policymakers to make more informed and data-driven decisions. This data-driven approach helps in understanding the current state of operations, identifying trends, and anticipating future challenges, thereby informing strategic planning and policy development.

7.3.4 Contribution to industry

Although this study's focus has been on SOEs in South Africa, the private sector can also benefit from its conclusions and insights. This study draws attention to the difficulties and complications involved in applying lean concepts to organisations that function in environments that are stakeholder-driven, politically influenced, and controlled. These observations are especially pertinent to private sector businesses that deal with comparable issues pertaining to stakeholder involvement, regulatory compliance, value chain management, organisational dynamics, and customer service optimisation.

This research also highlights the significance of harmonising strategy development with operational

realities, engaging personnel across all hierarchies in ongoing enhancement endeavours, and cultivating a climate of cooperation, openness, and responsibility. These generally applicable guidelines can help private sector businesses improve their performance, strengthen their lean implementation efforts, and create sustainable value.

Furthermore, the study underscores the interconnected nature of organisational dynamics and the need for holistic and integrated approaches to lean implementation. Private sector companies can benefit from adopting a system thinking perspective that considers the interdependencies and interactions among various organisational elements, processes, and stakeholders.

In conclusion, while the study's primary focus has been on SOEs, its findings and recommendations have broader implications and applicability for the private sector. By learning from the challenges and insights identified in this study, private sector organisations can enhance their understanding of lean principles, optimise their operational performance, and drive continuous improvement and value creation in their respective industries.

7.4 CONCLUSIONS OF THE STUDY

In developing a framework for the adoption of lean manufacturing principles for state-owned entities in South Africa, the study confirmed that SOEs in South Africa are still marred by underperformance, loss and inefficiencies that burden fiscal performance and have led to waste. The relevance of applying a structured and systematic lean approach to address waste and improve the value that an SOE provides to its customers is clearly supported by the findings of the present study. However, this study has shown that some public sector characteristics, in particular the multiple stakeholder landscape, which includes the government, agencies, legal requirements (national key point acts, national environmental management act, etc.) and customers, who are often citizens or taxpayers, impede the direct use of lean manufacturing principles, as originally applied to other sectors, mainly the private sector, as discussed in detail in section 2.2.1. While the PFMA plays a crucial role in ensuring transparency, accountability, and responsible financial management within state-owned entities, the findings of this research suggest that certain provisions of the PFMA can pose challenges to the implementation of lean manufacturing principles in organisations. Specifically, one area of concern identified in this study relates to the PFMA's requirements around budgeting and planning.

The PFMA mandates a detailed and structured budgeting process for SOEs, which involves extensive

documentation, multiple approval stages, and strict adherence to predetermined spending limits. While this approach aims to safeguard public funds and promote fiscal discipline, it often leads to prolonged timelines for obtaining necessary signatures and approvals. This delay in the approval process hinders the ability of SOEs to implement the lean principle of flow effectively, as it creates interruptions in the flow of resources, materials, and information within SOEs. These delays have also led to bottlenecks, inefficiencies, and disruptions in production and the provision of service.

The investigation of what constitutes value from the public sector perspective has shown that successful implementation of strategies depends on middle management's capacity to channel ideas to different organisational levels. Furthermore, leadership inside state-owned entities is partly responsible for creating value. This study has shown that bottom-level employees are generally not involved in strategy formulation; therefore, continual improvement initiatives are often not preceded by a number of informal meetings where employee involvement is solicited to promote consensus in the operationalisation and adoption of strategies. The implication is that when employees at the bottom level are not involved in strategy formulation, there is a risk of disconnects between the formulated strategies and their practical application on the ground. This can lead to ineffective strategy implementation (often involving lean principles and tools), as employees may not fully understand or buy into strategic objectives and priorities.

Consequently, this study finds that contextual dimensions inherent in the public sector may be considered to apply lean manufacturing principles, supporting the argument advanced in Chapter 2 (Section 2.7). The findings, however, also indicate that the success of implementing lean principles within a particular environment/organisation depends on finding the correct fit of the lean principles or tools in the larger ecosystem/value chain.

Therefore, to understand the contextual dynamics and systematic interactions of lean principles with the SOE environment, this research applied contingency theory to determine whether lean principles can be tailored to fit a particular context and viable systems theory. In line with earlier research, the conclusions drawn from the data emphasise the ways that fit and interaction can be used to adapt lean principles to identify the value flow in the process by eliminating unproductive activities or processes. Two interesting conclusions are drawn from the findings of this study:

- The relevance of fit and adapt, as proposed by contingency theory, is clearly supported by the current findings. SOEs need to align some of their tools, such as Gemba walks, roots cause analysis, corrective action, corrective maintenance, 5S, and 5WHY lean, with the specific characteristics and dynamics of their organisation, allowing for customisation and flexibility in

implementation. This approach enables organisations to identify and eliminate unproductive activities or processes effectively, thereby optimising the value flow within the organisation.

- Furthermore, the focus on viability and systematic interaction emerged as important factors in creating a resilient and interconnected organisational system capable of adapting to changing environments and requirements. It was also shown that the significance of systematic interaction by the different systems, processes, stakeholders and operations in the SOEs, as indicated by viable system theory for System 3, was evident in the variety of business units, such as the divisions and the broader value chains of the respective SOE and cross-functional teams. The sustainability of an organisation depends on its capacity to promote efficient coordination, cooperation, and communication between various departments and roles. The findings indicated that improving systematic interactions can assist in ensuring the organisation's long-term sustainability and adaptation by streamlining procedures, reducing redundancies, and improving overall efficiency.

In conclusion, the synergy between contingency theory and viable system theory provides valuable insights into enhancing lean implementation by emphasising adaptability, customisation, viability, and systematic interaction. This study disagrees, in part, with recent research on lean manufacturing, which has highlighted the need to focus on the culture of the organisation as a critical success factor for lean implementation. The relevance of culture as a determinant of lean success and ultimate value creation is clearly not supported by the findings of the present study. Specifically, the study revealed that no consensus on lean culture emerged in the data. While culture may play a role, the study did not find conclusive evidence to support the notion that organisational culture is the sole or primary determinant of value creation. The study suggested that other factors, such as process design, resource allocation, and stakeholder engagement, may also play significant roles in lean implementation and thus waste reduction and value creation.

7.5 RECOMMENDATIONS FROM THE STUDY

The following section provides recommendations that were derived from the study.

Recommendation 1: The implementation of lean manufacturing principles to reduce waste should begin with understanding and determining the context within which SOEs operate. The context of the organisation includes factors such as the organisation's structure, culture, strategic goals, stakeholders,

legislation and other requirements, which are important when considering the implementation of lean manufacturing principles and which lean tools are most applicable for use in different contexts.

Recommendation 2: The strategy formulation process, including adopting lean as a strategy, should involve participation and collaboration with bottom-level employees. Involving bottom-level employees in strategy formulation ensures that the strategies developed are practical, realistic, and aligned with operational realities. Their input can help identify feasible and effective lean initiatives that can be implemented on the ground to drive improvement and value creation.

Recommendation 3: It is recommended that SOEs use the viable system proposed in this study to define their enterprise architecture and dynamics through the five systems of the viable systems model. By defining enterprise architecture through the five systems of the VSM (System 1: Operations, System 2: Coordination, System 3: Strategic Management, System 4: Policy, and System 5: Environment), SOEs may gain a holistic and integrated understanding of their organisational structures, functions, processes, interactions, and interdependencies.

Therefore, there is a definite need for the leadership of SOEs to intensify their efforts to involve bottom-level employees and other stakeholders in their value creation efforts to ensure buy-in and alignment with the proposed framework. By involving employees in the strategy formulation process, organisations can tap into the specialised knowledge of employees and improve the strategy and the way in which implementation tasks are performed. This may result in more effective implementation and possible adaptation of lean principles and tools, as employees are more likely to understand and support the strategy when they are involved in its development. Based on the findings of this research, management involvement in cascading lean strategy through the organisation and the involvement of employees in a bottom-up approach are essential.

Moreover, different approaches to lean implementation may be considered based on the structural complexities, strategic goals, and mandates of the state-owned entities. In addition to understanding their organisation and context as proposed in the framework, organisations should conduct a thorough analysis of their SOE enterprise architecture and dynamics through the application of the viable systems model. Unless organisations tailor their lean strategies and tools to address specific challenges specific to the context of SOEs, value creation will not be attained. Therefore, through the use of tools such as a SWOT analysis, the organisation can determine opportunities to explore which lean tools are suited to their context. For example, root cause analysis tools such as fault tree, 5 WHY, cause and

effect may be applicable to some processes but not all processes. The opportunities identified, if taken advantage of, will surely take the organisation to another level of value creation and eliminate non-value-adding activities.

The framework may be used to provide a holistic view of customer value creation through encouraging explorative thinking and interdepartmental collaboration to reduce bottle necks by looking for creative ways to respond to internal customer needs, such as streamlining the many governance forums and non-value-adding meetings to focus on meetings that enhance customer value creation. This can be done by aligning the organisation's key performance indicators (KPIs) to what adds value from the perspective of shareholders, customers, and customers. Tools for soliciting customer value must be extended to citizens and other stakeholder groups.

Leadership behaviour shapes organisational culture, influencing values, beliefs, assumptions, and norms. Cultivating a lean culture requires exemplary leadership that emphasises communication, empowerment, and continuous improvement. Leadership commitment to lean principles fosters a culture of innovation and excellence within SOEs. This study revealed that middle managers play a critical role in translating complex strategies into actionable steps and cascading them throughout the organisation. The leadership must continue with the current practice of engaging middle managers in lean initiatives to ensure effective communication, alignment, and implementation of lean practices at all levels. Managers must not only endorse lean initiatives but also actively participate in lean strategy rollout processes. This involves being visibly engaged with lean practices, such as participating in Gemba walks and demonstrating a commitment to continuous improvement. The role of leadership extends to creating a compelling vision for lean transformation and effectively communicating its benefits to all stakeholders. By doing so, mutual understanding will be fostered, therefore optimising the organisation's lean organisational goal. Without mutual understanding among all members of the SOE environment, adapting lean principles for value creation cannot be accomplished effectively.

7.5.1 Recommendations for theory

SOEs can use the integration of contingencies and the VS Model to adapt to external changes such as regulatory requirements or internal changes such as technological advancements, resource planning and other issues. The viable systems model also advocates for the elimination of silos and the promotion of cross-functional collaboration. A key priority should therefore be to adapt the VS Model for SOEs to illustrate how the model encourages shared goals, transparent communication, and interconnected feedback loops, which are essential for effective interdepartmental collaboration within

SOEs. Applying the five systems in the VS Model as posited by the framework in this study can offer practical benefits in optimising organisational decision-making and enhancing operational efficiency. Using the VS Model, SOEs can identify key subsystems within their organisations and thus unpack some of their complexities. Furthermore, this may assist organisations in aligning the roles and responsibilities of each subsystem or clustering within the organisation. Furthermore, systems 1 to 5 can help organisations identify primary activities within organisations that are essential for their functioning. The subsystems also represent the information channels that facilitate communication between different subsystems. The framework posited by this study may lead to a better understanding of lean and its dynamics for the viability of state-owned entities. This analysis, according to the perspective of viable systems, can explain many of the failures that occur in exporting lean from private sector organisations and offers that are adapted to different environments.

The systemic study of organisations using contingency theory concepts leads to the conclusion that the degree of interaction between the constituent parts of an organisation reveals a pattern of emerging complexity or simplicity, which is directly related to the capacity to manage the complexity and uncertainty of innovative projects. The implementation of the viable systems model structure helps managers implement lean practices to fit the level of integration required to achieve success in lean implementation or adaptation.

In addition, contingency theory can be used to develop targeted interventions aimed at enhancing the exploration of the environment. To this end, organisations can make informed decisions on which lean principles can be tailored specific to their operational context. It is very powerful in the lean field, for instance, for investigating the contextual factors influencing the success of lean implementation. The viable systems model is a cogent approach to describing organisations and their relationships with their environment, which is an important aspect of lean application, as posited by the current study.

Finally, considering previous lean studies, researchers can draw inspiration from this study and subsequently employ theory with heightened consciousness. By incorporating key elements from the framework proposed in this study, researchers can examine the impact of the bottom-up approach as a determinant of success in lean implementation.

7.5.2 Recommendations for future research

This study attempted to develop a framework for the adoption of lean manufacturing principles for state-owned entities in South Africa. The researcher attempted to investigate lean manufacturing principles and their dynamics for the viability of state-owned entities. This study focused on schedule 2 state-owned entities, particularly those entities that have been classified by the National Treasury as red zone organisations; other categories and schedules of SOEs were excluded from this study. The following aspects may be investigated in future studies.

7.5.3 Recommendations for industry

1. Future research can concentrate on expanding the investigation to schedule 3 to shed light on the various contextual factors that influence the adaptation of lean principles.
2. Future studies could develop a framework for effective collaboration among SOEs and between SOEs and national, provincial, and municipal authorities to factor value creation and waste reduction initiatives.
3. Researchers can conduct case studies focusing on themes such as process-based views, value orientation, waste elimination, and continuous improvement within the public sector to identify best practices and areas for improvement.
4. Future studies could perform cross-case comparisons of specific waste classifications between SOEs and lean implementation in the public sector.

7.5.4 Recommendations for use of theory for future studies

Considering the gaps found from the analysis of theoretical perspectives on lean (Chapter three), this section intends to identify some directions for future research on theory.

1. The resource-based perspective may be useful in analysing the sustainability of resources to implement lean practices, particularly in understanding the core competencies and competitive edge that SOE resources offer in comparison to those of other public sector entities.
2. Agency theory can be applied within the SOE context to explore how lean knowledge transfer can be implemented by examining the headquarters–subsidiary relationship through the lens of principal–agents.

3. Future studies need to quantitatively test the theoretical framework developed for the adoption of lean manufacturing principles in South Africa, to validate its effectiveness and explore its practical applications.

7.6 LIMITATIONS OF THE STUDY

The main limitation of the study was its restriction to SOEs, which are classified by the National Treasury as Schedule 2 SOEs. More samples from a large variety of SOEs would have been desirable. The reader should bear in mind that the public sector organisations in South Africa extended beyond state-owned entities to other public sector organisations such as municipalities, schools and health care; thus, due to practical constraints, this study cannot provide a comprehensive review of the public sector or other schedules of SOEs. Other researchers can extend the application of the framework to other public sector organisations. A full discussion of the different waste categories in other SOEs that are not listed under Schedule 2 lies beyond the scope of this study.

7.7 SUMMARY

This study proposed a comprehensive framework for the adaptation of lean manufacturing principles specifically tailored for SOEs in South Africa. The framework is grounded in insights derived from the application of lean principles in the South African construction industry, the development of a theoretical lean culture causal framework, and the integration of South African Ubuntu principles with lean implementation. It addresses the unique challenges and operational contexts of SOEs, emphasising the need for strategic alignment, leadership commitment, employee engagement, and stakeholder collaboration.

The framework highlights the importance of customising lean strategies to fit the specific needs and challenges of SOEs, highlighting the critical role of leadership in driving lean transformation. It advocates for a holistic approach that involves all organisational levels, from top management to frontline employees, in the lean journey. The framework also recognises the significance of engaging with a broad range of stakeholders, including government entities, customers, and suppliers, to ensure that lean strategies are responsive to the broader socioeconomic environment and public accountability requirements.

In conclusion, the proposed framework contributes to both theory and practice by integrating contingency theory and viable systems theory to provide a deeper understanding of lean

implementation in SOEs. This study offers practical guidance for SOEs in South Africa seeking to implement lean principles effectively, considering the unique challenges and opportunities of their operational environment. This framework not only guides practitioners in enhancing the efficiency and effectiveness of SOEs but also provides a direction for future research to further explore and refine the integration of lean management within the unique context of the public sector.

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APPENDIX 1

APPENDIX 1(A): COMPREHENSIVE FINDINGS WITH RESPECT TO THE KEY QUOTES AND KEY ELEMENTS FROM THE PARTICIPANTS IN STATE OWN ENTERPRISE (SOE) ONE

RESEARCH QUESTION 1: What constitutes value from the public sector perspective? **# SOE 1**

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q1 (a)	Leadership ensuring value creation based on customer needs	**#1**. We need to be customer driven. So, to create value, the leadership has a strategic session that outlines KPIs, and during the session, we look at and provide input on each KPI to assess the value that is needed as per customer requirements. ***(SOE 1, Safety Manager)***	*Setting our key performance indicators (KPIs), through strategic sessions, strategic planning, value creation, customer-driven, customer requirements*	4:1 ¶ 3
		#2 ... value is created for the departments that we are servicing by giving them the outputs because we don't deal with walk-in customers. ***(SOE 1, Senior Advisor Risk Management)***	*Service orientation, provision of inputs into value creation*	4:2 ¶ 5
		#3. We will basically set ourselves some targets. We produce enough energy to be able to service our customers' requirements. ***(SOE 1, Production Manager)***	*Customer satisfaction, customer service, ensure enough energy production, target setting*	4:3 ¶ 7
		#5. We've got internal customers and external customers. In terms of our internal customers, they help us in value creation at different levels in the organization as we are generating our product for the external customer, who is transmission. ***(SOE 1, Quality Officer)***	*Coordination of internal customers, and generation of product/ services for external customers*	4:4 ¶ 10
		#6. From a service department perspective, we normally send out a customer needs analysis to the manager, and they will come back with the requirements in terms of the services they are interested in. ***(SOE 1, Technician)***	*Dissemination of customer needs analysis report,* *receiving feedback on customer requirements*	4:5 ¶ 11
		#7. Leadership sends the GC customer feedback programme, firstly we need to outline who the customer is and then indicate the method in which we solicit customer feedback ***(SOE 1, Quality Advisor)***	*Communication with stakeholders, delivering customer service*	4:6 ¶ 12
		#8. The leadership communicates with us on plant performance feedback at the toolbox meetings, but as for creating customer value, we don't have a say as to how we can contribute to that value. ***(SOE 1, Artisan)***	*Lack of influence, employee feedback, leadership communication, receive customer feedback*	4:7 ¶ 13
		#9. Our leadership demonstrate their commitment to creating value and also cultivate a culture of continuous improvement through leading Gemba walks and other strategic improvements ***(SOE 1, Boiler Engineer)***	*Cost effectiveness, reasonable price, energy availability, affordability, satisfying customer needs*	4:8 ¶ 14
		#10. By listening to the voice of the customer and the needs of the customer, we create customer value, although we don't have walk in customers so our customers will be the departments, divisions and business unit in accordance to the KPI's ***(SOE 1, Mechanics)***	*Customer focus, customer needs, listen to voice of* *customer*	4:9 ¶ 15
		#11. In my view, our departmental objectives and plans are developed in alignment with the broader goals and objectives of the organization. ***(SOE 1, Maintenance planner)***	*Department objectives are aligned with organizational goals*	4:10 ¶ 16
		#12. I think leadership creates customer value by communicating the objectives and requirements of the customers. ***(SOE 1, Projects Assistant Officer)***	*Communication customer requirements with stakeholders*	4:11 ¶ 17
Q1 (b)	Resources required for customer value creation	**#1.** To effectively manage safety, I need a lot of resources, like safety officers who are experienced in construction regulations, budgets for safety initiatives, training programs, safety audits, and the purchase and maintenance of safety equipment. ***(SOE 1, Safety Manager)***	*Experienced safety officers, budget for safety initiatives, training programs, safety audits, purchase, and maintenance of safety equipment.*	11:1 ¶ 2
		#2. …make sure that there is enough manpower who is skilled to execute the project. ***(SOE 1, Senior Advisor Risk Management)***	*Project execution resources, adequate number of skilled laborers*	11:2 ¶ 3
		#3. We must have adequate resources. We need water, fuel, and oil, so we plan around that. ***(SOE 1, Production Manager)***	*Water, Fuel, Oil*	11:3 ¶ 4
		#4. We need budget and money to fund capital projects to purchase spare parts. A substantial budget is allocated to support our engineering projects and maintenance activities. This budget covers equipment procurement, maintenance costs, infrastructure investments, and technical research and development. ***(SOE 1, Engineering Manager)***	*Budget allocation, capital projects, infrastructure investments, maintenance costs, equipment procurement,* *research, and development*	11:4 ¶ 5
		#5. We need to look at resources such as manpower, budget, the filling of all critical skills, policies, documents, and equipment. ***(SOE 1, Quality Officer)***	*Documents, manpower, equipment, budget, policies, skills*	11:5 ¶ 6
		#6. Lack of resources is our main challenge; we have a shortage of operational staff. ***(SOE 1, Technician)***	*Staff shortage, resource limitations*	11:6 ¶ 7
		#8. To stay at the forefront of technological advancements, we invest in research and development initiatives. This includes funding for further study innovation, pilot projects, and partnerships with research institutions. ***(SOE 1, Artisan)***	*Innovation, partnerships, pilot projects, research and development, technological advancements*	11:7 ¶ 8
		#9. ...resources, which are tangible resources, and commodities, which are things like space, materials, and so forth. ***(SOE 1, Boiler Engineer)***	*Resource planning, skills acquisition, commodities i.e., space and materials*	11:8 ¶ 10
		#11. So, it's the work planners, and then Operating, Maintenance and Outages planners. ***(SOE 1, Maintenance planner)***	*Maintenance planners, operating and outages planners*	11:9 ¶ 12
		#12. Human Resources strategy, direction, policy, and assurance, as well as strategic HR services and finance, manage our overall CAPEX and OPEX. Operational departments such as production, operating, and maintenance; support departments such as risk and assurance; and support services. ***(SOE 1, Projects Assistant Officer)***	*Support services, human resource strategy, direction,* *Policy, assurance, skilled labor*	11:10 ¶ 13

CON'T: RESEARCH QUESTION 1: What constitutes value from the public sector perspective? **# SOE 1**

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q1 (c)	The roles of the departments in customer value creation	**#1**. As a safety department, our value proposition is to ensure that everyone operates safely, reducing the risk of injury. Also, departments can support value creation by adhering to procedures, and the leadership of the organization must show visible and felt leadership. ***(SOE 1, Safety Manager)***	*Leadership by example, adherence to procedures, ensuring employees safety, reducing employees' risk of injuries*	12:1 ¶ 3
		#2. Project management, because they're dealing with the execution of the project and procurement, which is to supply the value to plant management. Materials management is important in ensuring that we have the right people spared when they are needed; HR human resources provide the skilled people; the finance department looks at the funds and contracts; and management, quality, and risk management are also important. ***(SOE 1, Senior Advisor Risk Management)***	*Successful project execution, recruit highly skilled employees, monitoring of funds, controlling spending, right spare parts availability, operations and management, supply of materials, risk monitoring and control, quality assurance, proper contract management*	12:2 ¶ 4
		#3. The maintenance department plays a crucial role in implementing the maintenance strategy and preventing plant breakdowns. ***(SOE 1, Production Manager)***	*Prevent plant breakdowns, and implement the maintenance strategy*	12:3 ¶ 5
		#4. Delays in data reporting and analysis limit our ability to identify emerging trends and make informed strategic decisions. The information is not flowing across departments, and this causes delays. ***(SOE 1, Engineering Manager)***	*Ensure employees safety, reducing employee fatality and uninterrupted operations*	12:4 ¶ 6
		#5. We cascade it down to our objective of keeping the lights on in the other department. So, for us to also reduce the waste on the plant, we check in terms of feeding into that area. ***(SOE 1, Quality Officer)***	*Top-down communication strategy, Collaboration Interdepartmental value*	12:5 ¶ 7
		#6. We are servicing the whole station, so we always ask the departments to give us their needs prior to servicing so that we can create interdepartmental value like internal customers. It's important that we collaborate to create value. ***(SOE 1, Technician)***	*Creating interdepartmental value, customer value, and service customers through collaboration*	12:6 ¶ 8
		#7. We communicate the expectation at various levels of the organization. This communication goes to all the employees and the contractors because they are also part of our value chain. We continually monitor our progress throughout the financial year. (***SOE 1, Quality Advisor)***	*Ensure effective communication both internally and externally, improving measures, creating organizational awareness, monitoring performance and create value*	12:7 ¶ 9
		#8. We work together, mostly doing outages when the unit is standing still. ***(SOE 1, Artisan)***	*Ensure collaboration among the departments*	12:8 ¶ 10
		#9. We try to create that value by working with HR to recruit, train, and retain skilled and motivated employees who can contribute to the organization's success. ***(SOE 1, Boiler Engineer)***	*Recruit of skilled employees, and motivate employees*	12:9 ¶ 11
		#11. We work collaboratively and contribute to the organization's overarching goals. ***(SOE 1, Maintenance planner)***	*Ensure collaboration, and achieve organization's goals*	12:10 ¶ 13
		#12. I think it starts with proper planning, which is something we are already very good at. And we also need to do a lot of roots cause analysis to find some causes to our problems and to also look at what percentages of the problems contribute to the issues that are impacting us on a larger scale. ***(SOE 1, Projects Assistant Officer)***	*Perform risk impact assessment, work together, do proper planning, and perform root cause analysis*	12:11 ¶ 14
Q1 (d)	Important factors to improve customer. value creation	**#1**. Customer needs are included in the process. The scope of the project is based on customer needs. ***(SOE 1, Safety Manager)***	*Project scope based on customer needs, customer needs inclusion in the process, customer satisfaction*	5:1 ¶ 4
		#2. I look at project plans to achieve customer needs, and the risks that may arise during project execution are identified and addressed. ***(SOE 1, Senior Advisor Risk Management***)	*Problem-solving, project planning, risk management*	5:2 ¶ 5
		#3. There are various departments that are involved to ensure that customers' demand for electricity supply is met***. (SOE 1, Production Manager)***	*Internal collaboration, departmental alignment*	5:3 ¶ 6
		#5. We include customer needs in our leadership planning sessions or quality management review sessions. We have an operational plan where we have identified and set our station objectives (which are taken from the needs of our customer, who in this case is the transmission division). We make sure that when we set our objectives, they are customer focused. ***(SOE 1, Quality Officer)***	*Quality management, objective setting, review process, operational plans, target setting, customer-focused performance measuring*	5:4-5 ¶ 7
		#9. So, we develop an operational plan based on customer needs***. (SOE 1, Boiler Engineer)***	*Operational plans, customer-focused, planning*	5:6 ¶ 8
		#10. Well, customer needs are included in planning meetings like our prioritization meeting. We also look at the need and risk as to which plant to prioritise first. ***(SOE 1, Mechanics)***	*Project planning, risk analysis, customer focus, implementation of solutions*	5:10 ¶ 16
		#11. In the maintenance planning section, we try to minimize disruptions to customers and schedule maintenance activities during off-peak hours whenever possible. We also communicate maintenance schedules in advance through various channels, such as customer notifications, our website, and local media, so customers can plan accordingly***. (SOE 1, Maintenance planner)***	*Advance customer information, planned maintenance activities, avoid customer surprises, minimise service disruptions, adoption of off-peak hour maintenance activities*	5:11 ¶ 18
		#12. We also do an internal customer survey to see if the customers are happy with the value, we deliver to them. **(*SOE 1, Projects Assistant Officer)***	*Customer satisfaction survey, value performance*	5:12 ¶ 19

RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector? #

SOE 1

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q2 (a)	Specific lean tools used for continual. improvement in customer value creation	**#1**. We also have risk assessment, which is also part of what we give to employees to check and assess their areas prior to working. ***(SOE 1, Safety Manager)***	*Risk assessment, and internal auditing*	7:1 ¶ 3
		#2. We use audits, self-assessment, peer review, and root cause analysis. They have now also introduced Gemba plant walks, where we group ourselves into different teams that go on a plant walk to different areas of the plant and assess the work being done with a view to noting issues. ***(SOE 1, Senior Advisor Risk Management)***	*Peer review, self-assessment, root cause analysis, and Gemba plant walks*	7:2 ¶ 5
		#3. We use different tools for different plant investigations in the form of QIM (quality issue management). This is the system that we used to investigate things like unit trips, technical failures, and other failures in the plant. We also look at the root cause of that issue and address all the findings that come from that sort of investigation. We've got tools, such as our risk assessment, that we use to register all. ***(SOE 1, Production Manager)***	*Risk assessment, root cause analysis, and QIM (quality issue management)*	7:3 ¶ 6
		#4. We basically go through the 5 WHYs, which is a quality tool used for root cause analysis. The other tool we use is fault tree analysis to get to the root cause, so my engineers use this tool to investigate many other causes of plant failures. ***(SOE 1, Engineering Manager)***	*Root cause analysis, 5 WHYs analysis, and Fault tree analysis*	7:4 ¶ 7
		#5. We use fault tree analysis in all our technical plant investigations. We do conduct some audits, and we do use the 5 WHYs in terms of root cause analysis and also corrective and preventive actions to prevent non-conformances. So, we use the 5 WHYs analysis, and then, above all, we do have some meetings like trip reduction meetings where we sit down and analyze all the causes of unit trips. ***(SOE 1, Quality Officer)***	*Root cause analysis, 5 WHYs analysis, Fault tree analysis, and Trip reduction meetings*	7:5 ¶ 8
		#6. Regular Gemba walks have become a standard practice for our management and risk department teams. They help us stay connected to the shop floor, understand the challenges, and gather insights from our front-line employees. Also, root cause analysis, corrective action, and specifically, as a catering office, we also issue non-conformance reports from suppliers that provide us perishables that do not conform to our specification or preservation quality. We also use a checklist to monitor all components and report on their functionality status. ***(SOE 1, Technician)***	*Checklist, corrective action, non-conformance reports, Root cause analysis, and Gemba walks*	7:6 ¶ 9
		#7. We started with Gemba as a sorting tool to improve safety scores and housekeeping. ***(SOE 1, Quality Advisor)***	*Safety score, and Gemba*	7:7 ¶ 10
		#8. We use operating check sheets to monitor defects in and around the plant, making it easier for teams to track progress and make data-driven decisions***. (SOE 1, Artisan)***	*Checklist, data-driven decision, and task monitoring*	7:8 ¶ 11
		#9. We use root cause analysis, such as the Five Whys, to help us dig deep into the reasons behind issues and defects, allowing us to address the underlying problems rather than just the symptoms. ***(SOE 1, Boiler Engineer)***	*Root cause analysis, and 5 WHYs analysis*	7:9 ¶ 12
		#10. So, they've got different business tools, issue tree analysis, and root cause management systems in place. ***(SOE 1, Mechanics)***	*Fault tree analysis, and Root cause analysis*	7:10 ¶ 13
		#11. Some tools are maintenance tools, such as SAP notifications. This proactive approach has increased machine reliability and reduces unplanned downtime. ***(SOE 1, Maintenance planner)***	*SAP notification*	7:11 ¶ 14
		#12. In terms of the tools, we also have steps in place for making use of Primavera and some financial tools***. (SOE 1, Projects Assistant Officer)***	*Primavera, and financial tools*	7:12 ¶ 15
Q2 (b)	The effectiveness of the lean tools used for continual improvement in customer value creation	**#1**. We have audits that we conduct internally by our safety department, which will then tell us where we are standing. We also have risk assessment, which is also part of what we give to employees to check and assess their areas prior to working. ***(SOE 1, Safety Manager)***	*Improvements in safety incidents, and audit scores*	7:1 ¶ 3
		#2. We use audits, self-assessment, peer review, and root cause analysis. They have now also introduced Gemba plant walks, where we group ourselves into different teams that go on a plant walk to different areas of the plant and assess the work being done with a view to noting issues. ***(SOE 1, Senior Advisor Risk Management)***	*Improvements in safety incidents, audit scores, elimination of problems, and problem-solving*	7:2 ¶ 5
		#3. We use different tools for different plant investigations in the form of QIM (quality issue management). This is the system that we use to investigate things like unit trips, technical failures, and other failures in the plant. ***(SOE 1, Production Manager)***	*Reduction in plant downtimes and technical failures, implementation of solutions, and reduction in quality issues*	7:3 ¶ 6
		#4. If there is a plant issue that needs to be investigated or resolved, we basically go through the 5 WHYs, which is a quality tool used for root cause analysis. The other tool we use is fault tree analysis to get to the root cause, so my engineers use this tool to investigate many other causes of plant failures. ***(SOE 1, Engineering Manager)***	*Reduction in quality issues, problem-solving, implementation of solutions, and defect reduction*	7:4 ¶ 7
		#5. We want to reduce the undesired effects, such as load shedding and waste, so we use a fault-three analysis in all our technical plant investigations. We do conduct some audits; we do use the 5 WHYs in terms of root cause analysis and also corrective and preventive. actions to prevent non-conformances. ***(SOE 1, Quality Officer)***	*Reduction in undesired effects, load shedding and waste* *Reduction in quality issues, non-conformances preventions, implementation of solutions*	7:5 ¶ 8
		#6. We also issue non-conformance reports to suppliers that provide us perishables that do not conform to our specifications or preservation quality. We also use a checklist to monitor all components and report on their functional status. ***(SOE 1, Technician)***	*Improvements in safety incidents, reduction in plant* *downtimes, defects, and quality issues,*	7:6 ¶ 9
		#7. Because safety is one of our gatekeepers for achieving our objectives, we don't want to harm anyone at the end of the day, be it our subcontractors, our contractors, or our employees. ***(SOE 1, Quality Advisor)***	*Safeguard people's safety*	7:7 ¶ 10
		#8. I provide information on plant status, making it easier for teams to track progress and make data-driven decisions. ***(SOE 1, Artisan)***	*Problem-solving, and positive change in employee morale*	7:8 ¶ 11
		#9. We use root cause analysis techniques, such as the 5 WHYs, to address the underlying problems rather than just the symptoms. (***SOE 1, Boiler Engineer)***	*Problem-solving*	7:9 ¶ 12
		#11. This proactive approach has increased machine reliability and reduces unplanned downtime ***(SOE 1, Maintenance planner)***	*Increased machine reliability and reduced unplanned downtime*	7:11 ¶ 14

CON'T: RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector? #

SOE 1

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q2 (c)	Monitoring deviations in the customer value creation processes	**#1**. Deviations from the processes are monitored through audits, i.e., safety audits, external auditors, and self-assessments. ***(SOE 1, Safety Manager)***	*Safety audits, external auditors, and self-assessment*	1:1 ¶ 3
		#2. We do performance reviews, audits, and man-job inspections. ***(SOE 1, Senior Advisor Risk Management)***	*Job inspection, auditing, and performance evaluation*	1:2 ¶ 4
		#3. There are people that are monitoring 24/7 at the control room. ***(SOE 1, Production Manager)***	*24-hour automation monitoring system at Control room*	1:3 ¶ 5
		#4. We have a monthly inspectorate that comes to monitor, and the quality department has also introduced self-assessments where each department can assess their own deviations from processes or procedures, although there is just a lot of paperwork. ***(SOE 1, Engineering Manager)***	*Monthly job inspections by Inspectorate, and self-assessment*	1:4 ¶ 6
		#5. We monitor process deviations through audits and self-assessment. The operating department also conducts plant walks, where they do physical plant checks to monitor for defects and other out-of-normal plant conditions. ***(SOE 1, Quality Officer)***	*Self-inspections, plant walk checks, and auditing*	1:5 ¶ 7
		#6. We monitor them through job observations. We normally observe each person's job tasks, activities, and performance to gather information and data about how a particular job is being carried out and if there are any deviations. ***(SOE 1, Technician)***	*Job inspections and job observation*	1:6 ¶ 8
		#7. We do monitor our processes through audits and quarterly quality review meetings. ***(SOE 1, Quality Advisor)***	*Auditing, and Quality review meeting*	1:7 ¶ 9
		#9. We are always encouraged to report all deviations and non-conformances on the SAP Quality Issue Management System. ***(SOE 1, Boiler Engineer)***	*Observations and voluntary reporting*	1:8 ¶ 11
		#10. We have audits, self-assessments, and quality control activities that monitor deviations. ***(SOE 1, Mechanics)***	*Self-assessment, auditing, and quality control activities*	1:9 ¶ 12
		#12. Automation systems (risk-based inspections online) help control critical processes within predefined parameters. If deviations occur, automated control systems can make real-time adjustments to bring processes back into compliance. ***(SOE 1, Projects Assistant Officer)***	*Automation control systems*	1:10 ¶ 14

RESEARCH QUESTION 3: What factors can impede the successful implementation of lean principles within the public sector environment? **# SOE 1**				
NUMBER	**INTERVIEW QUESTION GUIDE**	**KEY QUOTATIONS**	**KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES**	**TRANSCRIPT REFERENCE FROM ATLAS**
Q 3	The internal and external issues that can affect. customer value creation	**#1**. The employee representatives are complaining about the incidents, which are continuously happening all the time without maybe strategies being put in place. Some of the external issues might be politically influenced, and some of them are coming from the community. The power stations are situated far from the towns and cities. ***(SOE 1, Safety Manager)***	*Employee complaints, community influence, political influence, and power accessibility issues*	2:1-2 ¶ 3
		#2. One internal issue is plant obsolescence due to aging; plant obsolescence makes maintenance problematic in terms of spares, skills, and cost***. (SOE 1, Senior Advisor Risk Management)***	*Maintenance issues, and plant obsolescence*	2:3 ¶ 4
		#3. We have a risk that can influence the ability to achieve the intended results and can impact production or plant operation. ***(SOE 1, Production Manager)***	*Mitigation actions*	2:4 ¶ 5
		#4. ... sometimes we don't get the project funding that we need on time, and we can have many projects that wait for over 3 years. We have issues with resources; some are not even local spares; we will depend on the external suppliers to give us those things. ***(SOE 1, Engineering Manager)***	*Lack of funding, and resource constraints*	2:5 ¶ 6
		#6. Internal issues such as resource constraints, labor issues, and external issues such as the strikes we had and the escalating fuel oil prices. ***(SOE 1, Technician)***	*Labor strikes, fuel/oil prices escalation and resource constraints*	2:6 ¶ 8
		#7. We can identify all those factors that can affect the organization's ability to meet customer requirement. ***(SOE 1, Quality Advisor)***	*Performance-related issues*	2:7 ¶ 9
		#8. Internally, we do have issues like inadequate log writing, which could lead to plant incidents resulting in plant unavailability. ***(SOE 1, Artisan)***	*Inadequate log writing, and plant unavailability issues*	2:8 ¶ 10
		#9. Strategies to assess the risk of plant failures, the risk of critical spares not being available to support plant operation, and so on***. (SOE 1, Boiler Engineer)***	*Operational risks, risk of plant failures, and unavailability of critical spares*	2:9 ¶ 11
		#11. This plan looks at the budget and funds and links them to the outage window period. ***(SOE 1, Maintenance planner)***	*Budgeting issues, and lack of fund*	2:11 ¶ 13
		#12. We have issues such as lack of resources, training that is not adequate to address the needs, and financial issues such as lack of funding to support key critical failing plants. All these can prevent the organization from achieving its goals. And what I can think of is the national treasurer regulations. It is difficult to have good procurement turnaround times because there are just so many signatures to approve a purchase of one spare that is needed for a critical plant, and this led to delays and caused us losses in load or megawatts. ***(SOE 1, Projects Assistant Officer)***	*National treasury regulations, lack of funding, lack of resources, inadequate training, financial issues, and bureaucratic regulations*	2:12 ¶ 15

RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector? #

SOE 1

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q 4 (a)	Identification of waste or non-value-adding activities in the customer value creation processes	**#1**. I describe it as working with people who are always waiting to be told what they should do. You don't want to work on something repeatedly. ***(SOE 1, Safety Manager)***	*Lack of initiative, and lack of progress in projects or tasks*	9:2 ¶ 2
		#2. It's not showing up for the meetings from some stakeholders; we set up meetings and other stakeholders don't pitch; it's wasted time; and we will have to resend the scopes. Rework, we have lots of units that we refurbish, and we waste money by paying for them again. We also have plant breakdowns that are not recovered on time. Project spares non-availability also means the project wait times are longer or deferred. ***(SOE 1, Senior Advisor Risk Management)***	*Unreliable stakeholders, plant breakdowns, project defects, rework, delayed projects, financial waste, timeline delays, and wasted time*	9:3 ¶ 3
		#3. I can describe waste as things like your coal spillages, which I have managed, ash spillages, oil spillages, and water leaks. We also have, in my view, a lot of meetings that waste time and don't add value. We should start looking at meetings that can help us solve. ***(SOE 1, Production Manager)***	*Coal spillages, ash spillages, oil spillages, and water leaks, and meetings that do not add value*	9:4 ¶ 4
		#4. In my view, some processes don't add any value but add complexity and waste time. I feel like some of them are duplications. We also have many meetings that deal with the same issues, for example, trip reduction and events teams. These meetings all look at plant failures, and we delegate the same engineers to sit there; this doesn't add value to the way we run things. We also have repeat projects that waste billions of rands, namely PFMA. ***(SOE 1, Engineering Manager)***	*Process complexity, process duplication, duplication of roles, inefficiency, rework/repeat in projects, time-Wasting, and meetings that do not add value*	9:5 ¶ 5
		#5. We address plant deviations like coal spillages and unit send-outs, and we also look at which plant breakdowns took place in the last few days. We have a process called quality issue management that a person can use to raise non-conformances or anything that doesn't add value or waste. ***(SOE 1, Quality Officer)***	*Plant deviations, coal spillages, plant breakdowns, and non-conformances incidents*	9:6 ¶ 6
		#6. We have long lead times and meetings that really don't add a lot of value. Also, there are a lot of processes that are duplication. In my view, we can't have an events team and a trip reduction forum when the purpose of all the meetings is to investigate plant failures. We can save a lot of time by only having one meeting that resolves all issues. ***(SOE 1, Technician)***	*Long lead times, inefficiency, redundancy, time-wasting, process duplication, and meetings that do not add value*	9:7 ¶ 7
		#7. Waiting waste occurs when processes or workers are idle due to delays, bottlenecks, or inefficient workflows. ***(SOE 1, Quality Advisor)***	*Operational inefficiency, delays, bottlenecks, inefficient workflows, and idle workers*	9:8 ¶ 8
		#8. My job is to verify and sign the job card regarding which areas of the plant are defective***. (SOE 1, Artisan)***	*Incidents of plant defects*	9:9 ¶ 9
		#9. We started a process called the cost of quality or cost of rework, where we wanted to look at how much money the business was losing by retracking rework. ***(SOE 1, Boiler Engineer)***	*Rework, and poor quality*	9:10 ¶ 10
		#10. My boss doesn't like redundant inspections, approvals, or excessive steps. ***(SOE 1, Mechanic)***	*Redundant inspections, and excessive steps*	9:11 ¶ 11
		#11. We get delayed when it comes to planning if we have a lack of critical plant spares and the red tape around the procurement of the spares, and it increases the outage planning days, and this has the potential to delay the unit from returning to service, which causes load shedding. ***(SOE 1, Maintenance planner)***	*Lack of critical plant spares, load shedding and work delay*	9:12 ¶ 12
		#12. The planning and communication are so poor between the executing units that you run into outage slips that will cost the organization a lot of money. ***(SOE 1, Projects Assistant Officer)***	*Costly mistakes, poor communication, poor planning, and outage slips*	9:13 ¶ 13

CON'T: RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector? #

SOE 1

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q 4 (b)	Lean strategies used to eliminate waste in the customer value creation	**#1**. We have migrated to the new standard, which is ISO 45,001, which talks about leadership, talking from the top to the bottom. So, my CEO and group executives define the organizational strategy and operational plan, which are then cascaded down to different sections of the organization. ***(SOE 1, Safety Manager)***	*ISO Standard, leadership and communication from top to bottom, CEO and group executives define strategy and operation plan, strategy and plan cascaded down to different sections of the organization*	3:1 ¶ 3
		#2. I prepare the risk management plan that will guide us on how to execute the risks of the project. The operational plan is influenced by customer needs as well as the objectives that are derived for that year. The operational plan is also influenced by the divisional plan that is communicated from the head office. ***(SOE 1, Senior Advisor Risk Management)***	*Risk management plan, project risks matrix, operational influence by customer needs, organizational objectives, Head office communique, and divisional plan*	3:2 ¶ 5
		#3. We must have adequate resources. Then you look at your planned availability. Those may be consumables that you will require. We need water, fuel, and oil, so we plan around that. ***(SOE1, Production Manager)***	*Adequate resources, planned resources availability, resource planning, and availability consumables such as water, fuel, and oil.*	3:3 ¶ 7
		#4. We have long-term and short-term strategies. The short term will basically be looking at your current performance and then marrying it to the life of the plant plan. There's a program called Life Plan where we plan it about five years ahead. ***(SOE1, Engineering Manager)***	*Long term strategies, short term strategies, assessment of current performance, and plant life plan alignment*	3:4 ¶ 8
		#5. One of the problems we have is the unplanned capability loss factor. This means that somewhere in the production process, our units are losing their capabilities. These unplanned events, such as unit trips, are because of plant failures. So, when we do the planning, we look at strategies that can help us reduce the loss of capability incidents in the plant. ***(SOE 1, Quality Officer)***	*Plant capacity incidents, reduce loss of capacity incidents, unplanned capability loss factor, mitigation strategy development*	3:5 ¶ 9
		#6. Like operational planning and control, production planning, resource planning, and project planning. ***(SOE1, Technician)***	*Operational planning, production planning, project planning, and resource planning*	3:6 ¶ 10

		#7. We should know which areas of our business are critical and which areas can hinder us from achieving our objectives. In terms of risks, we identify our strengths, weaknesses, opportunities, and threats to our organization. Like all those external internal factors that can affect achieving our objectives. ***(SOE1, Quality Advisor)***	*Identification of organizational strengths, weakness,* *opportunities, threats, critical areas that can hinder.* *success*	3:7 ¶ 11
		#8. We try to create value by forming strong relationships with our support department to secure quality materials and negotiate favorable terms. ***(SOE 1, Artisan)***	*Value creation, building strong interdepartmental relationships, creating support culture, securing quality materials, negotiation focused on favorable terms*	3:8 ¶ 12
		#9. We have the generation turnaround strategy that is a strategy document whose aim is to confront the issues around our declining energy availability factor and has actions to end load shedding. So, the plans focus on the top contributors to the unplanned energy loss factors in the organisation. ***(SOE 1, Boiler Engineer)***	*Strategy document, addressing issues, declining energy availability, end load shedding, and unplanned energy loss factors*	3:9 ¶ 13
		#10. There are many strategies; the first is the generation turnaround strategy and the generation business plans; then we have the operational plan here at the power station level; and then we have our department objectives. ***(SOE 1, Mechanic)***	*Generation turnaround strategy, developing sound business and operations plans*	3:10 ¶ 14
		#11. Our maintenance strategies and plans are developed in alignment with the broader goals and objectives of the organization. We ensure that our maintenance efforts directly contribute to the overall mission, whether it's ensuring uptime, enhancing safety, or optimizing costs. ***(SOE 1, Maintenance planner)***	*Maintenance strategy, organization broader goals alignment, assurance of equipment uptime and safety, and cost optimization*	3:11 ¶ 15
		#12. We establish performance metrics and KPIs to track the effectiveness of our maintenance efforts. These metrics include equipment uptime, mean time between failures (MTBF), and maintenance costs. Regularly monitoring these indicators helps us assess our progress toward organizational objectives. (***SOE1, Projects Assistant Officer)***	*Key performance indicators (KPIs), tracking, maintenance efforts, regular monitoring, Utilising Mean time between failures (MTBF) tool, and progress assessment*	3:12 ¶ 17

APPENDIX 1(B): COMPREHENSIVE DOCUMENT ANALYSIS IN STATE OWN ENTENTITES (SOE) ONE

RESEARCH QUESTION 1: What constitutes value from the public sector perspective? **#D1**

NUMBER	QUESTION GUIDE	KEY EXTRACTS FROM THE DOCUMENT	CODES CREATED FROM THE EXTRACT	ATLAS REFERENCE
Q1 (a)	Leadership ensuring value creation based on customer needs	The distribution business aims to enhance customer value and experience by embracing customer centricity. This approach allows the business to stay relevant, competitive, and sustainable amidst changing market trends, competition, and regulatory pressures. With evolving customer expectations towards energy independence, the business adopts customer-focused leadership, empowers staff, and uses metrics and customer feedback to drive continuous improvement. Customer centricity entails understanding customer needs, preferences, and behaviors and utilizing data analytics and other technologies to design and deliver solutions that meet or exceed their expectations. This approach creates value for customers while achieving business goals, resulting in an agile, responsive, and sustainable business. ***(SOE 1, Corporate Plan FY24-FY28, p. 140).***	*Agility, customer behaviors, customer centricity, customer needs, customer preferences, Customer-focused leadership, empowers staff, customer feedback, data analytics, responsiveness, sustainability, technology, value creation, continuous improvement*	1:1 ¶ 8 in SOE_1_docreview
		Embedded within its planning, SOE 1, as an SOC, gives effect to prevailing legislation to support and enable the government's transformation objectives. As such, SOE 1 is required to align itself with the relevant legislation, national plans, and policies residing in relevant government policy departments. SOE 1's Transformation Plan drives SOE 1's revised Corporate Social Responsibility (CSR) Strategy, which, in turn, is aligned with SOE 1's short, medium, and long-term strategic trajectory. Consequently, the revised CSR strategy serves as a vehicle for leveraging business value-creating opportunities that arise from the execution of the strategy. ***(SOE 1, Corporate Plan FY24-FY28, p. 47)***	*Business strategy, corporate social responsibility strategy, government policy, national plans,*	1:2 ¶ 10 in SOE_1_docreview
		SOE 1 needs to ensure that its suppliers are truly value-adding and not simply strawman entities: that neither they, nor their affiliated companies, nor their directors are on official blacklists or sanctions lists; that their own supply chains are legitimate, ethical, and reliable; that there are no signs of collusion with other suppliers nor any signals that they may be acting on privileged information; that their work does not involve unethical or illegal behavior; and that payments to them are made based on verified quantity, quality, and pricing, to a verifiable bank. ***(SOE 1, Corporate Plan FY24-FY28, p. 57)***	*Ethics, risk assessment, transparency, quality control,* *verified pricing, value addition, service reliability,*	1:3 ¶ 12 in SOE_1_docreview
Q1 (c)	The roles of the departments in customer value creation	A number of the support functions are working in tandem to enhance our ESG framework in support of "The SOE 1 Way", which is the code that defines how we conduct business as a values-driven organization. The supporting focus areas for each of SOE 1's ESG (environmental, social, and governance) elements are indicated in the figure below. This chapter highlights SOE 1's commitment to ensuring that we continuously strive to leverage ESG to enhance our value offering across our commercial and socio-economic development and mandates, aligned with our inherent organizational DNA as a responsible corporate citizen and in keeping with our track record for transparent sustainability reporting. ***(SOE 1, Corporate Plan FY24-FY28, p. 48)***	*Collaboration, commitment, corporate responsibility, sustainability, transparency*	1:4 ¶ 15 in SOE_1_docreview
		With the support of relevant government departments and agencies to unlock bottlenecks, SOE 1 is expending every effort to improve plant performance and procure additional capacity. Through a number of programs and initiatives, SOE 1, in collaboration with the government, is facilitating the increasing participation of the private sector in the generation of new capacity**. *(SOE 1, Corporate Plan FY24-FY28, p. 3).***	*Collaboration, effort, capacity building, government support, programs and initiatives, procure additional capacity, improve plant performance*	1:5 ¶ 17 in SOE_1_docreview
		Processes, policies, and operational procedures, together with the competency and skills of our workforce, are critical to ensuring that each component of the integrated power system is operated optimally to deliver on key stakeholders' expectations. Quality management, specifically the management systems component that governs our strategic, tactical, and operational performance, in terms of being fit for purpose—international standards and benchmarks—plays a significant role in driving operational excellence, ensuring that we optimize the sustainable performance of our assets over their designed life cycles. **(*SOE 1, Corporate Plan FY24-FY28, p. 54*)**	*Competent and skilled workforce, achieving stakeholder expectations, sustainability, operations management, performance optimization, operational excellence, quality management, adherence to standards and benchmarks*	1:6 ¶ 20 in SOE_1_docreview
Q1 (d)	Important factors to improve customer value creation	Customer centricity entails understanding customer needs, preferences, and behaviors and utilizing data analytics and other technologies to design and deliver solutions that meet or exceed their expectations. This approach creates value for customers while achieving business goals, resulting in an agile, responsive, and sustainable business. ***(SOE 1, Corporate Plan FY24-FY28, p. 140)***	*Agile, business goals, customer centricity, data analytics, customer preferences, responsive, solution design, meeting expectation, sustainable business, understanding customer needs, value creation, technologies*	1:7 ¶ 22 in SOE_1_docreview
		A number of efficiency-based system improvements and enhancements have been implemented over the last two years (FY21 and FY22), which enable and support the business as an interim measure. This remains ongoing with the current key automation projects, as follows: Digital procurement: This project seeks to transform P&SCM into a practically automated and integrated procure-to-pay process that will bring improved process compliance and greater visibility of spend. The project is to follow a five-phase (wave) approach to implementation. The project has commenced, with final phase implementation planned for 2024, depending on market responses. ***(SOE 1, Corporate Plan FY24-FY28, p. 178).***	*Automation, integration, market response, visibility, efficiency, technology implementation, process compliance, procurement, integrated procure-to-pay process,*	1:8 ¶ 25 in SOE_1_docreview

RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector?				**#D1**
NUMBER	**QUESTION GUIDE**	**KEY EXTRACTS FROM THE DOCUMENT**	**CODES CREATED FROM THE EXTRACTS**	**ATLAS REFERENCE**
Q2 (a)	Specific lean tools used for continual improvement in customer value creation	Automated procurement systems: SOE 1 is implementing automated systems in the procurement of goods and services and the management of spend to better manage procurement spend and protect against integrity breaches, including tools such as Price Check, the digitalization of stock control, the use of an augmented procurement model in certain business areas, and the use of e-auction. **(*SOE 1, Corporate Plan FY24-FY28, p. 57).***	*Automated procurement systems, price check, digitalization of stock control, e-auction.*	1:39 ¶ 101 in SOE_1_docreview
		Driving continuous improvement through effectiveness assessments for operating, maintenance, and outages, including deep dives and participation in relevant incident investigations (such as outage slips), as well as benchmarking exercises. ***(SOE 1, Corporate Plan FY24-FY28, p. 57)***	*Benchmarking, maintenance, operating, incident investigations, outages, effectiveness assessments, continuous improvement*	1:40 ¶ 104 in SOE_1_docreview
		Leveraging the Remote Monitoring and Diagnostic Centre (RMDC) to support predictive monitoring techniques to identify, diagnose, mitigate, and eliminate imminent operating and engineering risks through early warning and reporting to power stations**.** ***(SOE 1, Corporate Plan FY24-FY28, p. 57)***	Remote Monitoring and Diagnostic Centre (RMDC), *Monitoring and diagnostics, risk management*	1:41 ¶ 105 in SOE_1_docreview
		Monitoring, reporting, and providing assurance on implementation progress, compliance, and effectiveness of stations against set OMO standards. ***(SOE 1, Corporate Plan FY24-FY28, p. 57)***	*Monitoring and reporting, performance evaluation, OMO standards*	1:42 ¶ 106 in SOE_1_docreview
Q2 (b)	The effectiveness of the lean tools used for continual improvement in customer value creation	Lessons learned from past events are implemented to improve the resilience of the system to unforeseen events. ***(SOE 1, Corporate Plan FY24-FY28, p. 48)***	*Adaptability, learning from past events, improvement in system performance*	1:43 ¶ 111 in SOE_1_docreview
		We are also subject to oversight or regulation by several other government departments, parliamentary committees, and regulators. ***(SOE 1, Corporate Plan FY24-FY28, p. 7).***	*Government oversight, regulations*	1:44 ¶ 116 in SOE_1_docreview
		We must embark on a digital transformation journey to improve our ability to respond to technological disruption and transition the business to utilizing digital technology to enhance operations. ***(SOE 1, Corporate Plan FY24-FY28, p. 22)***	*business operations, technology, digital transformation, reduction in technological disruption, operations enhancement*	1:45 ¶ 119 in SOE_1_docreview
		Committing to greater efficiencies across the organization, reducing wasteful expenditure, and optimizing revenue. ***(SOE 1, Corporate Plan FY24-FY28, p. 21)***	*Efficiency, cost reduction, revenue optimisation, reducing wasteful expenditure*	1:46 ¶ 122 in SOE_1_docreview
Q2 (c)	Monitoring deviations in the customer value creation processes	An audit recovery programme to address its challenges with PFMA reporting, which includes assessing the effectiveness of the procurement compliance monitoring systems and other internal controls. ***(SOE 1, Corporate Plan FY24-FY28, p. 30)***	*Auditing, internal controls, procurement compliance, assessment, monitoring system*	1:47 ¶ 125 in SOE_1_docreview
		The responsibility for combined assurance is delegated to A&F, which facilitates and coordinates the execution of combined assurance activities. ARC receives regular reports on the status of governance, risk management, compliance, and the adequacy and effectiveness of preventative and corrective controls. ***(SOE 1, Corporate Plan FY24-FY28, p. 30).***	*Controls, coordination, governance, compliance, delegation, misconduct(reporting), risk management*	1:48 ¶ 128 in SOE_1_docreview
		Deploying technologies to minimise both technical and non-technical energy losses, as well as strategically leveraging the Just Energy Transition. ***(SOE 1, Corporate Plan FY24-FY28, p. 18).***	*Sustainability, technology, energy efficiency monitoring*	1:49 ¶ 131 in SOE_1_docreview
		This shift introduces new players to the industry and an unfolding series of demand-centric, value-adding applications. ***(SOE 1, Corporate Plan FY24-FY28, p. 20).***	*Demand-centric assessment, value adding inspections*	1:50 ¶ 134 in SOE_1_docreview

RESEARCH QUESTION 3: What factors can impede the successful implementation of lean principles within the public sector environment?				**#D1**
NUMBER	**QUESTION GUIDE**	**KEY EXTRACTS FROM THE DOCUMENT**	**CODES CREATED FROM THE EXTRACTS**	**ATLAS REFERENCE**
Q 3 **(a)**	The internal issues that can affect customer value creation	Create a culture of accountability and high performance. Attract, develop, and retain critical skills, and ensure that employees go through training and interventions to remain relevant to meet global changes. Strengthen leadership and management effectiveness. Intensify consequence management for fraud and corruption. Ensure adequate funding. ***(SOE 1, Corporate Plan FY24-FY28, p. 107)***.	*Culture accountability, attract and retain critical skills, employee training, fraud and corruption, inadequate funding*	1:25 ¶ 73 in SOE_1_docreview
		SOE 1 is operating in a constrained environment, with liquidity challenges confronting the company. This has necessitated a reduction in allocated capex, specifically for the execution of improvement and reliability projects, including the required planned outages where safety and statutory scopes are prioritized over performance improvement. ***(SOE 1, Corporate Plan FY24-FY28, p. 107)***.	*safety prioritization, financial challenges, cost-cutting measures, infrastructure maintenance, liquidity challenges,*	1:26 ¶ 77 in SOE_1_docreview
		It is envisaged that the NERSA revenue allocation for the remaining period of the MYPD5, together with the National Treasury balance sheet support package, will significantly alleviate the funding constraints to enable effective planning of outages. ***(SOE 1, Corporate Plan FY24-FY28, p. 107)***.	*Planning, financial support*	1:27 ¶ 79 in SOE_1_docreview
		Secure funding for the life of assets, including full funding for projects and outages, investment in cost-plus mines (in line with shutdown plans), and MES compliance aligned with 2035 station shutdown plans, and ensure the timely release of funding to enable execution. ***(SOE 1, Corporate Plan FY24-FY28, p. 107)***.	*Financial planning and budgeting, infrastructure maintenance*	1:28 ¶ 80 in SOE_1_docreview
		Leadership and skills challenges: the high turnover of Generation Group executives causes leadership instability and diluted focus. There is also a high turnover of competent skills that are leaving SOE 1 for better opportunities both locally and globally as the job market improves. Skills gaps and the inability to retain the required skills, as well as vacancies that are not timeously filled, are leading to a growing dependence on the contracting of external skills, which, in turn, are not always at the required levels of proficiency and quality. ***(SOE 1, Corporate Plan FY24-FY28, p. 94)***.	*Dependency on external skills, skill gaps, employee turnover, leadership challenges*	1:23 ¶ 66 in SOE_1_docreview
Q 3 **(b)**	The external issues that can affect customer value creation	The engagements to reduce and moderate some requirements of policies and procedures for DPE and NT have been addressed by the disaster management act, NECOM, and the provision of funds for outage and midlife refurbishment. ***(SOE 1, Corporate Plan FY24-FY28, p. 107)***.	*Funding provision, policy and procedure modification*	1:30 ¶ 86 in SOE_1_docreview
		Generation is dependent on key external levers to reduce the severity and frequency of the occurrence of loadshedding. ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***	*Dependency, external factors, loadshedding*	1:31 ¶ 87 in SOE_1_docreview
		Recovery of the 6000 MW in the next 24 months of SOE 1 capacity and delays or an inability to ensure that the enablers are implemented will necessitate a review of the achievable capacity in the 24-month period. ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***	*capacity, infrastructure, delays*	1:32 ¶ 88 in SOE_1_docreview
		It is critical to revise the IRP 2019, which is the country's electricity infrastructure development plan. Based on the least-cost electricity supply and demand balance, considering security of supply and environmental impact, it is designed to minimize negative emissions and water usage. ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***	*Electricity supply, environmental impact, negative emissions, security of supply, water usage, demand balance, infrastructure development*	1:34 ¶ 90 in SOE_1_docreview
		Engage with stakeholders for a long-term generation revenue price path at prudent and efficient cost-reflectivity, including legacy and capacity costs. This is essential to enable the servicing of generation debt and to avert placing an additional burden on an already constrained national Treasury. ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***	*Cost management, debt servicing, financial planning, external stakeholders influence,*	1:35 ¶ 92 in SOE_1_docreview
		Work with the government to effectively incorporate the balance sheet relief announced by the Minister of Finance during the Budget Speech on February 22, 2023, that is, R254 billion over a three-year period, in accordance with the soon-to-be promulgated SOE 1 Debt Relief Act of 2023. ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***	*Finance, government cooperation, legislation*	1:36 ¶ 94 in SOE_1_docreview
		Work and support interventions by law enforcement agencies to address the fraud, corruption, and criminality that have grown prevalent at many SOES 1 sites. ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***	*Law enforcement, criminality, fraud and corruption*	1:37 ¶ 95 in SOE_1_docreview
		Compliance with environmental requirements places a limitation on plant output in certain cases. Long-duration outages, unfavorable economics, and extensive funding are required for the projects. ***(SOE 1, Corporate Plan FY24-FY28, p. 107).***	*Economics, environmental requirements, limitations, plant output, funding, outages*	1:38 ¶ 97 in SOE_1_docreview
RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector?				**#D1**
NUMBER	**QUESTION GUIDE**	**KEY EXTRACTS FROM THE DOCUMENT**	**CODES CREATED FROM THE EXTRACTS**	**ATLAS REFERENCE**
Q 4 **(a)**	Identification of waste or non-value-adding activities in the customer value creation processes	Compliance with sections of the PFMA has been SOE 1's challenge over the past few years. The risk of misstatement of irregular, fruitless, and wasteful expenditures and losses due to criminal conduct will lead to a qualified audit opinion, high financial losses, reputational damage, and possible criminal prosecution of members of the SOE 1 Board if found to have neglected their fiduciary duties. This is exacerbated by regulatory non-compliance with MES limits and the litigation challenges SOE 1 faces. ***(SOE 1, Corporate Plan FY24-FY28, p. 39)***	*Financial mismanagement, litigation challenges, reputational damage, regulatory non-compliance, criminal conduct, high financial losses,*	1:10 ¶ 31 in SOE_1_docreview
		To drive and oversee P&SCM direction, policy, and assurance from a corporate level for optimal and cost-effective supply chain execution by the divisions, the challenges must be navigated. ***(SOE 1, Corporate Plan FY24-FY28, p. 176).***	*corporate level challenges, cost-effective, supply chain management issues*	1:11 ¶ 33 in SOE_1_docreview
		Procurement of goods and services at market-related prices via once-off purchase orders, contracts, and local purchase orders. ***(SOE 1, Corporate Plan FY24-FY28, p. 176).***	*Contracts related issues, purchase orders, procurement irregularities,*	1:12 ¶ 34 in SOE_1_docreview
		Inventory, spares, and warehouse management with poor control, lack of compliance with norms and standards relating to inventory management, and cases where orders are created for store items without first checking the inventory levels result in the business spending more money on items idling in the stores or being stolen. ***(SOE 1, Corporate Plan FY24-FY28, p. 176).***	*Inventory management issues, lack of compliance, theft, unnecessary expenditures,*	1:13 ¶ 35 in SOE_1_docreview
		Leverage data analysis to create internal and external visibility of spend, trends, and controls in digital procurement. ***(SOE 1, Corporate Plan FY24-FY28, p. 176)***.	*Lack of visibility of spend lack of data and trends analysis*	1:14 ¶ 39 in SOE_1_docreview
		Medupi and Kusile, have not delivered on expectations due to critical shortcomings in project planning, design, and execution, a direct consequence of the delay in the decision to commence building. Outages to address the design defects at Medupi and Kusile. ***(SOE 1, Corporate Plan FY24-FY28, p. 10, 50)***	*Delay, performance shortfall, project management challenges*	1:51 ¶ 139 in SOE_1_docreview
		The closing balance of fruitless and wasteful expenditure amounted to R5 billion at year end. ***(SOE 1, Corporate Plan FY24-FY28, p. 30).***	*Fruitless expenditure, wasteful expenditure, R5 billion fruitless and wasteful expenditure*	1:52 ¶ 145 in SOE_1_docreview
		The generation process produces waste in the form of ash, gaseous and particulate emissions, contaminated water, and nuclear waste, as well as eroding natural capital. ***(SOE 1, Corporate Plan FY24-FY28, p. 6)***.	*Wasteful production, environmental impact*	1:53 ¶ 151 in SOE_1_docreview
		The Generation fleet recorded 697 UAGS trips for the year, at an average of 58 trips per month, a significant deterioration compared to the previous year (2021: 527). ***(SOE 1, Corporate Plan FY24-FY28, p. 51)***	*Significant deterioration of generation fleet*	1:54 ¶ 154 in SOE_1_docreview
		Coal-related load losses contributed to capacity constraints at our coal-fired stations, with a coal-related OCLF of 0.64% for the year (2021: 0.66%). ***(SOE 1, Corporate Plan FY24-FY28, p. 51).***	*capacity constraint, Coal-fired stations, Coal-related load losses*	1:55 ¶ 157 in SOE_1_docreview

		Less coal was transported by rail, mainly due to the continued unavailability of the rail offloading facility. ***(SOE 1, Corporate Plan FY24-FY28, p. 38).***	*Logistics challenges, infrastructure challenges*	1:56 ¶ 160 in SOE_1_docreview
		Medupi Unit 4 is out of service until at least August 2024, following the explosion of the generator in August 2021. ***(SOE 1, Corporate Plan FY24-FY28, p. 15)***	*Equipment failure, lack of service availability*	1:57 ¶ 163 in SOE_1_docreview
		The other is the fact that we had to keep deferring scheduled maintenance and much-needed midlife refurbishment to keep the lights on, leading to a further deterioration in the state of the existing plant***. (SOE 1, Corporate Plan FY24-FY28, p. 16).***	*Equipment deterioration, deferring scheduled maintenance*	1:58 ¶ 166 in SOE_1_docreview
Q 4 **(b)**	Lean strategies used to eliminate waste in the customer value creation	To assist SOE 1 in minimizing interfaces with multiple suppliers, migration to the Engineer Procurement and Construction type of contracts to be applied for repowering and repurposing as well as Just Energy Transition projects*.* ***(SOE 1, Corporate Plan FY24-FY28, p. 178).***	*Minimising interfaces with multiple suppliers, contracts management, energy transition,*	1:15 ¶ 50 in SOE_1_docreview
		The Group IT strategy is focused on solutions to empower the user (employee and customer) through the use of technology and simplifying the user experience (i.e., reducing the cost to serve, improving efficiency, effectiveness, and productivity). The Group IT strategy is also aligned with enabling greater business impact by enabling a digital business transition, specifically within the realm of addressing fraud and high procurement expenses. The implementation of a robust fraud analytics platform to identify, reduce, and eliminate waste, abuse, and fraudulent procurements. Billing and customer interface analytics aimed at reducing non-technical losses to support revenue assurance are also being developed. Block chain technology use cases are being investigated to manage spending, promote transparency, and control fraudulent transactions in the supply chain of different goods and services. ***(SOE 1, Corporate Plan FY24-FY28, p. 34)***	*Use of blockchain technology to simplify user experience (reducing the cost to serve, improving efficiency, effectiveness, and productivity), robust fraud analytics platform (fraud detection, identify, reduce, and eliminate waste, abuse, and fraudulent procurements), digital business transition, Billing & customer interface analytics, supply chain efficiency, revenue assurance,*	1:9 ¶ 29 in SOE_1_docreview
		SOE 1 has embarked on a process of segmenting its suppliers with the aim of developing strategies that will assist SOE 1 in optimizing opportunities in relation to cost savings. As part of strengthening its relationship with suppliers, the segmentation exercise will enable SOE 1 to develop strategic programs that will sustain its relationship with suppliers through a shared value approach. The quantity surveyor function has been enhanced through augmentation with external capacity. ***(SOE 1, Corporate Plan FY24-FY28, p. 178).***	*business strategy, cost savings, strengthening suppliers' relationship, shared value approach, augmentation with external capacity*	1:16 ¶ 51 in SOE_1_docreview
		A price verification report was developed and integrated into SAP (System Application and Products) to assist buyers in determining the SAP-based SOE 1 prices paid for the same item during the previous three years. This report is receiving continual focus to fully embed as part of operational activities, in addition to the price comparisons. The implemented control of SAP workflow for once-off purchase orders with price variances above 10% and 20% and local purchase orders with price variances above 10% has enabled reporting of price exceptions at the divisional board level. The external market pricing functionality will form part of the Digital Procurement Wave Five (5) requirements, with a planned implementation in 2024. This will result in additional management controls and expanded price comparisons. ***(SOE 1, Corporate Plan FY24-FY28, p. 178).***	*SAP workflow, price variances report, purchase orders, management controls, reporting (misconduct), market pricing functionality, operational activities, price verification,*	1:17 ¶ 53 in SOE_1_docreview
		SOE 1 will continuously run the investment recovery department optimally to ensure the generation of sufficient income through competitive disposal. ***(SOE 1, Corporate Plan FY24-FY28, p. 178).***	*business operations, sufficient income generation*	1:18 ¶ 55 in SOE_1_docreview
		SOE 1 is implementing a warehouse management system to "go paperless" in materials management processes to drive productivity and stock accuracy. The technology transformation is creating real-time inventory visibility to optimize stock planning by reducing surplus stock. ***(SOE 1, Corporate Plan FY24-FY28, p. 178).***	*Warehouse management system, efficiency inventory management*	1:19 ¶ 58 in SOE_1_docreview
		The business focus will be on more effective stock management, ensuring material availability and stock turn ratio compliance. ***(SOE 1, Corporate Plan FY24-FY28, p. 178).***	*Effective stock management, business efficiency, supply chain management*	1:20 ¶ 60 in SOE_1_docreview
		Contracts management continues to provide its oversight mandate by proving direction, policy, and assurance to ensure effective contract management throughout the contract life cycle. ***(SOE 1, Corporate Plan FY24-FY28, p. 178).***	*Contract management, oversight, policy, assurance*	1:21 ¶ 62 in SOE_1_docreview
		The implementation of a robust fraud analytics platform to identify, reduce, and eliminate waste, abuse, and fraudulent procurements. Billing and customer interface analytics aimed at reducing non-technical losses to support revenue assurance are also being developed. Block chain technology use cases are being investigated to manage spending, promote transparency, and control fraudulent transactions in the supply chain of different goods and services. ***(SOE 1, Corporate Plan FY24-FY28, p. 33)***	*Billing & customer interface Analytics, transparency, fraud detection, supply chain management, reducing non-technical losses, revenue assurance, control fraudulent transactions*	1:22 ¶ 64 in SOE_1_docreview

APPENDIX 1 (C): COMPREHENSIVE FINDINGS WITH RESPECT TO THE KEY QUOTES AND KEY ELEMENTS FROM THE PARTICIPANTS IN STATE OWN ENTITIES (SOE) TWO

RESEARCH QUESTION 1: What constitutes value from the public sector perspective? **# SOE 2**

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q1 (a)	Leadership ensuring value creation based on customer needs	**#A.** The leadership of the organization ensures value creation for the customer through various strategies. They demonstrate commitment through visibility and clear top-down communication, cascading corporate strategy to all employees as the original mouthpiece for the organization. ***(SOE 2, Communications Officer)***	*Strategic planning, corporate strategy planning, top-down communication strategy, commitment through visibility, and cascading corporate strategy to all employees*	9:1 ¶ 3
		#B. The new leadership, which started in 2020, is focused on transforming the organization and implementing new strategies to add value. ***(SOE 2, Procurement Manager)***	*Value addition strategies and transformation leadership*	9:2 ¶ 5
		#C. As a public entity, the organization creates economic value for its broader stakeholder base and the South African economy through infrastructure development, in-service maintenance, repair, upgrade, conversion, design, and manufacture of various types of wagons, coaches, and locomotives, as well as equipment, machines, and services. ***(SOE 2, Manager Quality Audit support)***	*Stakeholder value creations, conversion, upgrade, design, repair, and maintenance, economic value creation, equipment, vehicle, and machine manufacturing, infrastructure value*	9:3 ¶ 7
		#D. The business model is centered on customer needs, and customer value is created through strategies that support the organization's value proposition. As an organization, we also listen to the voice of the customer and tailor our planning based on customer input. ***(SOE 2, Program Manager Critical projects)***	*Reliability, service excellence, customer inputs, a customer-centered approach, value creation, and a customer-focused business model*	9:4 ¶ 9
		#E. The organization operates within a complex stakeholder landscape; we have multiple stakeholders with varying needs and expectation, when strategies are set the leadership doesn't always consider other influences and trends that impact all aspects of the strategy implementation. So, increasing value is informed by our strategy, business context, and emerging risks. There is also a multi-stakeholder perception survey on a two-yearly basis to independently gauge how the company is perceived by its stakeholders and customers**.** ***(SOE 2, Engineer)***	*Service excellence, perception survey, stakeholder management, and value creation*	9:5 ¶ 10
		#F. Customer value is created from our planning, so the leadership ensures that there is a strategy in place that is linked to the objectives of freight rail. For instance, what are the key projects, who are our main customers, and what is the value that the customer is looking for? ***(SOE 2, Warehouse Supervisor)***	*Customer value, leadership, stakeholders, main customers, and strategic planning*	9:6 ¶ 11
		#G. We have to turn around to drive value, also through operational plans that have targets and objectives, like what projects will secure future capacity and need to enhance port efficiency. ***(SOE 2, Continual Improvement specialist)***	*Goal setting, operational planning, process improvement, and efficiency*	9:7 ¶ 12
		#H. We assess demand through market demand strategies to understand the different needs of stakeholders and provide value accordingly. ***(SOE 2, Senior Project Engineer)***	*Customer needs, market analysis, market demand strategies, different needs of stakeholders, strategic planning, segmentation, and stakeholder engagement*	9:8 ¶ 13
		#I. Leadership encourages innovation and the adoption of cutting-edge technologies to enhance customer experiences, such as implementing digital platforms for booking and tracking shipments and leveraging data analytics for predictive maintenance and route optimization. ***(SOE 2, Human Resource Officer)***	*Innovative leadership, cutting-edge technologies, digital platforms, leveraging data analytics, service excellence, customer experience, technology utilization, and predictive maintenance*	9:9 ¶ 14
Q1 (b)	Resources required for customer value creation	**#A.** In my department, we need people. A shortage of staff is a resource constraint because, with fewer staff members, the communications department may struggle to respond promptly to internal and external communication needs. ***(SOE 2, Communications Officer)***	*The need for skilled staff, shortage of staff, and resource constraint*	4:1 ¶ 2
		#B. I think we have adequate human resources from a departmental point of view; we have enough buyers and assistant buyers. However, where we struggle is where we can't expedite due to a lack of resources or spares due to the unavailability of those spares in the market, and we need to go into sole sourcing. ***(SOE 2, Procurement Manager)***	*Resource shortage, lack of resources, and unavailability of spares in the market*	4:2 ¶ 3
		#C. We need skilled and trained quality professionals for quality control, assurance, and process improvement. ***(SOE 2, Manager Quality Audit support)***	*Need skilled and trained quality professionals*	4:3 ¶ 4
		#D. We need critical resources to help us manage projects. A competent and motivated project team with the necessary skills makes managing the project portfolio a lot easier. ***(SOE 2, Program Manager Critical projects)***	*Critical resources and a competent and motivated project team*	4:4 ¶ 5
		#E. We need more engineers as the organization has missed out on the critical skills that most of the older engineers who resigned have, and the process of skill transfer is not working. Unfortunately, the engineers are now running to the private sector or more into engineering consulting because they feel they can add the most value. ***(SOE 2, Engineer)***	*More skilled engineers, avenues for value addition, attrition, skills gap, and workforce shortage*	4:5 ¶ 6
		#F. The key resources needed for processes are adequate storage capacity and trained staff for inventory management in the warehouse. I feel like we're being told to improve our skills, but when we want to pursue further studies, it's like pulling teeth. We have to jump through hoops to prove it's relevant to our current job" ***(SOE 2, Warehouse Supervisor)***	*Training and development, adequate storage capacity, and trained staff*	4:6 ¶ 7
		#G. We need skilled engineers, specialists, and the right leaders. If we want to improve locomotive effectiveness, we need to have the right skills and resources, the correct budget forecast, and training for maintenance development. ***(SOE 2, Continual improvement specialist)***	*Management with leadership capabilities, skilled engineers and specialists, and a correct budget forecast*	4:7 ¶ 8
		#H. Highly skilled and diverse project management team, specialized software and tools for project planning, scheduling, and performance tracking, and access to substantial budgetary allocations to support large-scale projects. ***(SOE 2, Senior Project Engineer)***	*Budgetary allocations, a skilled management team, and project management software*	4:8 ¶ 9
		#I. We need communication channels and employee feedback mechanisms to support a culture of employee engagement and well-being. ***(SOE 2, Human Resource Officer)***	*Effective communication channels, employee feedback mechanisms, and organizational culture that support employee engagement*	4:9 ¶ 10

CON'T: RESEARCH QUESTION 1: What constitutes value from the public sector perspective? #

SOE 2

NUMBER	NUMBER	NUMBER	NUMBER	NUMBER
Q1 **(c)**	The roles of the departments in customer value creation	**#A.** In my communications department, we ensure that employees are informed about important matters within the organization and the surrounding communities. ***(SOE 2, Communications Officer)***	*Internal organizational communication, information sharing, and media relations with communities*	7:1 ¶ 3
		#B. Project management deals with the execution of the project. Procurement deals with supplying value to plant management. Materials management ensures the right spares are needed. HR provides skilled people. The finance department looks at the funds and expenditures. Contract management, HR management, and quality and risk management are all relevant. ***(SOE 2, Procurement Manager)***	*For successful project execution, recruit highly skilled employees, monitoring of funds, controlling spending, right spare parts availability, operations and management, supply of materials, risk monitoring and control, quality assurance, and proper contract management*	7:2 ¶ 4
		#C. We encourage cross-functional collaboration to identify opportunities for process improvement and reduce waste. ***(SOE 2, Manager Quality Audit support)***	*Cross-functional collaboration, process improvement, and waste reduction*	7:3 ¶ 5
		#D. The shareholders have emphasised the need for organisational redesign to address the growing complexities within our SOE. This includes streamlining processes, which results in the unbundling discussions, clarifying roles and responsibilities, and fostering greater collaboration across departments to overcome the challenges we're facing. ***(SOE 2, Program Manager Critical Projects)***	*Project management, successful project execution, and reporting*	7:4 ¶ 6
		#E. Departments are encouraged to collaborate and not work in silos, viewing themselves as important contributors to value creation. If departments can see themselves as an important part of value creation, innovation becomes an opportunity for continuous improvement and then workflow, informing the right person to action the respective task, milestone, phase, or gate approval. ***(SOE 2, Engineer)***	*Cross-functional collaboration, innovation for continuous improvement, workflow, and service excellence*	7:5 ¶ 7
		#F. In our SOE, we often encounter bottlenecks in our procurement processes. The approval procedures are lengthy and bureaucratic, resulting in delays in acquiring necessary resources and materials. ***(SOE 2, Warehouse Supervisor)***	*Cross-functional collaboration and integration*	7:6 ¶ 8
		#G. Resource allocation is managed to ensure each department receives the necessary budget, personnel, and technology resources to execute their strategies effectively and support value creation***. (SOE 2, Continual Improvement specialist)***	*Budgeting, resource allocation, technology utilization, personnel management, and technology resources*	7:7 ¶ 9
		#H. Corporate leadership is focused on a restructuring of our organizational framework. This is in recognition of the complexities in our operations and the need to improve our productivity ***(SOE 2, Senior Project Engineer)***	*Strategic planning, corporate strategy, integration, top-down communication, and integration*	7:8 ¶ 10
		#I. HR promotes transparent communication between departments to share best practices and insights, encouraging knowledge sharing and a holistic understanding of operations. ***(SOE 2, Human Resource Officer)***	*Transparent communication, knowledge sharing, and a holistic understanding of operations*	7:9¶ 11
Q1 **(d)**	Important factors to improve customer. value creation	**#A.** To include customer needs in processes for value creation, we consider factors such as market competitiveness, changing customer needs, and the products and services offered by competitors to understand the different needs of stakeholders and provide value. accordingly. ***(SOE 2, Communications Officer)***	*Competitive analysis, changing customer needs, and the products and services offered by competitors*	10:1 ¶ 3
		#B. In the supply chain, procurement processes are also informed by customer demand, with a focus on customization, turnaround times, and product quality. This ensures the continuity of our products, which come from good and reputable suppliers***. (SOE 2, Procurement Manager)***	*Service excellence, business continuity, customization strategy, turnaround times, demand analysis, suppliers, and customer-centric approach*	10:2 ¶ 5
		#C. Business unit managers develop strategies that incorporate the needs of customers and service plans, and the delivery of capital projects is aligned with meeting customer expectations. ***(SOE 2, Manager Quality Audit support)***	*Strategic planning incorporates the needs of customers, service plans, and customer expectations.*	10:3 ¶ 7
		#D. SOE 2 Freight Rail adopts a customer-centric approach, with a focus on understanding customer needs and creating value across the organization. KPIs are set around creating value rather than simply as a series of once-off projects. ***(SOE 2, Program Manager Critical projects)***	*Customer needs, customer-centric, and key performance indicators*	10:4 ¶ 9
		#E. Understanding the needs of the customers and engaging with them through breakfast sessions and negotiations helps to gauge and address their needs and concerns. ***(SOE 2, Engineer)***	*Engagement, customer service, breakfast sessions and negotiations*	10:5 ¶ 10
		#F. Value is added through customer service delivery, with different customers prioritizing different aspects such as time, quality, or transport solutions. ***(SOE 2, Warehouse Supervisor)***	*Customer needs and preferences, service excellence, and service delivery*	10:6 ¶ 11
		#H. In our organisation, our customer needs are included in long-term plans and initiatives, and segment strategies are developed to meet and enhance customer needs. ***(SOE 2, Senior Project Engineer)***	*Customer focus, long-term plan initiatives, segment strategy, meeting and enhancing customer needs*	10:7 ¶ 13
		#I. Internal customer approaches are promoted, with employees encouraged to understand their impact on customer satisfaction and contribute to enhancing the customer experience. The organization is working on getting employee buy-in to improve engagement and create value through collaboration**. *(SOE 2, Human Resource Officer)***	*Employee engagement, organizational culture service excellence and customer centricity*	10:8 ¶ 14

RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector? #

SOE 2

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q2 (a)	Specific lean tools used for continual. improvement in customer value creation	**#A.** We use SAP systems for standardizing and consolidating project management tools, continuous improvement, and DMAIC methodology. ***(SOE 2, Communications Officer)***	*SAP systems and DMAIC methodology.*	1:1 ¶ 3
		#B. We utilize Kaizen events to continuously improve our operations, involving cross-functional teams in problem-solving. We also employ corrective action methodologies to reduce defects and errors, ensuring the quality of the goods and services we procure. ***(SOE 2, Procurement Manager)***	*Corrective action methodologies and Kaizen events*	1:2 ¶ 5
		#C. We use planning meetings, problem-solving techniques such as root causes and fault trees, and tools that are specific to us, like SAP planning systems. ***(SOE 2, Manager Quality Audit support)***	*Root cause analysis, fault trees, and SAP*	1:3 ¶ 6
		#D. We have some digital tools and some software programs that look to improve the way we create value for the customer, such as lean six-sigma principles. ***(SOE 2, Program Manager Critical projects)***	*Lean Six Sigma principles*	1:4 ¶ 7
		#E. Our organization is aligned to best practices: PLP, PMBOK, Lean Six Sigma, and Prince 2. ***(SOE 2, Engineer)***	*Lean Six Sigma principles, PLP, PMBOK, Prince 2*	1:5 ¶ 8
		#F. We use root cause analysis, fish bone, and 5 WHYs***. (SOE 2, Warehouse Supervisor)***	*Root cause analysis, fish bone, and 5 WHYs*	1:6 ¶ 9
		#G. We use lean six sigma, root cause analysis, and audits. The lean six-sigma tool was institutionalized and is used for eliminating waste and reducing variability to achieve consistency in our performance and enable the organization to offer a more predictable service to its customers. ***(SOE 2, Continual improvement specialist)***	*Audits, lean Six Sigma, and root cause analysis*	1:7 ¶ 10
		#H. We have the SAP Portfolio, which is part of a continuous improvement program based on lean six-sigma principles to operate more efficiently. So, we also use it in project management tools and applications to drive efficiently, reduce costs, and improve quality. ***(SOE 2, Senior Project Engineer)***	*SAP Portfolio, Lean Six Sigma Principles, and Project Management Tools*	1:8 ¶ 11
		#I. We leverage several lean tools to enhance customer service and value creation. We utilize Gemba walks, which involve going to the workplace, to better understand the needs and challenges of our employees**. *(SOE 2, Human Resource Officer)***	*Gemba walks*	1:9 ¶ 12
Q2 (b)	The effectiveness of the lean tools used for continual improvement in customer value creation	**#A.** I guess through improved operational efficiencies and through continuous improvement and problem solving, that doesn't lead to repeat work, complaints, or waste. When we reduce waste materials as by-products of infrastructure projects. ***(SOE 2, Communications Officer)***	*Problem-solving, improved operational efficiencies, and waste reduction*	12:1 ¶ 2
		#B. The successful application of tools like value stream mapping (VSM) and Kaizen events should lead to noticeable reductions in procurement cycle times. ***(SOE 2, Procurement Manager)***	*Efficiency and reduction in procurement cycle times*	12:2 ¶ 3
		#C. When we see fewer customer complaints or improvements in the actions we have put down for monitoring. ***(SOE 2, Manager Quality Audit support)***	*Reduction in customer complaints and continuous improvement in operation*	12:3 ¶ 4
		#D. The use of the DMAIC tool allowed for a centralized view of savings, eliminating the need for manual tracking and ensuring governance and reviews at different project phases, leading to more efficient and streamlined processes. ***(SOE 2, Program Manager Critical projects)***	*Streamlined and efficient processes*	12:4 ¶ 5
		#E. Waste reduction, the reduction of scrap and rework, and material delay for contractors. ***(SOE 2, Engineer)***	*Waste reduction, reduction of scrap and rework*	12:5 ¶ 6
		#F. Our KPIs are to reduce plant incidents to zero, and if we get closer, it means that the tools are working, in my view. ***(SOE 2, Warehouse Supervisor)***	*Continuous improvement and reduction in plant incidents*	12:6 ¶ 7
		#G. In my view, when employees are trained on the proper use of lean tools to ensure their effectiveness. ***(SOE 2, Continual improvement specialist)***	*Trained employees and effective tool utilization*	12:7 ¶ 8
		#H. Lean Six Sigma methodologies are aimed at reducing errors and defects. Tracking the rate of errors and monitoring how quickly they are resolved can help assess the effectiveness of these tools in improving procurement quality. ***(SOE 2, Senior Project Engineer)***	*Problem-solving, error reduction, and defect reduction*	12:8 ¶ 9
		#I. Direct feedback from internal customers, such as end-users and stakeholders, is invaluable. Regular surveys or feedback mechanisms can provide insights into whether our lean efforts have resulted in improved customer satisfaction and value perception. ***(SOE 2, Human Resource Officer)***	*Good customer feedback and customer satisfaction*	12:9 ¶ 10
Q2 (c)	Monitoring deviations in the customer value creation processes	**#A.** We use internal audits and peer reviews to check our own work to see if it is still aligned with set processes and procedures. ***(SOE 2, Communications Officer)***	*Peer reviews, and internal audits*	5:1 ¶ 3
		#B. Deviations are monitored via online monitoring and via our internal processes for monitoring and evaluation. ***(SOE 2, Procurement Manager)***	*Online monitoring systems and internal processes for monitoring and evaluation*	5:2 ¶ 4
		#C. Deviations from the processes, for example, in planning to enhance product performance, are logged on the corrective action management processes, and we also monitor them via audits. ***(SOE 3, Manager Quality Audit support)***	*Corrective action management processes and audits*	5:3 ¶ 5
		#D. We conduct regular audits and inspections of processes to ensure compliance with established procedures. Also, we have internal audits, external audits, or third-party assessments. ***(SOE 2, Program Manager Critical projects)***	*Internal audits, external audits, third-party assessments, and inspections*	5:4 ¶ 6
		#E. We conduct root-cause analysis to determine why they occurred. This helps address the underlying issues rather than just treating the symptoms. ***(SOE 2, Engineer)***	*Root cause analysis*	5:5 ¶ 7
		#F. We conduct audits or assessments to ensure that suppliers are also following the prescribed processes. ***(SOE 2, Warehouse Supervisor)***	*Audits and assessments*	5:6 ¶ 8
		#G. So, through planning and review meetings, we pick up deviations. ***(SOE 2, Continual improvement specialist)***	*Planning, review meetings*	5:7 ¶ 9
		#H. We monitor deviations, which include process adherence and compliance, as part of employee performance reviews, linking individual performance to process outcomes. ***(SOE 2, Senior Project Engineer)***	*Process adherence review, and Performance reviews*	5:8 ¶ 10
		#I. We implement corrective actions to address immediate deviations and preventive actions to avoid recurrence. ***(SOE 2, Human Resource Officer)***	*Tracking performance*	5:9 ¶ 11

RESEARCH QUESTION 3: What factors can impede the successful implementation of lean principles within the public sector environment? #

SOE 2

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q 3	The internal and external issues that can affect customer value creation	**#A.** We use the normal PESTEL to sort of get a bird's eye view, so the PESTEL is political issues, economic issues, social issues, technological issues, environmental issues, and legislative issues that can affect our business. ***(SOE 2, Communications Officer)***	*Political issues, economic issues, social issues, technological issues, environmental issues, and legislative issues*	6:2 ¶ 3
		#B. We use SWOT analysis to identify internal issues, such as port infrastructure constraints or critical skills shortages. This analysis helps in decision-making and finding strategies to enhance strengths, overcome weaknesses, control threats, and take advantage of opportunities. ***(SOE 2, Procurement Manager)***	*Port infrastructure constraints and critical skills shortages*	6:3 ¶ 4
		#C. The objective is to identify each element and define a strategy that will enhance strengths, overcome weaknesses, control threats, and take advantage of opportunities. ***(SOE 2, Manager Quality Audit support)***	*External opportunities, and threats*	6:4 ¶ 5
		#D. Some of the internal issues we identify are port infrastructure constraints, deteriorating infrastructure due to climate change, and extreme adverse weather conditions. ***(SOE 2, Program Manager Critical projects)***	*Port infrastructure constraints, deteriorating infrastructure due to climate change, and extreme adverse weather condition*	6:5 ¶ 6
		#E. For internal factors, we use SWOT analysis to look at those factors that are internal to the organization and Pestel analysis to look at those that are external to the organization. ***(SOE 2, Engineer)***	*Internal and external related factors*	6:6 ¶ 7
		#F. ...one threat that we have identified is critical skills shortages. ***(SOE 2, Warehouse Supervisor)***	*Critical skills shortages*	6:7 ¶ 8
		#G. We have sources for identifying external issues, including intelligence departments and corporate affairs, which monitor political, environmental, and market share issues. ***(SOE 2, Continual improvement specialist)***	*Political issues, environmental issues, market share issues*	6:8 ¶ 9
		#H. We mention issues internally, such as requirements in our operational plan, and externally, such as changing mandatory regulations, that can affect our operations. ***(SOE 2, Senior Project Engineer)***	*Requirements in the operational plan and changing mandatory regulations*	6:9 ¶ 10
		#I. One frustration that we have identified within the HR space is a lack of initiatives to address improved productivity and employee morale. ***(SOE 2, Human Resource Officer)***	*Employee morale and lack of initiatives*	6:10 ¶ 11

RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector? **# SOE 2**				
NUMBER	**INTERVIEW QUESTION GUIDE**	**KEY QUOTATIONS**	**KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES**	**TRANSCRIPT REFERENCE FROM ATLAS**
Q 4 (a)	Identification of waste or non-value-adding activities in the customer value creation processes	**#A.** Waste within the branch includes excessive wait times for customers, a lot of redundant paperwork, inefficient sorting and delivery processes, customer complaint feedback, long queue times, low employee productivity, delivery delays, high error rates, and excess inventory. ***(SOE 3, Branch Manager)***	*Excessive wait times for customers, a lot of redundant paperwork, inefficient sorting and delivery processes, customer complaint feedback, long queue times, low employee productivity, delivery delays, high error rates, and excess inventory.*	13:2 ¶ 2
		#B. I consider obsolete technology waste; long queues for grant collection are a waste of people's time; and many citizens complain about waiting time for vehicle license disks; they wait for a long time, over 4 weeks, for disks to arrive; other branches only have a few tellers working; missing parcels; and the system is glitched, leading to late processing of Sassa grants. ***(SOE 3, Logistics Manager)***	*Customer complaints, long waiting times, long queues for grant collection, delays in processing Sassa grants, missing parcels, system glitches, Obsolete technology.*	13:3 ¶ 4
		#C. Projects that don't provide value for money, criminal conduct leading to loss, fruitless and wasteful expenditure, and irregular expenditure on corrupt contracts. ***(SOE 3, Quality Manager)***	*Projects that don't provide value for money, criminal conduct leading to loss, fruitless and wasteful expenditure, and irregular expenditure on corrupt contracts.*	13:4 ¶ 7
		#D. …such as error rates, rework levels, and delivery delays. ***(SOE 3, Quality Assurance Specialist)***	*Error rates, rework levels, and delivery delays*	13:5 ¶ 8
		#E. In my view, other tools are not working, and they waste resources. Feedback directly comes from employees who participate in these tools. The audits are done, and then results are not communicated at times, even the KPI's, so we can't influence this tool from an employee perspective. ***(SOE 3, Supervisor)***	*Frustration, inefficiency in tool usage, and lack of communication*	13:6 ¶ 9
		#F. It's crucial to assess whether the lean tools align with the organization's goals and capabilities. ***(SOE 3, Supply Chain Advisor)***	*Alignment with goals*	13:7 ¶ 10
		#G....unnecessary steps, delays, and inefficiency. Additionally, foster a culture of continuous improvement among public sector employees. ***(SOE 3, Front end teller)***	*Unnecessary steps, delays, inefficiency, and an unsupportive culture*	13:8 ¶ 11
		#H. In my view, the tools are effective when we don't have safety incidents and we improve safety scores. ***(SOE 3, Safety Officer)***	*Reduction in safety incidents and improved safety scores.*	13:9 ¶ 12
		#I. By tracking equipment downtime, maintenance costs, asset reliability, and disruptions in postal operations. ***(SOE 3, Maintenance Planner)***	*Equipment downtime, maintenance costs, asset reliability, and disruptions in postal operations.*	13:10 ¶ 13

CON'T: RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector? **# SOE 2**

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q 4 (b)	Lean strategies used to eliminate waste in the customer value creation	**#A.** Standardizing and consolidating tools used to manage projects. The organization used SAP systems to have a consolidated view of all large-scale projects and reduce waste***. (SOE 2, Communications Officer)***	*Process and efficiency improvement, standardization, and organizational strategy*	8:1 ¶ 3
		#B. The organization aligns port strategies with the overall strategy of the organization, and each head of department develops their own strategy aligned with the port strategy and then cascades it to team without necessarily involving the employees although as management its discussed at the meetings. ***(SOE 2, Procurement Manager)***	*Goal alignment, strategic planning, initiative planning, and strategy development*	8:2 ¶ 5
		#C. Our business enablement leg develops strategies and then cascades to other divisions. This strategy includes managing the relationship with our corporate customers and rolling out commercial best practices across the group. ***(SOE 2, Manager Quality Audit support)***	*Top-down communication, strategic planning, relationship management, and strategy development*	8:3 ¶ 6
		#D. The organization has strategies in place to ensure timely and cost-efficient project completion, including the use of the SAP Portfolio and Project Management applications for managing projects, financials, resources, and reporting. ***(SOE 2, Program Manager Critical Projects)***	*Timely and cost-efficient project completion, project transparency, and application of project management tools*	8:4 ¶ 7
		#E. The organization has formulated policies to enforce security and works with external law enforcement agencies to tackle cable theft. Funding strategies are also being developed for investment in technologies to deter theft and improve response times. ***(SOE 2, Engineer)***	*Countering theft, vandalism, and sabotage, collaboration with law enforcement, technology utilization, security measures, and technology investment*	8:5 ¶ 8
		#F. My organization conducts regular environmental scans to assess internal and external factors that may impact its objectives, such as market trends, economic conditions, regulatory changes, technological advancements, and competitive forces***. (SOE 2, Warehouse Supervisor)***	*Environmental scan and analysis, competitive analysis, economic conditions, market trend analysis, technological advancements, technology utilization, and regulatory change analysis*	8:6 ¶ 10
		#G. Strategies for lean and continuous improvement have been implemented, and efforts have been made to address resistance to change through training and mending gaps in understanding***. (SOE 2, Continual Improvement specialist)***	*Change management, addressing resistance to change, strategies for lean and continuous improvement, training, and mending gaps*	8:7 ¶ 11
		#H. The organization uses SAP Portfolio and other lean Six Sigma tools and applications to drive efficiency, reduce costs, and improve quality***. (SOE 2, Senior Project Engineer)***	*Quality improvement, cost reduction, efficiency, Lean Six Sigma principles, and quality improvement*	8:8 ¶ 12
		#I. Engineers provide input on resource allocation for capital projects, including budget estimates, resource requirements, and timelines, to ensure adequate funding and execution. ***(SOE 2, Human Resource Officer)***	*Resource allocation, resource requirements, budget estimates, and timelines*	8:9 ¶ 13

APPENDIX 1 (D): COMPREHENSIVE DOCUMENT ANALYSIS IN STATE OWN ENTITIES (SOE) TWO

RESEARCH QUESTION 1: What constitutes value from the public sector perspective?				**#D2**
NUMBER	**QUESTION GUIDE**	**KEY EXTRACTS FROM THE DOCUMENT**	**CODES CREATED FROM THE EXTRACT**	**ATLAS REFERENCE**
Q1 (a)	Leadership ensuring value creation based on customer needs	The body charged with overall governance oversight actively leads the company's value-creation process. ***(SOE 2, Integrated Report, 2022, p. 1)***	*Governance, leadership,*	2:1 ¶ 7 in SOE_2_docreview
		Accordingly, risk-crucial leadership conversations and the implementation of functional risk action plans are ongoing\. ***(SOE 2, Integrated Report, 2022, p. 41).***	*Leadership, action planning, risk management*	2:2 ¶ 9 in SOE_2_docreview
		The SOE 2's core purpose, risks, opportunities, strategy, business model, performance, and sustainable development are all integral to value creation. Sustainable value creation considers dynamic trade-offs in all business aspects, recognizing that financial capital cannot compensate for the loss of natural living organisms, biospheres, or human rights. Therefore, pure financial gain or trade-offs are not considered sustainable progress measures. ***(SOE 2, Integrated Report, 2022, p. 2)***	*Business model, value creation, sustainable development*	2:3 ¶ 12 in SOE_2_docreview
		The only true consideration of value for us is to measure the overall shared value created in the context of all our business activities ***(SOE 2, Integrated Report, 2022, p. 4).***	*Business activities, value creation*	2:4 ¶ 14 in SOE_2_docreview
		SOE 2's strategic direction for the next five years is contingent on five key levers aimed at actualizing shared stakeholder value. Customer service: We guard against our personal interests influencing business decisions. We aspire to honor the content and spirit of all business transactions. We aim to exceed internal and external customer expectations. We strive for superior service and quality in all our tasks—honestly and without prejudice. Care for our people: We strive to build a company where colleagues trust each other's best intentions. Mutual respect governs our business practices. Our people—their ideas, commitment, knowledge, and competencies—are our strength and pride. ***(SOE 2, Integrated Report, 2022, p. 06)***	*Stakeholder value, strategic planning, customer service, customer expectations, care for people, stakeholder needs and engagement, collaboration, commitment, service reliability, mutual respect and trust*	2:5 ¶ 16 in SOE_2_docreview
		Using customer requirements to guide how and where to integrate services and streamlining our management structures and processes where operations are centers of business, creating enterprise development programs to expand opportunities in the communities where the company operates Ensuring transparent disclosure of financial, operational, and ESG performance to stakeholders. Creating socio-economic infrastructure such as community centers and hubs. ***(SOE 2, Integrated Report, 2022, p. 18)***	*Customer requirements, management structures and processes, business development, transparent financial disclosure,*	2:8 ¶ 38 in SOE_2_docreview
Q1 (c)	The roles of the departments in customer value creation	Plans to separate its network and non-network businesses to allow third-party access to the network infrastructure. The Network business portfolio will cover rail, port, and pipeline operations, while the Operations business portfolio will cover rail operations, port terminals, property, and engineering operations. ***(SOE 2, Integrated Report, 2022, p. 09)***	*Network infrastructure, capital, market segmentation, operations, partnerships, technology*	2:7 ¶ 35 in SOE_2_docreview
		SOE 2 will also secure partnerships for its engineering portfolio, expanding beyond rolling stock to port equipment manufacturing and maintenance. The company will optimize its portfolio by enhancing existing capabilities and leveraging partnerships where necessary. The ultimate measure of success will be customers' commercial success, trade competitiveness in their markets, and South Africa's overall competitiveness***. (SOE 2, Integrated Report, 2022, p. 09)***	*Infrastructure, capability enhancement, portfolio optimization, skills, business strategy, customers focused, trade competitiveness in the markets, customer experience, collaboration*	2:6 ¶ 34 in SOE_2_docreview
Q1 (d)	Important factors to improve customer value creation	SOE 2 plans to enhance its operational efficiency by focusing on key aspects like knowledge, leadership, and synergies while also implementing a logistical strategy to enhance productivity and service delivery. ***(SOE 2, Integrated Report, 2022, p. 21)***	*Performance improvement, organizational transformation, workplace dynamics, leadership, enhanced service delivery*	2:9 ¶ 44 in SOE_2_docreview
		SOE 2's tactical enablers, including customer service, people, asset utilization, safety, and cost optimization, aim to restore the company's core business operations, enabling critical port, rail, and pipeline cargo transport and handling services. These enablers support safety, productivity, innovation, and accountability among employees, ensuring SOE 2's nameplate status as an efficient custodian of ports, rail, and pipelines***. (SOE 2, Integrated Report, 2022, p. 26)***	*business operations, customer service, people safety, value creation, cost optimization, asset utilization, logistics, transportation, accountability, organization culture, innovation, performance management,*	2:10-13 ¶ 46,50, 52 in SOE_2_docreview
		The Generation Division's strategic KPIs are influenced by external factors and will be reviewed closer to deadlines, considering the current business environment. ***(SOE 2, Integrated Report, 2022, p. 76)***	*Business environment, external factors key performance indicator, strategic planning*	2:14 ¶ 54 in SOE_2_docreview

RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector?				**#D2**
NUMBER	**QUESTION GUIDE**	**KEY EXTRACTS FROM THE DOCUMENT**	**CODES CREATED FROM THE EXTRACTS**	**ATLAS REFERENCE**
Q2 (a)	Specific lean tools used for continual improvement in customer value creation	ICT aims to employ a digital-first culture to digitize both existing and next-generation products and services. ***(SOE 2, Integrated Report, 2022, p. 54)***	*technological advancement,*	2:37 ¶ 118 in SOE_2_docreview
		The digital-first approach is enabled by the provision of digital platforms as well as disruptive and enabling technologies to support digital transformation, which underpins a strong digital backbone. (***SOE 2, Integrated Report, 2022, p. 54)***	*Digital transformation, digital platforms,*	2:38 ¶ 119 in SOE_2_docreview
		Leveraging an ecosystem that includes strategic partnerships to ensure that ICT provides agile and innovative services. ***(SOE 2, Integrated Report, 2022, p. 54)***	*Agility, innovation, strategic partnerships*	2:39 ¶ 120 in SOE_2_docreview
Q2 (c)	Monitoring deviations in the customer value creation processes	The level of desired control effectiveness is based on considerations such as the extent to which the root causes, consequences, or likelihood of the risk materializing can be controlled. Due consideration is also given to the cost-benefit analysis when deciding on the scope for further control and risk treatment. **(*SOE 2, Integrated Report, 2022, p. 44)***	*Cost-benefit analysis, control effectiveness, risk assessment*	2:41 ¶ 127 in SOE_2_docreview
		Implementation of specific maintenance plans for specific operating divisions (infrastructure, locomotives, wagons, ports, and pipelines) Assurance of maintenance projects and development of a maintenance policy. ***(SOE 2, Integrated Report, 2022, p. 43)***	*Equipment maintenance monitoring, infrastructure maintenance assurance and monitoring*	2:40 ¶ 122 in SOE_2_docreview

RESEARCH QUESTION 3: What factors can impede the successful implementation of lean principles within the public sector environment?				**#D2**
NUMBER	**QUESTION GUIDE**	**KEY EXTRACTS FROM THE DOCUMENT**	**CODES CREATED FROM THE EXTRACTS**	**ATLAS REFERENCE**
Q3 (a)	The internal issues that can affect customer value creation	The chrome and magnetite channels are also experiencing locomotive reliability issues due to the non-availability of OEM spares and high incidents of theft and vandalism. ***(SOE 2, Integrated Report, 2022, p. 28).***	*Vandalism, technical issues, supply chain issues, theft*	2:30 ¶ 101 in SOE_2_docreview
		There has been significant technological development in tools and operating models in the sector, which SOE 2 has not adopted to date ***(SOE 2, Integrated Report, 2022, p. 31).***	*Lack of technological advancements adoption*	2:36 ¶ 116 in SOE_2_docreview
		A SWOT analysis reveals long-term growth opportunities in all segments, except coal and liquid fuels. Port Terminals, a regional leader in container, automotive, and dry bulk segments, holds 21 terminal operator licenses. SOE 2 Pipelines, the largest multi-product pipeline operator in southern Africa, has a well-established supply value chain and advanced pipeline skills. Pipelines can establish strategic terminal import connectivity, particularly in the renewable energy sector***. (SOE 2, Integrated Report, 2022, p. 15)***	*Regional leadership, long-term growth opportunities, multipurpose port infrastructure, terminal operator licenses, sub-Saharan African rail connectivity, railway asset base,*	2:31 ¶ 103 in SOE_2_docreview
		SOE 2 Engineering, South Africa's largest heavy engineering firm, supports rail, ports, and pipeline infrastructure requirements. The multiskilled workforce has a unique understanding of rolling stock design requirements in the African environment, particularly narrow-gauge railways operating on poor-quality infrastructure. ***(SOE 2, Integrated Report, 2022, p. 15)***	*Pipeline supply, Manganese handling, Automotive segment, Iron ore handling, Dry bulk segment, Competitive strength, Container segment, Capability, Engineering, Infrastructure, Manufacturing*	2:32 ¶ 104 in SOE_2_docreview
		Operational sustainability issues; availability of supply; quality and reliability of supply; impact of loadshedding; nuclear program; customer connections; illegal connections; electrification and job creation; new build program; workforce demobilization; all contribute to non-delivery of supply. ***(SOE 2, Integrated Report, 2022, p. 23).***	*Operational challenges, Illegal connections, on-delivery of supply, Operational sustainability, Supply quality and reliability; Customer connections, Supply availability, electrification and job creation, loadshedding impact, nuclear programme, new build programme, workforce demobilization*	2:33 ¶ 106 in SOE_2_docreview
		Unavailability of critical port equipment on a consistent basis due to poor reliability, aging (especially in the bulk sector), accidents, and long lead times in the sourcing of spares. ***(SOE 2, Integrated Report, 2022, p. 44)***	*Infrastructure issues, maintenance problems, supply chain issues, unavailability of equipment*	2:34 ¶ 108 in SOE_2_docreview
Q3 (b)	The external issues that can affect customer value creation	We have identified the material external issues that create risks and opportunities for our business model, operations, and strategy, such as trading conditions, the availability of resources, societal changes, and climate change. ***(SOE 2, Integrated Report, 2022, p. 85)***	*Material external issues, trading conditions, the availability of resources, societal changes, climate change*	2:35 ¶ 111 in SOE_2_docreview

RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector?				**#D2**
NUMBER	**QUESTION GUIDE**	**KEY EXTRACTS FROM THE DOCUMENT**	**CODES CREATED FROM THE EXTRACT**	**ATLAS REFERENCE**
Q4 **(a)**	Identification of waste or non-value-adding activities in the customer value creation processes	Delays in procurement of long-lead items due to global challenges increase costs, turnaround time, and non-delivery of strategic objectives. (***SOE 2, Integrated Report, 2022, p. 45)***	*Challenges, procurement delays, cost increase, non-delivery of strategic objectives, turnaround time*	2:15 ¶ 58 in SOE_2_docreview
		SOE 2 disclosed R105 billions of PFMA reportable items in its 2021-year AFS, which included R104,3 billion of irregular expenditure and R728 millions of fruitless and wasteful expenditure. These amounts were inclusive of the prior year's opening balances. ***(SOE 2, Integrated Report, 2022, p. 58)***	*Irregular expenditure, fruitless and wasteful expenditure*	2:16 ¶ 60 in SOE_2_docreview
		Irregular expenditure should be clearly distinguished from fruitless and wasteful expenditure. Fruitless and wasteful expenses are defined as expenditures that were made in vain and would have been avoided had reasonable care been exercised. Losses through criminal conduct include losses where SOE 2 employees were parties to the criminal acts committed. ***(SOE 2, Integrated Report, 2022, p. 63)***	*Fruitless expenditure, irregular expenditure, wasteful expenditure, losses through criminal conduct*	2:17 ¶ 62 in SOE_2_docreview
		Inadequate demand planning, poor inventory planning, and/or management implementing more efficient stock management processes and systems. ***(SOE 2, Integrated Report, 2022, p. 43)***	*Inventory demand management, poor inventory planning, inefficient processes, and system*	2:18 ¶ 64 in SOE_2_docreview
		The company is exploring various strategic initiatives to improve operational performance; however, these are being hamstrung by challenges in our operating environment, such as the unabated vandalism of our rail network, cable theft and intermittent power cuts, locomotive availability, and maintenance backlog. ***(SOE 2, Integrated Report, 2022, p. 55)***	*Locomotive availability, intermittent power cuts, cable theft, vandalism, maintenance backlog*	2:19 ¶ 67 in SOE_2_docreview
		Breakdowns due to maintenance backlogs can cause bottlenecks in our customer supply chains, which impact business opportunities and customer reputations as well as the effectiveness of entire value chains across our commodity sectors. It is, therefore, crucial that SOE 2 targets its capital investment to improve operational performance. ***(SOE 2, Integrated Report, 2022, p. 57).***	*System breakdown, backlogs, ineffectiveness value chain, operational challenges*	2:20-21¶ 69 in SOE_2_docreview
Q4 **(b)**	Lean strategies used to eliminate waste in the customer value creation	Strategies and forums to identify and manage safety hazards, define and implement remedial action, and limit human-factor safety concerns. ***(SOE 2, Integrated Report, 2022, p. 57)***	*Corporate strategies, remedial plans, risk assessment, safety procedures, safety management*	2:23 ¶ 82 in SOE_2_docreview
		Strategies to create or sustain value Potential trade-offs. Driving an ethical culture to support the company's long-term viability. Embedding a zero-harm safety culture across operations: follow 100% of our safety rules, 100% of the time**.** ***(SOE 2, Integrated Report, 2022, p. 18)***	*Safety culture, inclusivity, innovation, performance excellence, employee well-being and safety, business strategy, ethical culture*	2:25 ¶ 86 in SOE_2_docreview
		Managing the impact of COVID on our people and operations; improving the working environment, conditions, safety, and well-being of our people; building a culture that is both inclusive and accommodating while demanding performance excellence and innovation; supporting the development of South Africa's artisanal labor force and creating positive externalities while transferring value back to civil society; developing appropriate technology strategies and governance to support changing work practices**.** ***(SOE 2, Integrated Report, 2022, p. 18)***	*Improving working environment and conditions, building culture of inclusivity, and accommodating, performance excellence and innovation, operational excellence strategic planning*	2:27 ¶ 89 in SOE_2_docreview
		The Board held a strategy workshop in 2022 to accelerate the delivery of the Growth and Renewal Strategy, focusing on restoring rail and port assets, prioritizing investment resources for high-margin flows, and facilitating partnerships. The strategy relies on stable operations and investor confidence. ***(SOE 2, Integrated Report, 2022, p. 25)***	*Business strategy, investment prioritization, facilitating partnerships, high margins flow*	2:28 ¶ 92 in SOE_2_docreview
		The Board called for a shift in shareholder's compact structure to align performance expectations with the Strategy's core objectives. Key performance areas for 2022-23 include short-term priorities, maintenance programs, performance improvement, strategic initiatives, financial position improvement, financial ratios, and socio-economic benefits**.** ***(SOE 2, Integrated Report, 2022, p. 25)***	*Strategic and initiative planning, financial position improvement, financial ratios, socio-economic benefits.*	2:29 ¶ 93 in SOE_2_docreview

APPENDIX 1 (E): COMPREHENSIVE FINDINGS WITH RESPECT TO THE KEY QUOTES AND KEY ELEMENTS FROM THE PARTICIPANTS IN STATE OWN ENTITIES (SOE) THREE

RESEARCH QUESTION 1: What constitutes value from the public sector perspective?				**# SOE 3**
NUMBER	**INTERVIEW QUESTION GUIDE**	**KEY QUOTATIONS**	**KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES**	**TRANSCRIPT REFERENCE FROM ATLAS**
Q1 **(a)**	Leadership ensuring value creation based on customer needs	**#I.** Leaders ensure that employees are trained in customer service to enable them to serve customers. A product knowledge training is also given to each employee to enable them to add value to their customers. Our policies are taken at an executive level and shared throughout the organization. ***(SOE 3, Branch Manager)***	*Employee engagement, training and development, organizational policies, and communication with stakeholders.*	8:1 ¶ 3
		#II. Leadership approves employee actions for value creation and is responsible for developing strategies. ***(SOE 3, Logistics Manager)***	*Approval of employee actions, communication, leadership, and strategy development.*	8:2 ¶ 5
		#III. Like I said, the leadership must make sure that they come up with strategies, and they do so by providing resources such as budget and equipment. They also try to close the vacancy rate, particularly in critical skills and leadership stability. ***(SOE 3, Quality Manager)***	*Closing vacancy rate, leadership stability, strategic strategies, budget allocation, provision of equipment, provision of critical skills, and resource allocation.*	8:3 ¶ 7
		#IV I think they try to create value by improving the culture of people through the commitment of leadership. If the leaders don't show examples, how can the people follow? Our leaders need to cover this, but sometimes they don't. ***(SOE 3, Quality Assurance Specialist)***	*Leadership by example, commitment to leadership, and creating an organizational culture that supports value creation.*	8:4 ¶ 8
		#V. They ensure it currently by driving implementation, operational and process efficiencies, and appropriate skill and capacity; the execution of these is done by the bottom-floor employee. ***(SOE 3, Supervisor)***	*Ensure driving implementation, operational and process efficiencies, capacity building, and skill development.*	8:5 ¶ 9
		#VI. Leaders at all levels establish unity of purpose and direction and create conditions in which people are engaged in achieving the organization's objectives. ***(SOE 3, Supply chain advisor)***	*Leadership, establishing unity of purpose and direction, organizational objectives, and ensuring employee engagement.*	8:6 ¶ 10
		#VII. I think leaders should be giving support to the employees on how to carry out their job with excellence. They need to do this because if employees are happy, then value is created for the customer, and they are happy to drive objectives. ***(SOE 3, Front End Teller)***	*Provision of employee support, ensuring employee happiness, leadership, and customer satisfaction.*	8:7 ¶ 11
		#VIII. Our leadership team sets the tone by prioritizing safety throughout the organization. By ensuring that safety measures are in place and followed rigorously, they not only protect our employees and customers but also enhance the reliability and quality of our services. They invest in continuous training and equipment to keep our staff safe while optimizing operations. ***(SOE 3, Safety Officer)***	*Leadership, ensure reliability and quality of our services, prioritize employee safety and well-being, and provide continuous employee training and equipment.*	8:8 ¶ 12

		#IX. They allocate resources for regular maintenance, ensuring that our facilities and vehicles are in optimal condition, reducing downtime, and preventing service disruptions. ***(SOE 3, Maintenance Planner)***	*Resource allocation, ensuring that facilities and vehicles are in optimal condition, reducing downtime, and preventing service disruption.*	8:9 ¶ 13
Q1 **(b)**	Resources required for customer value creation	**#I.** The main resource I need as a branch manager is enough tellers, admin staff, and service staff, as well as enough funding to run upgrades, but as you know, funds are always an issue. ***(SOE 3, Branch Manager)***	*Enough tellers, admin staff, service staff, and enough funding*	3:1 ¶ 2
		#II. We have a big issue in terms of resources in our warehouses. Our warehouses are not equipped with the necessary infrastructure so that we can operate well due to budget cuts and prioritisation. This includes storage space for inventory and vehicles. Our fleet is old and not in good condition. ***(SOE 3, Logistics Manager)***	*Well-maintained warehouses and vehicles*	3:2 ¶ 4
		#III. Resources like management representation and quality champions can assist other departments in understanding the quality tools and using them as intended. ***(SOE 3, Quality Manager)***	*Management representatives and quality champions*	3:3 ¶ 6
		#IV. We obviously need skilled employees, like any organization, and good infrastructure. In the quality assurance section, we have few QC's, and this is an issue when it comes to inspection, because this is a specialised skill ***(SOE 3, Quality Assurance Specialist)***	*killed employees and good infrastructure*	3:4 ¶ 7
		#VI. Skilled and well-trained workforce. Including logistics coordinators, drivers, warehouse staff, and operations managers. ***(SOE 3, Supply Chain Advisor)***	*Skilled logistics coordinators, drivers, warehouse staff, and operations managers*	3:5 ¶ 9
		#VIII. In my view, mail land postal services are responsible, as they include postal workers, mail sorters, and delivery personnel. We have cost centers and budget in terms of financial resources. ***(SOE 3, Safety Officer)***	*Postal workers, mail sorters, and delivery personnel*	3:6 ¶ 11
		#IX. We need skilled and trained people on the maintenance side to do routine maintenance, inspections, and repairs. ***(SOE 3, Maintenance Planner)***	*Skilled and trained people*	3:7 ¶ 12

CON'T: RESEARCH QUESTION 1: What constitutes value from the public sector perspective? #

SOE 3

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q1 (c)	The roles of the departments in customer value creation	**#I.** The department's unique approach to tasks makes it difficult to establish consistent value creation. Collaboration is needed to align efforts and eliminate redundant steps. We sometimes compete within. We have a courier that delivers to customers and branches. The vehicle will move from Durban to Port Shepstone with only speed service items and leave all other mail. ***(SOE 3, Branch Manager)***	*Departmental collaboration and elimination of redundant steps*	6:1 ¶ 2
		#II. Collaboration is crucial for improving service quality and efficiency, but challenges arise in areas like mail center automation due to a lack of machine parts, a lack of communication, and silos within departments. Improving collaboration is essential for creating value. ***(SOE 3, Logistics Manager)***	*Interdepartmental collaboration and avoiding silos within departments*	6:2 ¶ 5
		#III. We always interface with other departments, meeting quality requirements during contract scopes. We also do risk assessments as part of the risk management plant; these interventions are interdisciplinary. We work on a lot of projects with different departments to include quality in the processes of the organization. ***(SOE 3, Quality Manager)***	*Interdepartmental collaboration, quality management, and risk management*	6:3 ¶ 7
		#IV. We work with all the departments and set thresholds in terms of guiding quality into the processes to give early warnings. This mobilized the teams proactively to make corrective actions and to recover schedules back to quality specifications, so in all, we support departments by coordinating along the mail delivery and production processes. So, we track the implementation of BU strategic initiatives to see if they are effective, standardized to the other processes, and communicated. ***(SOE 3, Quality Assurance Specialist)***	*Effective communication, coordination, strategic initiatives, process improvement, quality management, and process standardization of processes.*	6:4 ¶ 8
		#V. We must improve the alignment and collaboration of all divisions internally and with the broader stakeholder community. We coordinate with suppliers, manage inventory levels, and respond promptly to customer demands. ***(SOE 3, Supervisor)***	*Interdepartmental collaboration and alignment, broader stakeholder, and community collaboration*	6:5 ¶ 9
		#VI. We are going to have to improve coordination efforts across different departments. ***(SOE 3, Supply Chain Advisor)***	*Collaboration, teamwork, and improved coordination efforts across different departments*	6:6 ¶ 10
		#VII. If we can try to reduce customer complaints and try to respond in a quicker way, I think the quality department can assist with this, and it really will help to reduce the number of issues. ***(SOE 3, Front End Teller)***	*Prompt customer service, quality improvement, and reduction of customer complaints*	6:7 ¶ 11
		#VIII. In my understanding, the leaders are constantly exploring opportunities with others to enhance collaboration and improve service offerings to citizens via our infrastructure. ***(SOE 3, Safety Officer)***	*Collaboration, leadership, and service improvement*	6:8 ¶ 12
		#IX. The interaction between departments is currently missing. The thing that bothers me is the overhead activities that you can't tie to a specific department. We send the scope of work, and it gets lost in the air as we wait for approvals to take place. ***(SOE 3, Maintenance Planner)***	*Avoidance of departmental silos and interdepartmental collaboration*	6:9 ¶ 13
Q1 (d)	Important factors to improve customer value creation	**#I.** We start by actively listening, and feedback mechanisms are used to understand customer preferences and pain points. This input is then integrated into process design, from service delivery to product offerings. ***(SOE 3, Branch Manager)***	*Listening to customer feedback, customer product offerings, operational efficiency, and service delivery.*	9:1 ¶ 3
		#II. We always use customer user guides and surveys to solicit feedback and continuously adapt technologies to meet evolving customer expectations***. (SOE 3, Logistics Manager)***	*Adaptability of technological changes, customer expectations, customer needs, and customer satisfaction through customer user guides and surveys to solicit feedback.*	9:2 ¶ 5
		#III. It's always good for us to get feedback from the customers themselves, although many customers remain motivated to utilize SA SOE 3products and services. The organization also customizes its product portfolio to suit the unique requirements of customers. ***(SOE 3, Quality Manager)***	*Customer feedback, customer-centricity, and product customization to suit customer requirements*	9:3 ¶ 7
		#IV. Engaging with customers through online platforms and providing access to reliable, elevated, and technologically advanced services are other strategies employed to add value. They want the SOE 3to operate over the weekends; they don't want to wait long to get their parcels cleared from customs. ***(SOE 3, Quality Assurance Specialist)***	*Operational hours, customer engagement, customer service, digitalization, fast service, online platforms.*	9:4 ¶ 9
		#V. We try to give access to services in terms of reliability, reach, and relevance. Customers are no longer using traditional mailing systems. As an organization, we need to stay relevant to the latest technologies and market trends to add value or provide value to citizens. ***(SOE 3, Supervisor)***	*Market trends, service reliability, reach and relevance, and technology adoption*	9:5 ¶ 11
		#VI. We conduct situational analysis and environmental scans to understand how traditional business models haven't evolved as fast as technological advancements and social trends. We aim to improve and launch new business and product lines to provide value to customers. ***(SOE 3, Supply Chain Advisor)***	*Customer value, product launch, social trends, and technological advancement*	9:6 ¶ 13
		#VII. We really try to engage with customers, listen to their requests and concerns, and tailor our services to meet their specific needs, whether it's helping with various transactions or offering guidance on service options. ***(SOE 3, Front End Teller)***	*Engage with customers, listen to customer requests and concerns, and tailor services to meet customer-specific needs.*	9:7 ¶ 15
		#VIII. Tailoring services to meet specific customer needs, balancing safety with convenience, and aligning maintenance practices with customer expectations are ongoing challenges in delivering value to customers. ***(SOE 3, Safety Officer)***	*Customer-centric, customer convenience, secure environment, and value delivery*	9:8 ¶ 17
		#IX. Identifying and addressing long-term customer needs is challenging due to their evolving nature and the need for significant resource allocation. Aligning maintenance practices with customer expectations is also a challenge. However, if other responsible parties within the organization follow through, such as engineers refusing to conduct assessments, the customer value may not be realistic due to a low morale and internal environment. ***(SOE 3, Maintenance Planner)***	*Customer needs, customer-centricity, alignment with customer expectations, employee engagement, and employee morale*	9:9 ¶ 19

RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector? #

SOE 3

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q2 (a)	Specific lean tools used for continual	**#I.** Process improvement tools are used to automate some of our manual tools and processes. The aim is to identify and eliminate process duplications and redundancies. We also have a real-time management reporting tool to become more proactive in monitoring productivity levels. ***(SOE 3, Branch Manager)***	*Automation tools, real-time management reporting tools, and process improvement tools*	11:1 ¶ 3
		#II. We use key performance indicators to improve performance and business processes. ***(SOE 3, Logistics Manager)***	*Business performance monitoring and key performance indicators*	11:2 ¶ 5

	improvement in customer value creation	**#III.** We use ISO standards for process improvement, training, and the availability of resources like management representation and quality champions that can assist other departments in understanding the quality tools and using them as intended. ***(SOE 3, Quality Manager)***	*ISO standards, quality tools, and training*	11:3 ¶ 8
		#IV. We use SAP tool optimization, but the tellers are not trained to log issues on SAP. ***(SOE 3, Quality Assurance Specialist)***	*SAP tool optimization*	11:4 ¶ 9
		#V. We do have corrective action and tools like root causes. Each service type may have its own unique set of processes, requirements, and regulations, adding complexity to the overall operation. ***(SOE 3, Supervisor)***	*Corrective action and root cause analysis*	11:5 ¶ 10
		#VI. The JIT tool has been introduced to postal services; the frustration raised has been that many postal items, such as time-sensitive documents and parcels, require prompt delivery. JIT's focus on minimizing inventory gives us a lot of issues and complaints with the need for timely deliveries and has led to a lot of delays, so we need to find a way of fitting it nicely to the unique challenges of postal services. ***(SOE 3, Supply Chain Advisor)***	*JIT tool*	11:6 ¶ 11
		#VII. We use total quality management because, as a front-end teller, we need to collect information from customers about their postal experiences to identify areas that need improvement. We need to customize TQM for postal operations, which will help us deliver even higher levels of service quality and customer satisfaction. ***(SOE 3, Front End Teller)***	*Total Quality Management*	11:7 ¶ 12
		#VIII. We use corrective action, risk assessment, and observations. People are always willing to take short cuts because they like paperwork, but that doesn't mean the tools are not there. ***(SOE 3, Safety Officer)***	*Corrective action, risk assessment and observations*	11:8 ¶ 13
		#IX. One of the tools that we use is corrective maintenance. Focusing on equipment and machinery maintenance to minimize downtime and improve overall equipment effectiveness. ***(SOE 3, Maintenance Planner)***	*Corrective maintenance*	11:9 ¶ 14
Q2 (b)	The effectiveness of the lean tools used for continual improvement in customer value creation	**#I.** As a branch manager, we sit in the review meetings where we measure the effectiveness of the tools by tracking key performance indicators (KPIs) such as reduced processing times and improved customer satisfaction scores and by regularly soliciting feedback from both employees and customers to gauge their experiences and identify areas for further improvement. ***(SOE 3, Branch Manager)***	*Reduced processing times, and improved customer satisfaction scores, and soliciting feedback from employees and customers.*	12:1 ¶ 2
		#II. We are tracking reductions in mail processing times and costs. ***(SOE 3, Logistics Manager)***	*Reductions in mail processing times and costs*	12:2 ¶ 4
		#III. We recently evaluated the effectiveness of our corrective action process by assessing metrics such as the reduction in error rates and the timely resolution of customer complaints. ***(SOE 3, Quality Manager)***	*Reduction in error rates, and the timely resolution of customer complaints.*	12:3 ¶ 6
		#IV. This includes delivering these services efficiently, effectively, and transparently while optimizing resource utilization. ***(SOE 3, Quality Assurance Specialist)***	*Service delivery effectiveness and efficiency, problem-solving, and optimizing resource utilization.*	12:4 ¶ 7
		#V. In my view, there is a reduction in waste resources and fewer complaints from employees. ***(SOE 3, Supervisor)***	*Reduction in waste resources and fewer complaints from employees*	12:5 ¶ 8
		#VI. It's crucial to assess whether the lean tools align with the organization's goals and capabilities. ***(SOE 3, Supply Chain Advisor)***	*Alignment with goals and capabilities*	12:6 ¶ 9
		#VII. From an employee perspective, the service log is effective in tracking and addressing customer issues. ***(SOE 3, Front End Teller)***	*Effective customer service delivery*	12:7 ¶ 10
		#VIII. In my view, the tools are effective when we don't have safety incidents and we improve safety scores. ***(SOE 3, Safety Officer)***	*Reduction in safety incidents and improved safety scores*	12:8 ¶ 11
		#IX. By tracking reductions in equipment downtime, reductions in maintenance costs, and improved asset reliability. ***(SOE 3, Maintenance Planner)***	*Reduction in equipment downtime, reduction in maintenance costs, and improved asset reliability*	12:9 ¶ 12
Q2 (c)	Monitoring deviations in the customer value creation processes	**#I.** Our quality team conducts regular audits of our processes to ensure that they are being followed correctly. These audits are typically scheduled, and we have a dedicated team responsible for conducting them. The audit team checks compliance with established procedures, identifies any deviations, and provides feedback. ***(SOE 3, Branch Manager)***	*Process auditing*	4:1 ¶ 3
		#II. We monitor key performance indicators (KPIs) like delivery rates, vehicle maintenance, and inventory accuracy and promptly investigate deviations. We also encourage open feedback from logistics staff on process deviations or operational challenges they encounter. ***(SOE 3, Logistics Manager)***	*Performance evaluation and open feedback from logistics staff*	4:2 ¶ 5
		#III. Our team promotes regular reporting of non-conformances, self-assessment, and process audits to assess adherence and identify deviations, documenting, categorizing, and analyzing root causes. ***(SOE 3, Quality Manager)***	*Regular employee reporting systems, root cause analysis, self-assessment, and process audits*	4:3 ¶ 7
		#VI. My team encourages reporting daily process deviations and logs them onto the system, improving non-conformance issuing and dealing with deviations effectively. ***(SOE 3, Supply Chain Advisor)***	*Deviation management, log systems, and organizations encourage employees to report deviations.*	4:4 ¶ 10
		#VII. We record corrective action logs and non-conformance reports. We also conduct customer satisfaction surveys in branches and receive complaints via email from customers who have a card to indicate their satisfaction level. ***(SOE 3, Front End Teller)***	*Service evaluation, customer satisfaction surveys, and customer complaints' feedback*	4:5 ¶ 11
		#VIII. The organization encourages employees to report any deviations, near misses, or products or services that do not meet the required standards. ***(SOE 3, Safety Officer)***	*The organization encourages employees to report deviations.*	4:6 ¶ 12
		#IX. We conduct issue investigations and conduct root cause analysis for significant deviations to implement corrective actions and prevent future occurrences. ***(SOE 3, Maintenance Planner)***	*Issue investigation, root cause analysis, and corrective actions*	4:7 ¶ 13

RESEARCH QUESTION 3: What factors can impede the successful implementation of lean principles within the public sector environment? #

SOE 3

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q 3	The internal and external issues that can affect customer value creation	**#I.** Internally, we conduct regular performance assessments, employee feedback sessions, and process audits to look at some of the process bottlenecks, resource constraints, or skill gaps that might impede our progress. Externally, we closely monitor market trends, customer feedback, and industry developments to identify factors such as changing customer preferences, competitive pressures, and regulatory changes that could influence our ability to achieve our goals. ***(SOE 3, Branch Manager)***	*Bottlenecks, competitive pressures, skill gaps, regulatory changes, resource constraints, and market trends*	5:2 ¶ 3
		#II. We conduct situational analysis and an environment scan that is shared and reviewed during our management reviews. This includes a situational analysis of how traditional business models have not evolved as fast as technological advancement and social trends. The other thing for me is the organizational culture and the commitment of leadership. If the leaders don't show examples, how can the people follow? ***(SOE 3, Logistics Manager)***	*Market trends, technological advancements, organizational culture, and commitment of leadership.*	5:3 ¶ 5
		#III. To determine internal issues, we use the SWOT analysis, where we look at our strengths, weaknesses, threats, and opportunities. This is also recorded in our operational plan and reviewed annually. ***(SOE 3, Quality Manager)***	*Our strengths, weaknesses, threats, and opportunities.*	5:4 ¶ 7
		#IV. In the last quality review, the issue cited was the adoption of e-commerce and how digital technologies are driving customers away from the post office. ***(SOE 3, Quality Assurance Specialist)***	*An adoption of digital technologies and e-commerce*	5:5 ¶ 8
		#V. The issue of determining issues in SAPO is unclear due to numerous issues on the floor that are reported to managers without receiving feedback. The organizational culture within SAPO is challenging, along with system obsolescence. Tools like the 5 WHYs also face challenges in ensuring consistency and standardization across the organization, as inconsistencies in analysis depth can result in varying levels of problem resolution quality. ***(SOE 3, Supervisor).***	*Lack of feedback from managers, communication issues, organizational culture, system obsolescence, and lack of skilled employees*	5:6 ¶ 9
		#VI. That is determined at the higher levels of management; our employees are normally not involved in looking at ways to assess the issues. ***(SOE 3, Supply Chain Advisor)***	*Lack of employee's involvement*	5:7 ¶ 10
		#VII. We don't really know how other issues will be discussed. ***(SOE 3, Front End Teller)***	*Unawareness and lack of employee involvement*	5:8 ¶ 11
		#VIII. We don't sit and discuss it from the point of view of the customer, and unless it's discussed at the management meeting, the feedback is never given to us unless you have an action to take. ***(SOE 3, Safety Officer)***	*Lack of customer-centric approach, lack of feedback, and lack of employee communication,*	5:9 ¶ 12
		#IX. The issues are reported by the people who are working on the floor and escalated to the team leaders. ***(SOE 3, Maintenance Planner)***	*Problem reporting and escalation*	5:10 ¶ 13

RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector? #

SOE 3

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q 4 (a)	Lean strategies used to eliminate waste in the customer value creation	**#I.** Waste within the branch includes excessive wait times for customers, a lot of redundant paperwork, inefficient sorting and delivery processes, customer complaint feedback, long queue times, low employee productivity, delivery delays, high error rates, and excess inventory. ***(SOE 3, Branch Manager)***	*Excessive wait times for customers, a lot of redundant paperwork, inefficient sorting and delivery processes, customer complaint feedback, long queue times, low employee productivity, delivery delays, high error rates, and excess inventory.*	13:2 ¶ 2
		#II. I consider obsolete technology waste; long queues for grant collection are a waste of people's time; and many citizens complain about waiting time for vehicle license disks; they wait for a long time, over 4 weeks, for disks to arrive; other branches only have a few tellers working; missing parcels; and the system is glitched, leading to late processing of Sassa grants. ***(SOE 3, Logistics Manager)***	*Customer complaints, long waiting times, long queues for grant collection, delays in processing Sassa grants, missing parcels, system glitches, Obsolete technology.*	13:3 ¶ 4
		#III. Projects that don't provide value for money, criminal conduct leading to loss, fruitless and wasteful expenditure, and irregular expenditure on corrupt contracts. ***(SOE 3, Quality Manager)***	*Projects that don't provide value for money, criminal conduct leading to loss, fruitless and wasteful expenditure, and irregular expenditure on corrupt contracts.*	13:4 ¶ 7
		#IV. …such as error rates, rework levels, and delivery delays. ***(SOE 3, Quality Assurance Specialist)***	*Error rates, rework levels, and delivery delays*	13:5 ¶ 8
		#V. In my view, other tools are not working, and they waste resources. Feedback directly comes from employees who participate in these tools. The audits are done, and then results are not communicated at times, even the KPI's, so we can't influence this tool from an employee perspective. ***(SOE 3, Supervisor)***	*Frustration, inefficiency in tool usage, and lack of communication*	13:6 ¶ 9
		#VI. It's crucial to assess whether the lean tools align with the organization's goals and capabilities. ***(SOE 3, Supply Chain Advisor)***	*Alignment with goals*	13:7 ¶ 10
		#VII....unnecessary steps, delays, and inefficiency. Additionally, foster a culture of continuous improvement among public sector employees. ***(SOE 3, Front End Teller)***	*Unnecessary steps, delays, inefficiency, and an unsupportive culture*	13:8 ¶ 11
		#VIII. In my view, the tools are effective when we don't have safety incidents and we improve safety scores. ***(SOE 3, Safety Officer)***	*Reduction in safety incidents and improved safety scores.*	13:9 ¶ 12
		#IX. By tracking equipment downtime, maintenance costs, asset reliability, and disruptions in postal operations. ***(SOE 3, Maintenance Planner)***	*Equipment downtime, maintenance costs, asset reliability, and disruptions in postal operations.*	13:10 ¶ 13

CON'T: RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector? #

SOE 3

NUMBER	INTERVIEW QUESTION GUIDE	KEY QUOTATIONS	KEY ELEMENTS DERIVED FROM THE PARTICIPANTS' NARRATIVES	TRANSCRIPT REFERENCE FROM ATLAS
Q 4 (b)	Lean strategies used to eliminate waste in the customer value creation	**#I.** Strategies are developed by the senior managers and are then cascaded down for implementation at the different business units and branches of the organization. ***(SOE 3, Branch Manager)***	*Leadership and communication from top to bottom*	7:1 ¶ 2
		#II. Strategies are planned and developed at a national level by executives. It is shared with unions and the higher level of the organization before implementation. It is also communicated to the employees using the change agents within the organization before implementation. ***(SOE 3, Logistics Manager)***	*Executives define strategy and an operation plan, and strategy is cascaded down to different sections of the organization.*	7:2 ¶ 4
		#III. The leadership team in our organization makes strategic decisions without input from employees, leading to a top-down approach that limits the effectiveness of our strategies. This top-down approach results in strategies that don't align with the realities of our work, leading to unnecessary hurdles and inefficiencies. Employees are expected to follow these decisions without question. ***(SOE 3, Quality Manager)***	*Lack of employee involvement in strategy development, leadership, and communication from top to bottom; leadership defines strategy and cascades it down to different sections of the organization*	7:3 ¶ 6
		#IV. We have an issue with excess inventory, which can lead to increased storage costs and potential damage, so we implement systems to maintain minimal stock levels and ensure timely restocking. ***(SOE 3, Quality Assurance Specialist)***	*Continuous improvement, inventory management, process optimization, and waste reduction*	7:4 ¶ 7
		#V. Strategies are developed at leadership levels, but they are often not cascaded down to employees. Employees are supported in positioning processes into the strategy, and leaders may support efforts depending on the scope. For example, a modernization strategy, including a digital transformation strategy and technology roadmap, needs to be assessed on the ground. Managers struggle to cascade strategies effectively, leaving employees unaffected. ***(SOE 3, Supervisor)***	*Lack of leadership and communication, modernization strategy, and digital transformation strategy*	7:5 ¶ 8
		#VI. In my view, strategy is a paper exercise with KPIs formulated in the operational plan but poorly communicated. Managers track their units for successes without understanding the KPIs, and people are unaware of them. ***(SOE 3, Supply Chain Advisor)***	*Lack of effective communication of the strategies, lack of understanding of the strategies, and lack of awareness of the strategies.*	7:6 ¶ 9
		#VII. In my view, a lot of strategies are used, such as communication strategies and training of the people on what adds value and what does not add value, but that cannot come as a strategy from the managers without talking to us as tellers, because the customers talk to us. Although we do get performance ratings, we can offer significant potential for waste reduction in the organization. Another strategy is data-driven decision-making, where data analytics can identify areas of waste and inform evidence-based policy and program development. Additionally, fostering a culture of continuous improvement among public sector employees can help identify and address waste at all levels. ***(SOE 3, Front End Teller)***	*Lack of employee involvement in strategy development, data-driven decision-making strategies, communication strategies, and continuous improvement and efficiency improvement*	7:7 ¶ 10
		#VIII. "There's often a lack of empowerment among staff to identify inefficiencies and propose improvement initiatives. Even if we notice something that could be done better, there's a sense that our suggestions might not be taken seriously or acted upon.". ***(SOE 3, Safety Officer)***	*Lack of employee involvement in strategy development, lack of effective communication of the strategies, lack of understanding of the strategies, and safety strategies*	7:8 ¶ 11
		#IX. Strategies are there, and we are told about them. The one on the 2021/22 FY was to review all contracts to see the value they add to the business. Contracts could not be reviewed as planned due to a lack of skilled resources to perform the review. ***(SOE 3, Maintenance Planner)***	*Lack of understanding of the strategies and lack of skilled employees*	7:9 ¶ 12

APPENDIX 1 (F): COMPREHENSIVE DOCUMENT ANALYSIS IN STATE OWN ENTERPRISE (SOE) THREE

RESEARCH QUESTION 1: What constitutes value from the public sector perspective? **#D3**

NUMBER	QUESTION GUIDE	KEY EXTRACTS FROM THE DOCUMENT	CODES CREATED FROM THE EXTRACT	ATLAS REFERENCE
Q1 (a)	Leadership ensuring value creation based on customer needs	In the long term, the SOE 3 is positioned to become the face of South African government services to citizens through its proposition as a trusted platform for government service delivery and providing access for citizens. Core to this proposition is the vast physical delivery infrastructure and branch network touching all corners of South Africa. The provision of government services will enable the SOE 3 to play a meaningful role in reducing the cost of providing these services to all South Africans***. (SOE 3, Strategic Plan, 2022, p. 24)***	*Physical infrastructure and branch network, citizen/customer centricity, provision of service delivery, affordable pricing, government services*	3:1 ¶ 7 in SOE_3_docreview
		We have a passion for our customers and excellent customer service. Contributing positively to our communities and environment. Treating each other with respect, dignity, honesty, and integrity. Also, recognizing and rewarding individual contributions and embracing diversity and transformation in the way we conduct business. ***(SOE 3, Strategic Plan, 2022, p. 19)***	*Customer centricity, excellent customer services, community focused, environmental safety, employee's recognition and reward, good working relationship, integrity and honesty*	3:2 ¶ 15 in SOE_3_docreview
		Ensure leadership behavior supports a culture of high performance that is rewarded and addresses underperformance or non-performance appropriately. Talent and development forums will be implemented as the vehicle for these initiatives***. (SOE 3, Strategic Plan, 2022, p. 60)***	*Leadership by example, transformation leadership, performance management, leadership development, talent and improvement forum*	3:3 ¶ 19 in SOE_3_docreview
Q1 (c)	The roles of the departments in customer value creation	In addition, the robust implementation of the SOE 3 eCommerce platform (eMall) in collaboration with DTPS and its launch into the marketplace as a competitive alternative in this growing sector are seen as key features of the strategic plan. The eCommerce platform, earmarked to take off in 2019/2020, will contribute towards achieving the objectives of the developmental state agenda using the available logistical infrastructure at the SOE 3, allowing us to adequately service our markets. ***(SOE 3, Strategic Plan, 2022, p. 4)***	*Technology adoption and digital platform utilisation, logistical infrastructure, government policy*	3:4 ¶ 20 in SOE_3_docreview
		In these instances, we will make a concerted effort to crowd in capital, skills, technology, and know-how to supplement our own capabilities and capacity. Ultimately, our measure of success, as SOE 2, will be our customers' commercial success, the overall trade competitiveness of their respective markets, and that of South Africa in the region and internationally. ***(SOE 3, Strategic Plan, 2022, p. 4)***	*Provision of funds, acquire skilled employees, technology adoption, customer service delivery, logistics, trade competitiveness, capacity building,*	3:5 ¶ 23 in SOE_3_docreview
Q1 (d)	Important factors to improve customer value creation	Customers' needs are changing, and the SOE 3is still using old methods of doing business and has not embraced technology as a vehicle for radical economic transformation and for customers to be empowered. The traditional postal business is not generating adequate revenues to support increasing operational expenditure, which has resulted in net losses year on year***.*** ***(SOE 3, Strategic Plan, 2022, p. 10)***	*Tracking customer dynamics and customer changing needs, financial challenges, technological lag, cost of development, ensuring sufficient revenue generation, reduction in operational expenditure, reduction in losses*	3:6 ¶ 24 in SOE_3_docreview

RESEARCH QUESTION 2: What are the critical factors that determine the applicability of lean tools in the public sector? **#D3**

NUMBER	QUESTION GUIDE	KEY EXTRACTS FROM THE DOCUMENT	CODES CREATED FROM THE EXTRACTS	ATLAS REFERENCE
Q2 (a)	Specific lean tools used for continual improvement in customer value creation	During October 2018, Cabinet approved a revised delivery model, where the distribution of Set Top Boxes to the remaining 3.5 million qualifying households will be undertaken by way of a voucher system. This will enable qualifying households to exchange the voucher for goods and services to enable the migration from analog to digital. ***(SOE 3, Strategic Plan, 2022, p. 26).***	*STB (set top boxes) technology, activity monitoring,*	3:20 ¶ 71 in SOE_3_docreview
		The Department will continue with the roll-out of broadband by following a rapid deployment policy to provide a simplified, streamlined, and coordinated framework, supported by clear strategies and measures to accelerate the infrastructure deployment process as far as possible. Broadband has been recognized as a key enabler for economic development, and all provinces are actively pursuing broadband plans and strategies at different stages of implementation. The SOE 3can assist in bridging the digital divide by making its property infrastructure and branches available as Wi-Fi hotspots, facilitating digital access, and bringing the digital economy to communities. ***(SOE 3, Strategic Plan, 2022, p. 26).***	*Broadband, digital access, digital divide, digital economy, economic development, infrastructure, monitoring,*	3:21 ¶ 73 in SOE_3_docreview
Q2 (b)	The effectiveness of the lean tools used for continual improvement in customer value creation	Postal operators are beginning to apply analytics to gain deep customer insights that unlock value. Digital technologies can provide additional channels, offer efficiencies on the operational side of the business, and bring value-added services. ***(SOE 3, Strategic Plan, 2022, p. 29).***	*Customer insights, Data analytics for assessment, provision of value-add services, digital technologies, processes efficiencies,*	3:22 ¶ 76 in SOE_3_docreview

RESEARCH QUESTION 3: What factors can impede the successful implementation of lean principles within the public sector environment? **#D3**

NUMBER	QUESTION GUIDE	KEY EXTRACTS FROM THE DOCUMENT	CODES CREATED FROM THE EXTRACTS	ATLAS REFERENCE

Q3 (a)	The internal issues that can affect customer value creation	The chrome and magnetite channels are also experiencing locomotive reliability issues due to the non-availability of OEM spares and high incidents of theft and vandalism. (SOE 3, Strategic Plan, 2022, p. 28)	*Maintenance issues, supply chain issues, equipment reliability, security concerns*	3:16 ¶ 61 in SOE_3_docreview
		New business initiatives are not taken to market or extensively delayed because funding is not available to develop the product and the cost of development is exponential while the return on investment (ROI) is not realised. ***(SOE 3, Strategic Plan, 2022, p. 10)***	*Lack of funding, delayed projects, return on investment (ROI) not realized*	3:7 ¶ 25 in SOE_3_docreview
		The merger of Mail Operations, Retail, Transport, Logistics, and Properties business units into a single entity, focusing on regionalization and the integration of infrastructural elements, is a strategic move to ensure instant, reliable operations. (SOE 3, Strategic Plan, 2022, p. 58)	*Business units collaboration issues, integration issues, operations, infrastructure challenges, instant and reliable operations challenge*	3:17 ¶ 63 in SOE_3_docreview
		Strengthening both of these dimensions will give real meaning to digital transformation. It allows physical and/or digital interfaces for producer and consumer interaction in the secure exchange channel so as to trade and access government services. Noting that the channel is infrastructure, the maintenance and development of facilities and logistics capability enable operations to better serve customers. In the medium term, operations will drive optimization through the implementation of lean principles in acquiring its infrastructure. assembling and maintaining infrastructure assets. (SOE 3, Strategic Plan, 2022, p. 58).	*Technology adoption challenge, digital transformation challenge, infrastructure challenge, optimization challenge, resources required to serve customers*	3:18 ¶ 64 in SOE_3_docreview
Q3 (b)	The external issues that can affect customer value creation	Three factors contributed to the significant volume decline during the period 2000–2018, namely increased usage of mobile devices, particularly smartphones, increased internet access, and the SOE 3 labor unrest of 2014 and 2018. It is to be noted that once a customer has migrated to a digital alternative, it is highly unlikely that they will ever return. (SOE 3, Strategic Plan, 2022, p. 32).	*Customer behavior change, technological advancement, labor unrest*	3:19 ¶ 67 in SOE_3_docreview

RESEARCH QUESTION 4: What lean strategies that can be used to eliminate waste in the public sector?				**#D3**
NUMBER	**QUESTION GUIDE**	**KEY EXTRACTS FROM THE DOCUMENT**	**CODES CREATED FROM THE EXTRACT**	**ATLAS REFERENCE**
Q4 **(a)**	Identification of waste or non-value-adding activities in the customer value creation processes	Poor service delivery to customers results from an aging physical infrastructure, obsolete and underperforming systems, skills gaps, and a compliance culture that is not supportive of the future direction of SAPO. “The government, as sole shareholder and funder, has other competing priorities for funding. Lack of customer understanding of the SASSA product features Potential for damage and vandalism of properties. (SOE 3, Strategic Plan, 2022, p. 93)	*Compliance culture, customer understanding, product features, skills gaps, ageing physical infrastructure, funding projects, system damage, vandalism, obsolete systems, poor service delivery, underperforming systems,*	3:10 ¶ 39 in SOE_3_docreview
		Power outages. Decayed state of the property portfolio and current state of the work environment in branches Slow-decision-making processes. Duplication of application systems, outdated hardware and software. Stock availability at branches. Resistance to change, critical vacancies in the IT area, skills gaps, inadequate succession planning, and a lack of consequence management (positive and negative) (SOE 3, Strategic Plan, 2022, p. 93)	*Power outages, Slow-decision-making processes, skills gaps, duplication of application systems, outdated hardware and software, stock unavailability at branches,* *Incident management, technological challenges, inadequate succession planning, organizational inefficiencies, resistance to change,*	3:11 ¶ 40 in SOE_3_docreview
		Business disruption due to system, network, and/or IT hardware failures resulting in the inability to deliver products and services to customers (SOE 3, Strategic Plan, 2022, p. 94)	*Business disruption, IT failure, poor customer service, service unavailability*	3:12 ¶ 42 in SOE_3_docreview
		The skills profile of the organization was misaligned with the skills set required to achieve the "imminent staff optimization process. Moratorium on appointments. Inability to attract and retain the right skills. Freeze the training budget. Skills gaps identified within core and critical disciplines (SOE 3, Strategic Plan, 2022, p. 93)	*Unreliable employees, skills gap, training budget freeze, organizational misalignment, staff optimization and retention challenge*	3:13 ¶ 44 in SOE_3_docreview
Q4 **(b)**	Lean strategies used to eliminate waste in the customer value creation	Strategies and forums to identify and manage safety hazards, define and implement remedial action, and limit human-factor safety concerns (SOE 3, Strategic Plan, 2022, p. 57)	*Assessment of issues through strategic forums, safety management, remedial action*	3:14 ¶ 55 in SOE_3_docreview
		The eStrategy aims to create a digital society by creating necessary knowledge and skills, driving sector growth and innovation through ICT investment, and preparing for the Fourth Industrial Revolution. The Department has prioritized the development of the SOE 3eCommerce platform, eMall, to make South Africa globally competitive and introduce new digital markets from SADC and the African continent. This will enable the SOE 3to better prepare for and leverage the Fourth Industrial Revolution. (SOE 3, Strategic Plan, 2022, p. 25)	*Digital markets, digital transformation, e-commerce, fourth Industrial Revolution, ICT investment, innovation, global competitiveness, infrastructure development*	3:15 ¶ 57 in SOE_3_docreview

APPENDIX 2

Ethical clearance approval

UNISA college of economic and management sciences

COLLEGE OF ECONOMIC AND MANAGEMENT SCIENCE RESEARCH ETHICS REVIEW COMMITTEE

25 July 2022

NHREC Registration # : (if applicable)
ERC Reference #: 2022_CRERC_049 (FA)
Name: Mrs Unathi Thango
Student #: 50837632

Dear Mrs Unathi Thango

Decision: Ethics Approval from 2022 to 2027

Researcher(s): Mrs Unathi Thango; 50837632@mylife.unisa.ac.za ; 0833247086, 0147638264
College of Economic and Management Sciences
Department of Operations Management
University of South Africa

"A framework for the adaption of lean manufacturing principles for State-Owned Entities in South Africa"

Qualification: PhD

Thank you for the application for research ethics clearance by the Unisa College of Economic and management Sciences Research Ethics Review Committee, for the above-mentioned research. Ethics approval is granted for 5 years, from **25 July 2022 until 24 July 2027.**

*The low risk application was reviewed by the College of Economic and Management Sciences Research Ethics Review Committee on **14 June 2022** in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.*

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the College of Economic and management Sciences Research Ethics Review Committee.

3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.
7. No field work activities may continue after the expiry date **(24 July 2027)** Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.
8. Permission is to be obtained from the university from which the participants are to be drawn (the Unisa Senate Research, Innovation and Higher Degrees Committee) to ensure that the relevant authorities are aware of the scope of the research, and all conditions and procedures regarding access to staff/students for research purposes that may be required by the institution must be met.
9. If further counselling is required in some cases, the participants will be referred to appropriate support services.

Note:

*The reference number **2022_CRERC_049 (FA)** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,

Dr Vaola Sambo
Chairperson, CRERC
E-mail: Esambovt@unisa.ac.za
Tel: 012 429 4355

Prof MC Mulaudzi
Acting, Deputy Executive Dean: CEMS
E-mail: tshilmc@unisa.ac.za
Tel: 012 429 3724

UERC 25.04.17 - Decision template (V2) - Approve

APPENDIX 3

INTERVIEW GUIDE

Dear Sir or Madam

Request for participation in an interview as part of the PhD study

Thank you for taking time to participate in this research. As indicated in the consent letter, this interview section will assist the researcher to gain insight to the research objectives by asking the participants questions and allowing them to express their views and insights accordingly. These questions are part of the overall study by Unathi Thango, a PhD Student with student number 50837362 in the Department of Operations Management, under the supervision of Dr Anthea Amadi-Echendu and Prof. Marcia Mkansi at the University of South Africa. The duration of the interview will be 30 to 45 minutes. You may withdraw at any point from the study at any time without any consequences. The interviews will be conducted via Microsoft Teams, as to confirm with the UNISA COVID-19 policy and general COVID protocols. Prior to the interviews being held, a consent form to agree to the discussion will need to be signed by all parties. The interviews will be recorded to assist the researcher in transcribing the information to use in the study. The recording will be an unbiased record of what was said, and copies of the transcribing and interpretations of the interview will be made available each participant.

Your responses may be reviewed by my supervisors, a transcriber, an independent external coder, and members of the Research Ethics Review Committee to making sure that the correct interpretations have been made, including the and that the research has been carried out in an ethical manner. All identifiable information will be removed from these records. The relevant parties will complete a confidentiality contract with the researcher.

I hope that my request will receive your favourable consideration and thank you for taking time to read the contents herein. I will be honoured to receive your help. Please find the interview questions below:

_____

Unathi Thango
PhD candidate UNISA, Department of Operations Management
Student number: 50837362
Cell: 0833247086
Email: Thangou@eskom.co.za

SECTION A: BIOGRAPHICAL INFORMANTION OF PARTICIPANT

- Position within your organisation _____
- Related work experience in your organisation _____

Are you a permanent or a fixed term employee within your organisation_____**Layers of lean**	**Theory 1**	**Interview Questions**	**Research Questions**
Lean Philosophy Reduce waste. Improve customer value.	1.1 Leadership	1. How does the leadership of the organisation ensure that value is created for the customer? 2. How are the customer needs included in processes for value creation?	**RQ1** What constitutes value from the public sector perspective?
	1.2 Strategy	1. How have strategies or plans been developed to achieve the objectives of the organisation? 2. In coming up with the strategies or plans, what issues have you considered that can affect customer requirements?	**RQ 3** What lean strategies that can be used to eliminate waste in the public sector?
Lean principles Specify value. Identify value stream. Make value flow. Make customer pull. Pursue perfection.	1.3 Context	1. How are internal and external issues that can affect the organisation from achieving its goals determined? 2. How can the various departments in your department support value creation?	**RQ 2** What factors that can impede the successful implementation of lean within the public sector environment ?
Lean tools TQM; Gemba; 5S; Kaizen	1.4 Fit/Adapt	1. What are some of the tools that are used in the organisation for continual improvement? 2. How will you know if these tools are effective? 3. How would you describe or identify waste or non-value adding activities that lead to waste in your processes?	**RQ2** What are the critical factors that determine the applicability of lean tools to a new setting?
Layers of lean	**Theory 2**	**Interview Questions**	**Research Questions**
Lean Philosophy Reduce waste.	2.1 Complexity	1. How is customer value designed into the	**RQ 2** What factors that can impede the

Improve customer value.		processes of the organisation? 2. How are the deviations for the processes monitored?	successful implementation of lean within the **public sector environment ?**
Lean principles Specify value. Identify value stream. Make value flow. Make customer pull. Pursue perfection.	2.2 Viability	1. What departments or units carry out operations such as production or services in your organisation? 2. What are the resources needed for processes in your department. 3. What factors are considered important for improving customer value?	**RQ 4** What constitutes value from the public sector perspective?

APPENDIX 4

PARTICIPANT INFORMATION SHEET

Ethics clearance reference number: **2022_CRERC_049 (FA**)
Research permission reference number (if applicable): 2022 to 2027

Date: 07 July 2022

Title: "A framework for the adaption of lean manufacturing principles for State-Owned Entities in South Africa"

Dear Prospective Participant

My name is Unathi Thango, and I am doing research with Prof Marcia Mkansi and Dr Anthea Amadi-Echendu a senior lecture in the Department of Operations Management towards a Doctor of Philosophy Operations Management at the University of South Africa. We are inviting you to participate in a study entitled: A framework for the adaption of lean manufacturing principles for
State- owned entitles in South Africa.

WHAT IS THE PURPOSE OF THE STUDY?

This study is expected to collect important information that could assist in the development of a framework with implications specific to the public sector environment, which in turn may assist public sector organisations in implementing the framework milestones to their own unique processes to aid waste reduction, operation efficiency, reducing lead times and improving quality.

WHY BEING AM I INVITED TO PARTICIPATE?

I obtained your contact details from the Human Resources Manager of your organisation and your participation in this research was chosen based on your current role in your organsiation that may potentially assist with the outcomes of this research. This research has approximately 50 participants.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

The study involves semi-structured interviews that will be conducted via MS Teams, telephonically or via email. The interview questions will be provided to the participants prior to the meeting. The duration of the participation will between 30 to 45 minutes.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

Participating in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

ARE THEIR ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

There are not negative consequences that will come because of participation in this study.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

You have the right to insist that your name will not be recorder anywhere and that no one, apart from the researcher and identified members of the research team, will know about your involvement in this research. Your answers will be given a code number, or a pseudonym and you will be referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings. Your answers may be reviewed by people responsible for making sure that research is done properly, including the transcriber, external coder, and members of the Research Ethics Review Committee. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report. Participants will be given a link to the domain where the report is uploaded to.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Hard copies of your answers will be stored by the researcher for a minimum period of five years in a locked filing cabinet that is in the Lephalale office for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. Indicate how information will be destroyed if necessary. Hard copies will be shredded, and electronic copies will be permanently deleted from the computer using a relevant software program.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

There are not payments or incentives because of participating in this study.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

This study has received written approval from the Research Ethics Review Committee of the University of South Africa. A copy of the approval letter can be obtained from the researcher if you so wish.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

If you would like to be informed of the final research findings, please contact Unathi Thango on 0833247085 or 50837362@unisa.mylife.co.za. The findings are accessible for a period of 5 years.
Should you require any further information or want to contact the researcher about any aspect of this study, please contact Unathi Thango at the details provided above.

Should you have concerns about the way in which the research has been conducted, you may contact Dr Anthea Amadi- Echendu on email: amadiap@unisa.ac.za or 012 429 2627 and Prof Marcia Mkansi on email: mkansm@unisa.ac.za. Contact the research ethics chairperson of the

Research ethics and integrity advisory committee, Dr Marianne Engelbrecht on email: engelm1@unisa.ac.za or 012 429 4502 if you have any ethical concerns.

Thank you for taking time to read this information sheet and for participating in this study.

Thank you.

…….

Unathi Thango

CONSENT TO PARTICIPATE IN THIS STUDY

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I agree to the recording of the <insert specific data collection method>. 0

I have received a signed copy of the informed consent agreement.

Participant Name & Surname…… (please print)

Participant Signature…….Date……

Researcher's Name & Surname…… (please print)

Researcher's signature…….Date……

APPENDIX 5: DECLARATION OF PROFESSIONAL EDIT

Ke.Nna Publishing Services

This certifies that the thesis "DEVELOPING A FRAMEWORK FOR THE ADAPTION OF LEAN MANUFACTURING PRINCIPLES FOR STATE-OWNED ENTITIES IN SOUTH AFRICA" was edited by Ms Sehlodimela, who has over 10 years of scholarly publishing and editing experience.

The services provided include:

1. Ensuring accuracy in grammar and punctuation to improve readability and clarity
2. Consistency and structural enhancements to aid in creating a cohesive article

Ms Sehlodimela is contracted by the University of South Africa's College of Economic and Management Sciences to provide academic editing services. She holds a Masters in TESOL.

FOR ANY ENQUIRIES RELATING TO THE ABOVE, SEE BELOW CONTACTS

CT SEHLODIMELA, MA(TESOL), PMP
Managing Director: Ke.Nna Publishing Services
Tshegofatso.s@outlook.com