Public procurement of innovation in the valve manufacturing sector in South Africa

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ABSTRACT

Public procurement, in addition to its primary role of obtaining goods and services to fulfil public service functions, has been used by many economies to accomplish various socio-economic and developmental objectives. Moreover, public procurement is suggested to have played a big role in stimulating the establishment of manufacturing sectors in existence today. For many developing economies, manufacturing remains critical to creating large scale employment opportunities to reduce the high-rate unemployment and poverty.

Against the budgetary constraints and tough economic climate, the past decades witnessed a renewed interest in the utilisation of public procurement of innovation (PPI) as either a stand-alone policy or as part of general innovation or procurement policy tool to stimulate innovation amongst the existing sectors or creation of new sectors.

In South Africa, public procurement accounts for a significant share of economic activity with many domestic industries reliant on government contracts for their commercial activities. However, in comparison to other developed economies where PPI has become popular, it has been suggested that developing economies are not taking full advantage of the immense potential of PPI as tool to advance innovation capabilities and to strengthen the competitiveness of domestic firms.

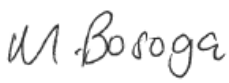
The purpose of the study is to explore the potential of PPI as tool to facilitate innovation in South Africa, utilising the valve manufacturing sector as case study. The study employed qualitative methods to gather and analyse data. The study used primary data as well as policy document analysis. Primary data was gathered through semi-structured one on one interviews with government officials, Eskom official as well as local valve manufacturers to determine the suitability of PPI to the South African environment. Policy documents and government report were used as secondary data.

The key finding of the study PPI is a complex tool and there are many factors involved its implementation. Its successful implementation is reliant on certain conditions being in place. The complexities and weaknesses inherent within the South African regulatory, organisational, and institutional landscape may present

major difficulties in the successful implementation of PPI as an explicit tool for government.

DECLARATION

I, **Morongwa Bosoga** , declare that this dissertation is my own unaided work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Innovation Studies at the Wits Business School in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other University.



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LIST OF ABBREVIATIONS

BRICS	Brazil, Russia, India, China, and South Africa
B-BBEE	Broad Based Black Economic Empowerment
DPE	Department of Public Enterprises
dtic	Department of Trade, Industry and Competition
EU	European Union
GDP	Gross Domestic Product
ICT	Information, Communication and Technology
IPAP	Industrial Policy Action Plan
NSI	National System of Innovation
NIPF	National Industrial Policy Framework
OECD	Organisation for Economic Cooperation and Development
PCP	Pre-commercial procurement
PPPFA	Preferential Procurement Policy Framework Act, 2000 (Act No 5 of 200)
PCP	pre-commercial procurement
PPI	Public Procurement of Innovation
PPR	Preferential Procurement Regulations
PPCB	Public procurement for capability building
SOEs	State Owned Enterprises
UNCITRAL	United Nations Commission on International Trade Law
WTO	World Trade Organisation
WTO GPA	The Plurilateral Agreement of Government Procurement of the World Trade Organisation

1 CHAPTER 1: INTRODUCTION

1.1 Purpose of the Study

There is a general consensus that innovation is an important factor in driving economic growth and competitiveness among economies and firms. As such promoting innovation has become a priority for many governments across the globe as means to develop and strengthen domestic firms competitiveness. Besides ensuring the delivery of public services, public procurement has been historically utilised as policy instrument to achieve other socio-economic objectives goals. Since the early 2000s, the use of public procurement has gained increased attention amongst the European Union, United Kingdom other developing economies as an important tool to spur innovation (Li , Ribeiro, Rauen, & Inacio, 2020).

In many economies, public procurement accounts for a substantial proportion of government expenditure and gross domestic product (GDP)(OECD, 2017). Therefore, it is considered have a significant influence in shaping markets. Through articulation of demand, public procurement is suggested to provide a favourable environment for firms to launch new innovation as well as encourage further innovation in later stages of product life cycle (Bjørnaas & Schmidt-Horix, 2013; Uyarra, Zabala-Iturriagagoitia, Flanagan, & Magro, 2020).

The manufacturing sector in particular, is suggested to have been a key factor driving growth and development in many advanced economies of today. Strengthening and developing manufacturing capabilities and competitiveness remains amongst the top priorities for many economies. To this end South African manufacturing firms are suggested to be performing low compared to international standards and the sector has declined faster in the last decades than in other BRICS countries (Kahn, Sithole, & Buchana, 2022). The subpar performance is largely attributable to lack of innovation and supportive policies.

Numerous studies have outlined the critical role of public procurement in encouraging innovation across manufacturing sectors particularly in developed economies. However, limited studies have been conducted in exploring public procurement of innovation (PPI) as a tool to stimulate the innovation in developing economies. (Li et al., 2020). The purpose of the study is thus to explore the potential of PPI as tool to

facilitate innovation utilising the South African valve manufacturing sector as case study.

1.2 Context of the Study

Public procurement is generally understood as the process of purchasing goods and services by a state organ to deliver services to the public. While value for money has traditionally been the main principle in contract award, it is suggested there is major shift across economies from applying “lowest “cost as the only determining factor in assessing value for money towards consideration of other factors to ensure maximum efficiency of public procurement (Davis & Brady, 2015).

Studies suggest that public procurement has been employed as demand side policy tool through which governments spending can be utilised to achieve multiple social and economic policy goals including stimulating innovation (Edquist & Zabala-Iturriagagoitia, 2012; Kattel & Lember, 2010).

According to Caravella and Crespi (2021) public procurement comprise between 10 - 15 per cent of total economic activity; and almost 30 per cent of national government spending in Organisation for Economic Cooperation and Development (OECD) economies. Moreover, some of developing countries public procurement has been recorded to exceed 20 percent of GDP (Djankov, Islam, & Saliola, 2016; Taylor & Yülek, 2012). Public procurement is thus considered a powerful market player.

Edler and Uyarra (2013) indicate that the academic discussion about the role of procurement in innovation can be traced back to 1980s and 1990s (Dalpé, 1994; Geroski, 1990; Rothwell, 1984). These studies were mainly centred on the role of United States defence procurement in the emergence of high technology sectors. The authors suggest that the interest in utilising public procurement to stimulate innovation subsided in the 1990s only to remerge in the 2000s with added emphasis.

Notably, Rolfstam (2015) ascribes the revival of the neglected policy instruments was to the Lisbon agenda developed for the European Union (EU) where public procurement was identified as an important instrument for addressing the challenges imposed by global competition and transition towards knowledge driven economies. Consequently, public procurement became a more prominent tool to foster innovation

in the OECD governments (Criscuolo, Gonne, Kitazawa, & Lalanne, 2022; Rolfstam, 2015, 2018).

Furthermore, Crespi and Guarascio (2019) point out the aftermath of 2008 financial crisis resulted in the steep decline in levels of economic activity and employment particularly in the manufacturing sectors also intensified the popularity of public procurement as a lever to stimulate technological upgrading and industrial renewal of productive sectors. From point of view, public procurement is seen as a powerful tool to reverse economic trends characterising many EU economies (Crespi & Guarascio, 2019; Davis & Brady, 2015). In addition, the disappointment with efficacy of traditional supply side measures is suggested to be another factor in increased focus to demand side initiatives (OECD, 2014).

While there have been reservations on whether manufacturing should still be the focus of industrial policy effort in developing economies (Huang, Morgan, & Yoshino, 2018) amidst the shifting globalisation patterns, rapid pace of innovation, and difficulties in penetrating the global trade market, the general observation is that the manufacturing sector remains critical to the industrialisation efforts of many middle-income economies including South Africa (Avenyo, Bell, Nyamwena, & Robb, 2021). Lall and Kraemer-Mbula (2005) contend that manufacturing is an important vehicle in employing new technologies to production and raising technical and managerial capabilities, central to the modernisation and competitiveness of industries.

Admittedly, industrial manufacturing levels in South Africa have been declining for decades (Andreoni, Kaziboni, & Roberts, 2021). A noticeable sharp descent can be seen after 1990 (Figure 1) where manufacturing declined from about 23% in 1990 to 13% in 2018. The trend is concerning given the fragile economy and persistently high rates of unemployment and poverty. The revival of the manufacturing sector is considered critical to resolving these challenges. Goga and Avenyo (2022) contend that a strong manufacturing sector could to a large scale create decent employment opportunities with better wages and labour conditions and generate linkages with other sectors and spillovers effects.

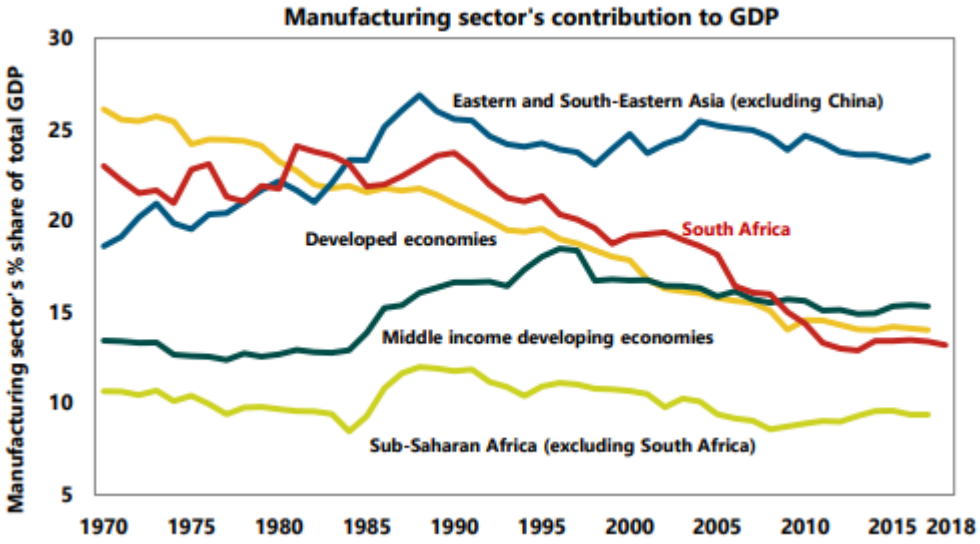

Figure 1: Manufacturing Sector's contribution to GDP

Source: IDC (2019)

The decline in manufacturing is attributable to many factors including global demand shifts, fragmentation of production, shift in labour cost, energy and transport costs, technology and innovation, rising trade agreements between economies, and in some case strengthening of prohibitive tariff measures (Manyika, 2012) The decline however has not been without effort for reversal (Mamphiswana, 2022). Numerous supply and demand side support instruments have been introduced including the Preferential Procurement Policy Framework Act (PPPFA) and developmental trade policies (Fotoyi, Tetani, Tsedu, & Wood, 2016) in an attempt to revitalise and grow important sectors of manufacturing (Andreoni et al., 2021).

Apart from economic benefits, a vast literature points to the use of public procurement as a policy tool to enhance capabilities and competitiveness of certain industrial sectors; encourage innovation; protect national industry against foreign competition; alleviate regional disparities; and furtherance of social and developmental agenda (Hoekman & Sanfilippo, 2018).

Uyarra, Edler, Garcia-Estevez, Georghiou, and Yeow (2014) point out that utilising public procurement to stimulate innovation holds twofold promise; it ensures effective and efficient service delivery in parallel making contributions to innovation dynamics in the economies. Accordingly various studies have documented the positive effects

of PPI in the innovative activities of domestic firms (Adjei‐Bamfo, Djajadikerta, Jie, Brown, & Kiani Mavi, 2023).

1.2.1 The South African Public Procurement Overview

Public procurement is of particular significance in South Africa. Secondary to its aim of delivery public service, it has been employed to accelerate social and economic transformation of historically disadvantages people of groups of people in South Africa (Fourie & Malan, 2020). The reforms that commenced in public procurement in 1995 were directed at two broad focus areas, namely the promotion of principles of good governance and the introduction of preference system to address socio economic objectives (Ambe 2016).

Accordingly, the principles of public procurement are set out in Section 217 of the Constitution of Republic of South Africa of 1996 (the Constitution) which requires that all organs of state to employ a procurement system which is fair, equitable, transparent, competitive and cost effective (Fourie & Malan, 2020). Consequently, numerous pieces of legislation have since been introduced regulating public procurement. Dawar and Oh (2017) contend that apart from the Constitution, no single comprehensive coherent piece of legislation exists that guide public procurement in South Africa. Watermeyer (2011) provides a summary of the legislation that regulate procurement practices indicated in Table *1*.

The Public Finance Management Act 1 of 1999 (PFMA) and the Local government: Municipal Finance Management Act 56 of 2003 are considered to be the primary statutes guiding public procurement (Fourie & Malan, 2020). Subsequently, the Preferential Procurement Policy Framework Act 5 of 2000 (PPPFA) and its regulations were promulgated to give effect to the constitutional requirements to determine the framework within which preferential procurement will be implemented.

However, the Preferential Procurement Regulations (PPR) have undergone several revisions. The latest regulations were published in November 2022 following a judgement by the Constitutional Court declaring the 2017 Preferential Procurement Regulation (the 2017 PPR) invalid. The 2022 Preferential Procurement Regulations (the 2022 PPR) came into effect in January 2023.

In light of the tensions, duplication, and overlaps amongst the various legislations, government is in the process of establishing a single statutory instrument to govern all public procurement in South Africa (Quinot, 2020).To this end, the Public Procurement Bill (the Bill) was introduced by the Minister of Finance to the National Assembly in June 2023. The Bill proposes to repeal the whole PPPFA and create a single regulatory framework to eliminate fragmentation in public procurement across organs of state. Consequently, the National Treasury considers the 2022 PPR a placeholder whilst the Bill undergoes parliamentary approval processes (National Treasury 2022b).

1.2.1.1 Localisation

In accelerating local economic development, the South African government identified public procurement as a lever to build capabilities of local manufacturing firms. Accordingly, the Department of Trade and Industry and Competition (the dtic) has designated certain sectors for local production through the introduction of local content requirement (LCR) instrument. At the core, the aim of local content is to utilise state procurement to build local capabilities and reduce reliance on imported products which in turn may catalyse growth and improve competitiveness.

The list of designated products is outlined in Table 1. LCR was introduced in the PPR in 2017. However, in the 2022 PPR amendment, LCR is no longer mandatory. Nevertheless, state organs are still required to demonstrate efforts of supporting local economic development in their procurement activities (National Treasury 2022a). The proposed Bill provides for the inclusion of preference criteria for goods produced in South Africa which advances local production.

Table 1: Primary Acts that regulate public procurement

Act	What it does in respect of procurement
Public Finance Management Act 1 of 1999	Establishes a regulatory framework for SCM, which includes procurement in national and provincial departments and state-owned enterprises.
Promotion of Administrative Justice Act 3 of 2000	Establishes fair administrative procedures, permits those affected by unfair administrative action to request reasons for such administrative action, and requires administrators to respond to such requests. (Administrative actions are presumed to have been taken without good cause where an administrator fails to respond within the prescribed period). Provides for procedures for the judicial review of administrative actions and remedies in proceedings for judicial review, including the prohibition of an administrator from acting in a particular manner, setting aside the administrative action, correcting the defective action, and ordering the administrator to pay compensation.
The Promotion of Equality and the Prevention of Unfair Discrimination Act 4 of 2000	Prohibits the state or any person from discriminating unfairly against any person on the grounds of race or gender through the denial of access to contractual opportunities for rendering services, or by failing to take steps to reasonably accommodate the needs of such persons.
Preferential Procurement Policy Framework Act 5 of 2000	Establishes the manner in which preferential procurement policies are to be implemented.
Broad-based Black Economic Empowerment Act 53 of 2003	Establishes a code of good practice to inform: • the development of qualification criteria for the issuing of licences or concessions, the sale of state-owned enterprises and for entering into partnerships with the private sector; and • the development and implementation of a preferential procurement policy.
Local government: Municipal Finance Management Act 56 of 2003	Establishes a regulatory framework for supply chain management which includes procurement in municipalities and municipal entities.
Prevention and Combating of Corrupt Activities, Act 12 of 2004	Makes corruption and related activities an offence; establishes a Register in order to place certain restrictions on persons and enterprises convicted of corrupt activities relating to tenders and contracts; and places a duty on certain persons holding a position of authority to report corrupt transactions.

Source: Watermeyer (2011)

Table 2: List of designated products

Designated Product	LC Threshold	Effective date
1. Rail Rolling Stock	65%	July 2012
2. Bus bodies	80%	July 2012
3. Canned/Processed vegetables	80%	July 2012
4. Textile, Clothing, Leather, and Footwear Sector	100%	July 2012
5. Solar Water heaters (collectors and storage tanks/geysers)	70%	July 2012
6. Set-top boxes	30%	September 2012
7. Certain Pharmaceutical products Per Tender	Per tender	November 2012
8. Furniture products	85%	November 2012
9. Electrical and Telecom Cables	90%	May 2013
10. Valves products and actuators	70%	February 2014
11. Working vessels	10-100%	August 2014
12. Residential Electricity Meters	50-70%	August 2014
13. Steel Conveyance Pipes	80-100%	September 2015
14. Powerline Hardware and Structures	100%	September 2015
15. Transformers and Shunt Reactors	10-100%	September 2015
16. Two Way Radio Terminals	60%	June 2016
17. Solar PV Components	70%	June 2016
18. Rail Signalling System	65%	June 2016
19. Wheelie Bins	100%	August 2016
20. Fire Fighting Vehicles	30%	November 2016
21. Steel Products and Components for Construction	100%	November 2016
22. Rail Perway (Track) Infrastructure	90%	November 2016
23. Pumps & Medium Voltage Motors	70%	December 2016
24. Plastic Pipes & Fittings	100%	August 2019
25. Air insulated MV Switchgear	50%	December 2019
26. Bulk Material Handling	85%	December 2019
27. Industrial Lead Acid Batteries	50%	December 2019

Source: dtic (2012)

Public Procurement Expenditure

Broadly, the public procurement policy literature recognises state owned enterprises (SOEs) as pivotal institutions in the realisation of public procurement goals (Edquist, Vonortas, Zabala-Iturriagagoitia, & Edler, 2015; Lember, Kattel, & Kalvet, 2013; Rolfstam, 2009). Notably across a number of developing economies, SOEs often control a substantial fraction of the country's industrial assets such sectors such as energy and water supply, telecommunication, and transportation infrastructure (Meissner, Sarpong, & Vonortas, 2019). The day-to-day operations and capital investment generally form a large part of SOEs procurement activities(Taylor & Yülek, 2012).

According to Stats SA (2022), South Africa's total purchases of goods and services for 2020/21 accounted for about 18% of total government expenses(R357 billion out of R1.98 trillion) Of this amount public sector accounted for about R198 billion (Figure 2). New construction works including waterworks, electricity, roads contributed the largest in expenditure. It is also indicated that public corporations accounted for the largest portion of the capital expenditure at about 36% of total national expenditure.

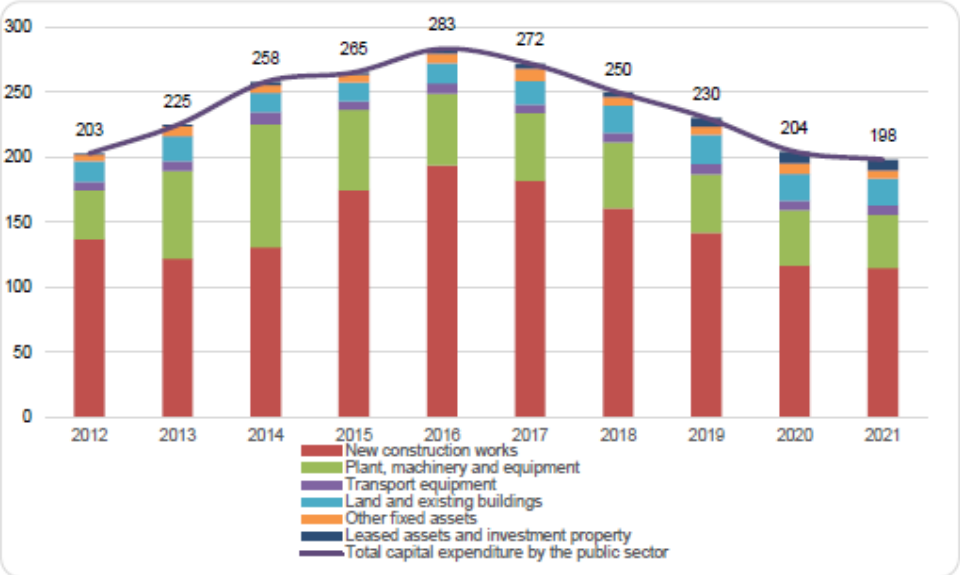

Figure 2:Capital Expenditure Trends by public sector institution between 2012 – 2021)

Source: Stats SA (2022)

With regards to public entities expenditure, Eskom reportedly accounts for largest share of the procurement budget in South Africa. According to Stats SA (2019), Eskom

alone accounts for over 25% of the country's public expenditure (Figure 3) Eskom's direct impact on the South African GDP because of its operational and capital expenditure is in the amount of 3%.(Eskom, 2018). Moreover, Eskom's expansion programme is one of the largest stimuli of the South African economy. According to Eskom (2019) over R226 billion worth of contracts were awarded and about R137 billion was committed to local content by suppliers.

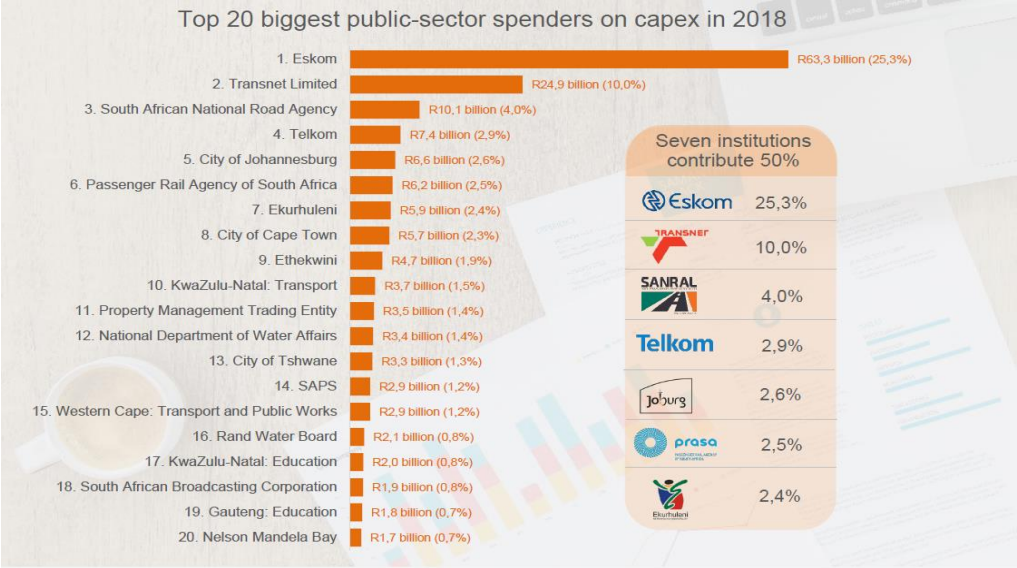

Figure 3: Top 20 biggest public sector spenders on capex in 2018

Source: Stats SA (2019)

Established in 1923, Eskom is South Africa's national electricity utility providing approximately 90% of country's electricity. The entity operates about 30 power stations of various technologies including: 15 coal fired power stations; from one (1) nuclear power station; two (2) conventional hydroelectric power stations; three (3) hydro pumped power storage schemes; four (4) non-dispatchable mini hydro stations; four (4) four (4) gas powered stations and one (1) windfarm.

The power stations have a generation capacity of over 52 000 Megawatt (MW) with coal fired power station generating over 44 000 MW of the total capacity. However, in late 2007 Eskom introduced nationwide loadshedding episodes as the demand for electricity exceeded supply. Lack of generation fleet maintenance is amongst one of the factors emphasised as the cause of loadshedding (Lenoke, 2017). Load shedding is conducted any time generation units are offline for maintenance and/or repairs. Due to its persistency, loadshedding continues to cause frustrations to electricity

consumers daily (Inglesi-Lotz, 2023) and damaging effects to the South African economy (Nowakowska & Tubis, 2015).

1.2.2 The valve manufacturing sector

The valve sector is regarded as one of the oldest industries in South Africa, dating back to the early 1900's. The sector has been well supported by private and public infrastructure projects and operations (VAMCOSA, 2019). Industrial valves are electromechanical devices used to regulate the flow and pressure of liquid, gas, powder, and slurry in piping system. Industrial valves are applied in various industries including power and energy industries, oil and gas industries, water and wastewater treatment, pulp, and paper industries as well as food and beverage industries

Rapid infrastructure development in support of industrialisation and urbanisation is one of the key factors driving the demand for industrial valves. In addition, the growing traction in renewable energy resources is anticipated to drive the market in the coming years (Research and Markets Ltd, 2023). According to Merchantec (2014), there are about 24 local valve manufacturing companies and about 60 importers and resellers in the South African valves market. However, according to the websites of the two valve manufacturing associations Valve and Actuator Manufacturers Cluster of South Africa (VAMCOSA) and South African Valve Manufacturing Association (SAMAVA) there are less than 12 South African owned valve manufacturers and about 10 supplies to Eskom (SACEEC, 2023; SAVAMA 2022). Most local valve manufactures have become importers or quasi-importers.

The South African trade statistics for the valve industry from the period of 2008 – 2020 is presented in Figure 4. From 2010, valve exports value increased from over R950 million to R2.1 billion in 2018. Similarly, during the same period, valve imports doubled from R2.5 billion to just below R6 billion in 2018. Correspondingly the trade deficit has been steadily widening which may signal higher rates of import to expand productive capacity. On the contrary it may also reflect a low preference for locally manufactured products.

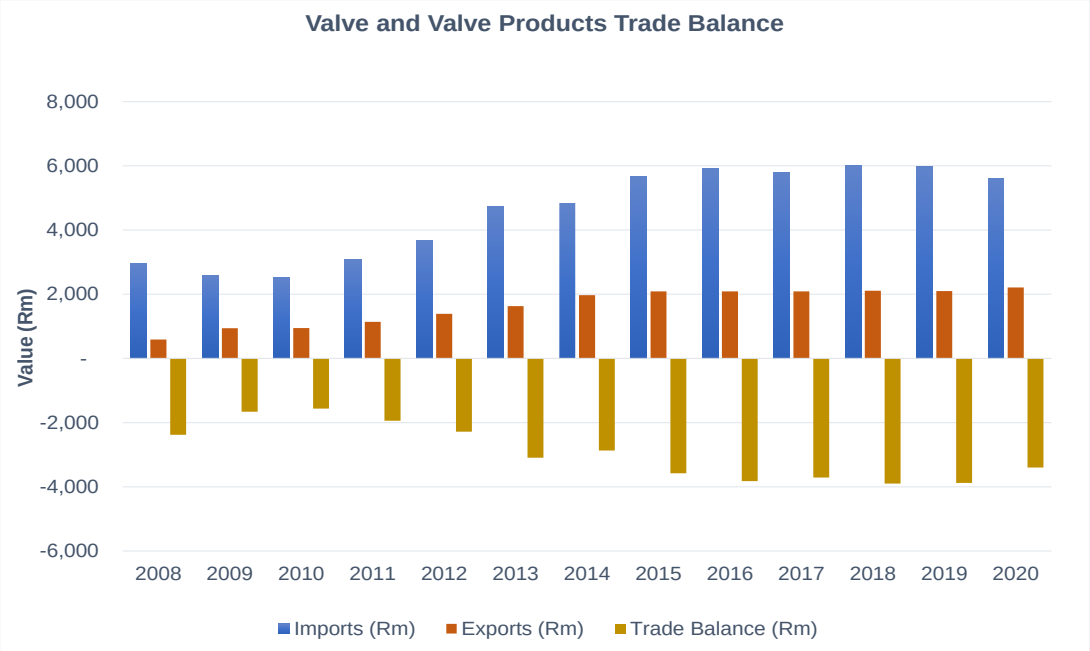

Figure 4: Valve and Valve Products Trade Balance

Source: Trade statistics, the dtic

Valves represent a significantly large operational and capital expenditure of Eskom's power generation activities. Eskom estimated that between 2012 -2027 over R3.5 billion will be spent on valves and valve spares. The procurement spent will emanate from construction of new power plants, maintenance and regular operational requirements (Eskom, 2013). In addition to Eskom operations, other SOEs in bulk water supply, gas and petroleum pipelines are considered to attract demand.

1.3 Research Problem

South African manufacturing firms are suggested to be perfoming poorly relative to comparator economies, in part due to lack of innovation and supporting policies. While there is a lack of systematic evidence on whether public procurement instruments to support local suppliers capabilities such as local content have delivered the desired effect, the sharp decline in local manufacturing and persitent trade deficit suggest that the current instrument may not be effective in strengthening local capabilities to withstand international competition (Stiglitz, Lin, & Patel, 2013).

While the South African valve manufacturing sector is considered to have built capabilities over the years on the back of strong mining and public infrastructure sector, very little technological innovation is occuring which in part has resulted to

drastic decline in competitiveness (Parker, 2020). Policy failure may be suggested as one the reasons for increased imports and a consistently widening trade deficit. Moreover, the sector is also suggested to have limited capabilties in the production of high pressure and temperature valves (Bhowan-Rajah, 2020) used in power generation which are considered to require advanced technological and organisational capabilities.

Recently, a number of economies including China, Brazil and India are showing increasing interest in introducing PPI as an expressed goal to boost innovation in local supplier firms. Given the explicit use of and better awareness of PPI, the literature so far is concentrated in the UK, USA and Europe (Crespi & Guarascio, 2019; Kundu, James, & Rigby, 2020). The potential use of PPI in other developing economies such as South Africa remains underexplored.

Furthermmore, the study employs an institutional- organisational perspective which is a missing link in innovation to understand in-depth policy proceses and challenges (Lember et al., 2013). In view of increased interest and perceived effects of PPI there is a need to test the appropriateness and implementation dynamics of PPI in different scenarios (Kundu et al., 2020).

1.4 Significance of the Study

The strategic potential of PPI is considered immense, especially in spurring innovation in domestic industries. It is documented that a significant amount of domestic industries depend on sales to the public sector and through public demand, firms can be motivated to innovate. Accordingly, raising the level of innovation effort in domestic manufacturing firms raises the opportunity for rapid industrialisation resulting in increased job opportunities and reduction in poverty and inequality that remain pervasive in South Africa.

Given the important role that public procurement plays in South Africa, it is relevant to develop knowledge on how it can be employed optimally. As Kattel and Lember (2010) argue, PPI is amongst one of the policy programmes developed economies of today used to gain dominance today's world markets. While there are risks and challenges associated with the implementation of PPI, the argument is that using public procurement as a mere act of procuring goods and services for delivering services countries such as South African would voluntarity forgo the opportunity of using one

of the most important demand side policy tools to promote innovation, industrial development, competetiveness and economic growth (Kattel & Lember, 2010).

This study thus intends to advance knowledge on how and under what conditions PPI can serve as policy instrument to stimulate innovation in South Africa. It is expected that the study will provide insight to government departments such as DPE, dtic, National Treasury; SOEs and local municipalities into how to effectively orientate public procurement towards fostering innovation and capability building of domestic industries.

1.5 Delimitations

i. The paper will be confined in the main to an analysis of public procurement of innovation which is considered a demand side policy. However, the study acknowledges the complementarity of demand and supply side policy instruments in catalysing innovation.

ii. While there are various types and uses of valves, the study is confined to industrial valves that are used in power generation plants.

iii. The study will also be limited to the local valve manufacturing companies established under the Companies' Act 71 of 2008 which are 100% owned by South African Citizens and operating in the Gauteng Province.

1.6 Assumptions

The following assumptions were made:

i. Public procurement accounts for a significant activity of the South African industrial valves manufacturing sector

ii. Innovation is not an explicit requirement for the supply of industrial valves to public sector organisations.

iii. Participants of interviews will provide honest and genuine responses

iv. Participants are knowledgeable on the subject of public procurement and innovation.

1.7 Key Definitions

- **Innovation:** new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process) (OECD, 2018)
- **Procuring Entities**: Government of public entities such as departments, municipalities, and state- owned enterprises (Bolton, 2017)
- **Public Procurement** : Purchasing of goods and services by state entity to fulfil public function
- **Public Procurement of Innovation** : purchasing activities carried out by public agencies that lead to all kinds of innovations such as introduction of new good or new method of production , the operating up of new market, the use of new source of supply of raw material or new ways of organising industries ((Moñux et al., 2016).

1.8 Research Questions

In addressing the problem outlined above, the study seeks to answer the following questions and the associated sub-questions.

1. What is the role of public procurement in stimulating innovation?
    a) What approaches have been used to position public procurement as a tool to stimulate innovation?
2. What are the conditional factors for effective implementation of public procurement of innovation?
    a) Is the South African regulatory and organisational landscape conducive to employing PPI as a tool to stimulate innovation in the valve manufacturing sector?
3. How has the innovative performance of local valve manufacturing sector improved since the sector was designated for public procurement?

1.9 Structure and Outline of The Research Report

The report is organised in six chapter and summary of the contents of each chapter are summarised as follows:

Chapter 1: Introduction

This Chapter provides a synopsis and lays the foundation for the study.

Chapter 2: Literature Review

This Chapter focuses on the theoretical and empirical analyses of the concepts of innovation and public procurement

Chapter 3: Research Methodology

This Chapter outlines the research methodology employed and approaches to analysing the data to test the questions posed in the study.

Chapter 4: Presentation of the data

This Chapter presents research findings from the content analysis and interview

Chapter 5 Analysis of the data

This Chapter analyses the and interprets research findings

Chapter 6: Conclusions and Recommendation

This chapter summarises the research study and draws conclusion from its findings

1.10 Conclusion

This Chapter comprises the introduction and background of this study which highlights the developments around the concept public procurement of innovation It also introduces the focus of the study which is the industrial valves sector. It also focuses on the problem statement, the aim of the study and the questions that research attempt to resolve.

2 CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The purpose of the chapter is to set the context of the phenomena of PPI by reviewing the relevant concepts and issues in the literature. To achieve a coherent review of the literature, the scope and content of the literature is organised as follows:

First the relevant theories of innovation are explored in relation to economic growth. How innovation occurs and spreads across economies is discussed with particular focus on role of the demand in the innovation process. The concept of public procurement as a policy instrument and its role in facilitating innovation is then examined. Aspects pertaining to the definition, typologies, and favourable conditions to realise public procurement of innovation effects are reviewed.

The Wits database and Google Scholar were used to search for literature sources from 2000. Mainly Science Direct, Oxford Journals, ResearchGate, Web of Science and Wiley were used to find resources. Keywords such as public procurement, innovation system, and demand side policies were used for searching the sources. List of references obtained from the articles; sections of the books were also used to identify additional resources for this research work.

2.2 Understanding innovation

The concept of innovation has evolved over time and different unique spins have surfaced to what is considered innovation. The Oslo Manual (OECD, 2018) which seeks, amongst others to provide a conceptual framework and general definitions of innovation applicable across sectors in the economy, defines innovation as the new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit.

Whilst the previous version of the Oslo Manuals classified innovation into four categories namely, product, process, organisational and market innovation, the 2018 Oslo Manual consolidates and categorises innovation into product and business process innovation, where the latter concern innovation in the different functions of a

firm to support production and bring products to the market. The different functions include marketing and sales; information and communication systems, administration, and management; and product and business process development. Essentially innovation is not only technological but also non-technological.

While newness is central to characterisation of innovation, the conceptualisation of innovation is that it can also arise from recombination of existing elements(Salter & Alexy, 2014). Innovation can emerge from adoption, imitation, adaptation of existing non- frontier technologies (Cirera & Maloney, 2017). Critically important is that the introduction of pre-existing products of process must lead to improved efficiency, better working practices and intensification of the innovation process thereby creating value for the local firm or setting (Kotsemir, Abroskin, & Meissner, 2013).

Accordingly, innovations can be new to a person, an organisation, a market or industry or country or world (Nooteboom & Stam, 2008). Activities such as purchasing, imitating, or modifying technology already in use by other organisation but introduced in a new local setting are thus considered as innovation in that setting. The emphasis placed is that the product or business process innovation must have one or more characteristics that are significantly different from those previously offered or used by the firm.

One of the distinctions generally made in the literature is between incremental (“minor”) and radical (“major”) innovations. Radical innovation is often related with the creation of new industries, introduction of new products and processes, whereas incremental innovation involves improvement or adaptation of existing processes, products and services, organization, or method (Verspagen, 2001). Incremental innovation involves improvement or adaptation of current technology or radical innovations not necessarily based on revolutionary change. Along with already established types of innovation, a broad range of innovation types can be found in the literature and are generally classified in terms dichotomies in the forms of strong/weak, genuine/renovation and everyday/disruptive innovation (Meissner, Polt, & Vonortas, 2017).

2.3 Theoretical Frameworks

2.3.1 Innovation and economic growth

It is well established that innovation is at the heart of economic and social development (Lema, Kraemer-Mbula, & Rakas, 2021). Although innovation is rarely an end goal, but a means to achieve broader goals like economic growth and increased employment to name a few. Lundvall (2013) posits that Joseph Schumpeter (1883 - 1950) is generally seen as the founder of modern innovation research dating to the early twentieth century. Schumpeter asserted that innovation is an essential driver of competitiveness and major mechanism behind economic dynamics (Nicolaides, 2014).

Subsequently, the association between innovation and economic progress has been studied extensively (Kumar & Sundarraj, 2018). The contributions of Abramowitz (1956), Solow (1956,1957) and Romer (1986, 1990) amongst others provided early empirical evidence that there exist large differences in cross country growth rates and per capita income which could not be explained through increases in labour and capital but through innovation and technological change. (Fagerberg, Martin, & Andersen, 2013; Kalyuzhnova, Nygaard, Omarov, & Saparbayev, 2016).

Thus, innovation not only contributes strongly to growth performance over time, but also plays a major role in explaining differences in income and productivity levels across countries (OECD, 2010). On some accounts, Jimenez (2019) argues that productivity or technology differences are held to explain up to between 60% and 90% of the growth differences and more than 90% of the difference in levels of income between poor and rich countries. Accordingly, it is observed that innovation is highly concentrated in few advanced economies while the developing countries including Africa are lagging.

Over the years various global organisations have developed indices to assess geographies of innovation and establish the level of innovative capacity across economies. One such tool is the Global Innovation Index (GII) which sets to assess the global innovation activities of 134 countries representing over 97% of world GDP (Sohn, Kim, & Jeon, 2015). According to the GII 2021 Report (WIPO, 2021), innovation activities remain concentrated in European economies and these economies continue to record high incomes. In the past decades though , Asian economies such as Singapore, Japan and China have made notable advances to establish themselves

amongst global innovation leaders occupying different positions within the top 30 countries. With respect to African countries, Mauritius and South Africa are suggested to be in more advanced positions compared to other African countries occupying at 52nd and 61st positions respectively. Notably the report assert with the exception of few African countries, the majority of African countries including South Africa have not made significant advances in moving up the rank for a long time.

Some authors such as Ghazinoory, Riahi, Azar, and Miremadi (2014) and Sohn et al. (2015) criticise the relevance of these types of indices to features of innovation dynamics in developing economies. While the existence of such gaps is not denied, the authors argue that developing economies have contextually different features from developed economies including macroeconomic uncertainty, poor physical infrastructure, institutional thickness, lack of access to new technologies, lack of demand for innovation, skilled manpower and many other obstacles that hinder the innovation process. Therefore some protocols for collecting data may not be compatible to the science, technology and innovation systems found in developing economies (Goedhuys, Hollanders, & Mohnen, 2015).

Despite the shortcoming of these indices and systematic elements that may be contributing to the sluggish economic growth observed in African economies for example, the general conclusion is that growth patterns continue to be skewed, leaning towards economies with higher innovative performance. Although innovation is not in itself an end result, it is well recognised that when innovation is absent or falls behind, business and nations languish and lag in economic advancement and prosperity (Kumar & Sundarraj, 2018).

2.3.2 Innovation diffusion and catch-up

Given the costly and risky nature of undertaking innovation activities, it is suggested that technological progress in developing economies mainly occurs through adoption and adaptation of pre-existing but new to the market, or new to the firm technologies; and through the spread of technologies across firms, individuals and the public sector within the country (World Bank 2008). On the other hand, in more advanced economies innovation and invention underpin technological progress.

The diffusion of innovation model popularised by Everett Rogers (1962) is generally used to explain technological adoption and diffusion dynamics (Fagerberg, Martin, &

Andersen, 2013). Hall and Khan (2003) contend that rather than invention or innovation, diffusion of innovation ultimately determines the speed of economic growth and rate of change of productivity. For developing countries, exploitation and diffusion of existing technologies are argued to be important for productivity growth and for further innovation (Matsunaga, 2019).

Notably, Li and Georghiou (2016) assert that in the context of advanced economies, innovation is frequently regarded as the creation of goods or services of socioeconomic significance that are non- existent; whereas in developing economies the process of innovation is associated with the intention to catch up with advanced economies, and not necessarily the creation of cutting edge, new to the world innovations. The innovation process (depicted in Figure 5) in developing economies is thus an iterative and complex process which is fundamentally different from that of developed economies (Kraemer-Mbula & Wamae, 2010).

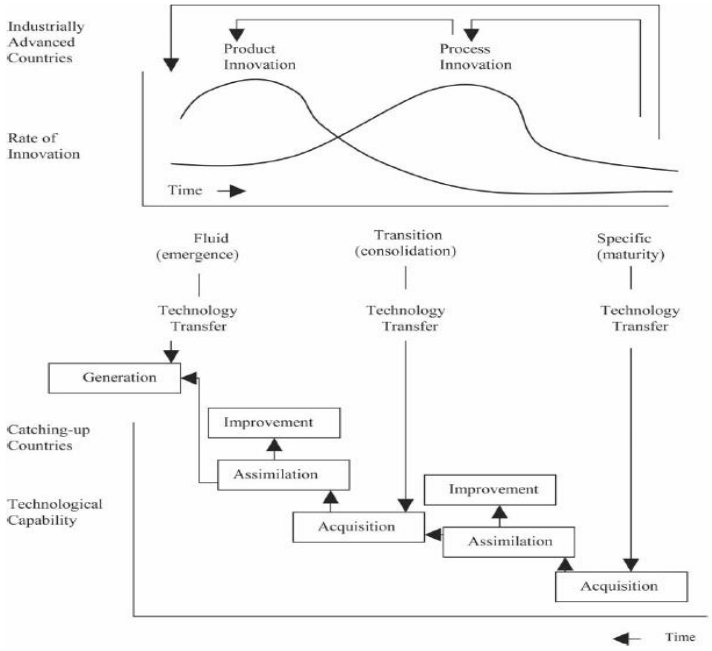

Figure 5: Innovation model in developing economies

Source: Kim (1999)

A central finding in the diffusion and catch-up literature is that developing economies tend to face multiple systems and potential failures in their innovation capability building process. A large literature documents the role of the state in achieving the desired level of development (Amsden, 1992; Basu et al., 2009; Chang, Hauge, & Irfan, 2016; Cimoli & Dosi, 2016; Lall, 2000; Wade, 2019). It is argued that

governments have played a role in promoting innovation, at times directly supporting the development of technologies or more indirectly by creating a climate favourable to innovation through various incentives or laws ((WBI, 2010). Strong and appropriate public policies, effective institutions, and sufficient human and financial resources are some of the important factors considered to accelerate the diffusion of innovation and promote firms' innovation capability building (Matsunaga, 2019; Perkins & Neumayer, 2005; Salazar-Xirinachs, Nübler, & Kozul-Wright, 2014; Zanello, Fu, Mohnen, & Ventresca, 2016).

Technological life cycle

It is also argued that innovation follows a certain developmental life cycle. This is generally referred to as technology life cycle (TLC) (Lin, Liu, Guo, & Meyer, 2021). The most popular approach used to describe TLC is by an S-curve shape outlining the stages of technology life cycle (TLC) namely: emergence, growth, maturity; and decline (Lin et al., 2021). The S-curve depicts evolution of technological innovation in terms cumulative diffusion and technical improvement over time (Kalthaus, 2020).

In summary, the cyclical TLC commences with breakthrough innovation affecting either processes or products (Taylor & Taylor, 2012). The classes of technology that represent discontinuity are associated with breakthrough or radical innovations. This is followed by a phase in which a dominant design emerges, and a main trajectory is established (Kalthaus, 2020). Once the dominant design become an industry standard and is widely adopted the nature of innovation is suggested to change from product to process development driven by the ability of innovating firms to appropriate returns from their investment in innovation (Adner & Levinthal, 2001). Competitiveness becomes entirely based on incremental improvement and economies of scale. The TLC model is depicted in Figure 6.

Accordingly, Lin et al. (2021). argue that for countries to develop appropriate interventions, it is critical to determine where in the current lifecycle technologies are situated. This is because different knowledge base and knowledge dynamics take place along the TLC (Kalthaus, 2020). The understanding of what different knowledge matter in different stages of technology is crucial for policy making to implement relevant policies that support the learning requirement of relevant actors.

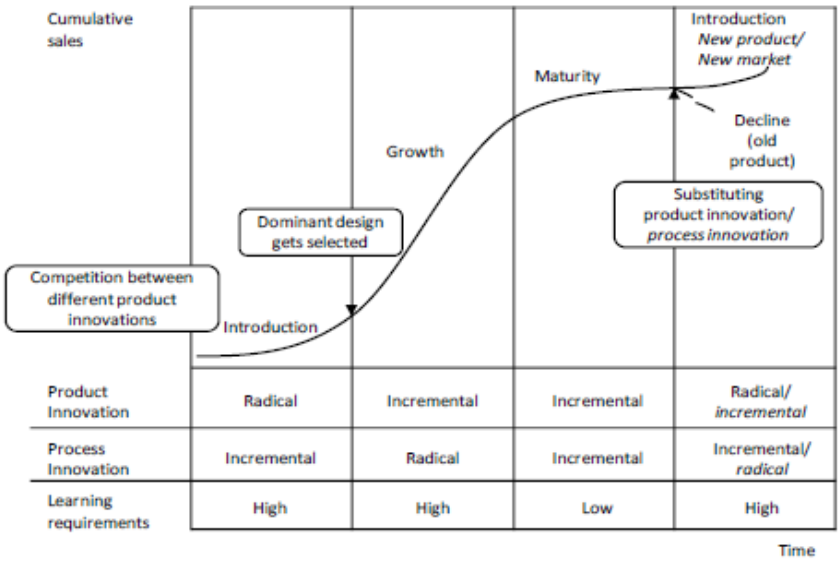

Figure 6:Types of innovation and technology life cycle

Source: Li (2013)

2.3.3 Systems of innovation

While innovations are primarily carried out by firms, the academic view is that innovation does not occur in isolation but it is an outcome of collaboration of interconnected economic agents involved in generation, utilisation and diffusion of knowledge and innovation (Ndicu, Ngui, & Barasa, 2023). This thinking follows an evolutionary economic perspective (Lundvall, Joseph, Chaminade, & Vang, 2009; Nelson, 1985) which considers innovation as an the outcome of an interactive, cumulative and context dependent learning processes that involves a number of actors (organisation) whose interaction are themselves influenced by institutions (formal and informal rules) (Chicot, 2017).

The concept of innovation systems has been studied extensively with various authors defining an innovation system from different perspective (Lundvall et al. (2009). Adopting the definition advanced by Borrás and Edquist (2019), innovation system is understood of being made up of all important economic, social, political organisational, institutional and other factors that influence the development and diffusion of innovation, as well as the innovations themselves. Accordingly, innovation system may be national, regional, or sectoral. An exemplary of an innovation system is shown in Figure 7.

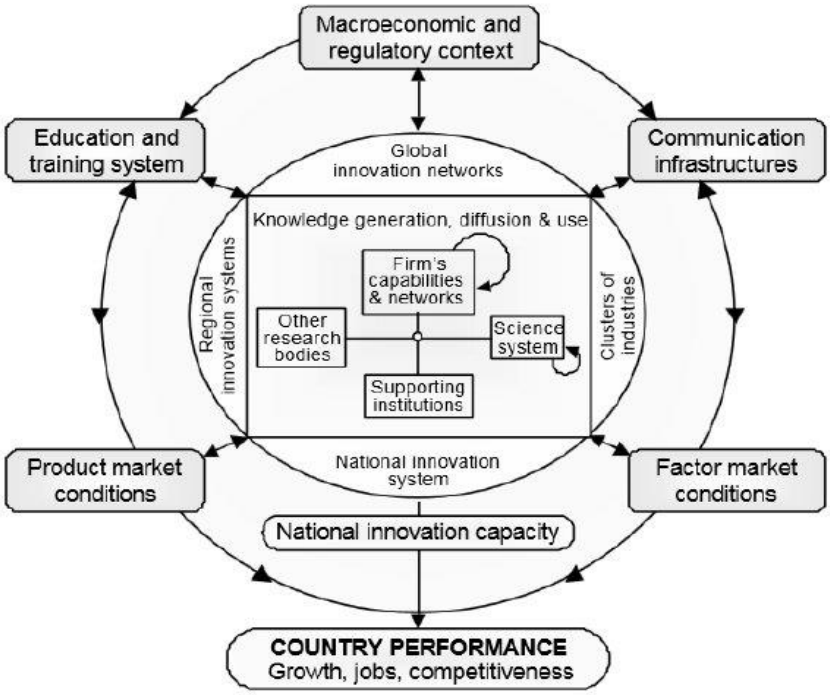

Figure 7: An example of an innovation system

Source: OECD (1999)

In the main the innovation system is characterised by components (actors, infrastructure, and policies), institutions and interactions between them. Institutions, including laws, regulations standards and norms as the 'rules of the game' to provide stability, set preconditions, and structure the interactions between various aspects of the system (Li, 2015). Notably, Borrás and Edquist (2019) contend that earlier studies strongly focussed on dynamics relating to the component dimensions of the IS, i.e., organisations and institutions.

However, critically important is understanding what takes place within the innovation system that influences the development and diffusion of innovation. Interactive learning amongst actors where functions such as articulation of quality requirements with regards to new products, competence building, resource mobilisation and formation of markets as well as an enabling environment are crucial in the development and diffusion of innovation (Edler & Georghiou, 2007; Edquist, 2010, 2011; Uyarra et al., 2014).

The IS approach also underscores the fact that innovation processes are influenced by the demand side activities much more than earlier approaches which characterised innovation as a linear causal chain starting from basic research, applied research,

development works resulting in new products and processes (Edquist et al., 2015). This was a supply push view (Edquist et al., 2015). However, it is widely acknowledged that innovation hardly occurs in a linear manner. As such the IS approach places great emphasis on integrating demand side factors in the innovation process rather than focussing solely on the supply side. This provides a holistic approach in understanding innovation processes.

Importantly, the literature acknowledges that each innovation system differs due to different contextual factors (Edquist, 2010). It follows that innovation systems in developing countries are characterised by weak and fragmented interactions among economic agents, low levels of science and technology skills, less effective governments, less diversified and fragmented markets and low investments in innovation amongst others (Egbetokun, Adekemi, Oluwadare, Ajao, & Jegede, 2017; Lundvall et al., 2009).

2.3.4 Demand and innovation

The importance of demand conditions in driving the rate and direction of technological change and innovation has been widely recognised since the 1960s (Dai, Li, & Chen, 2021; Edquist et al., 2015). However, Crespi and Guarascio (2019) argue that the role of demand side factors have generally been understated in both economic and government policy. Accordingly debates between the influence of technology push and demand pull factors have persisted in attempts to explain innovation (Dai et al., 2021).

The basic argument of the demand pull effect is that changes in the market conditions create opportunities for firms to invest in innovation to satisfy unmet needs(Edler, Georghiou, Blind, & Uyarra, 2012). Furthermore, Crespi and Guarascio (2019) contend that demand conditions are considered to crucially affect the desirability and realisation of inventions, while expected profitability resulting from the expansion of market demand represents the key stimulus to which inventive activities tend to respond. Thus, shifts in relative factor prices, geographic variation in demand, as well as identification of latent demand and potential new market all affect the size of payoff of investment in innovation (Nemet, 2009).

Public sector demand is one of the popular demand mechanism employed to spur innovation as observed in the emergence of computers, semiconductors and commercial aircraft industries (Edler & Uyarra, 2013). Public sector demand can pull

innovation by guaranteeing a significant level of production and a reduction in uncertainty that allows firms to form economies of scale and technological investment and ensures larger profits. Notably, both the structure, size and sophistication of public demand have an influence on innovation (Edler & Georghiou, 2007; Uyarra & Flanagan, 2010).

2.3.5 Policy instruments for facilitating innovation

In terms of the types of policy instruments aimed at facilitating innovation, a distinction is made between supply orientated ("technology push) and demand oriented instruments (demand pull) (Edler & Georghiou, 2007; Lember et al., 2013). Supply orientated measures seek to create incentives among firms to innovate by reducing the costs and risks of innovation, essentially, inputs to innovation. These include equity support, grants for R&D, support for training, and mobility.

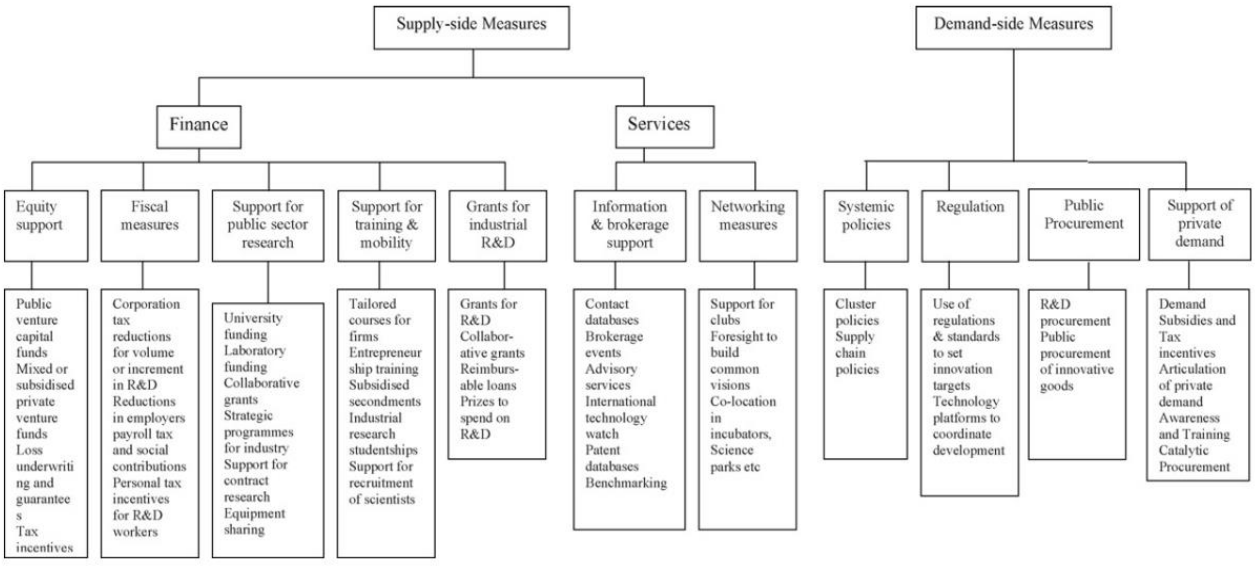

Figure 8: Taxonomy of innovation policy tools

Source: Edler and Georghiou (2007)

Demand orientated measures on the other hand seek to increase demand for innovations by improving conditions for their uptake or by improving the articulation of demand to spur innovation and facilitate innovation (Cirera, Frias, Hill, & Li, 2020). These are considered to encourage innovation by creating demand and markets for the output of innovation (Crespi & Guarascio, 2019). Georghiou, Edler, Uyarra, and

Yeow (2014) emphasise that at the core demand has two primary roles; first increase incentives for firms to innovate by making the return to innovating organisation sufficiently large or more certain such that it is motivated to develop the innovation, and secondly, to make buyers more willing and able to demand and absorb innovation. These demand pull initiatives can be grouped into systemic policies, regulation, public procurement and support of private demand (Edler & Georghiou, 2007). Examples of policy instruments are outlined in Figure 8.

The literature on innovation policy acknowledges that neither supply nor demand factors by themselves are likely to be optimally effective in isolation (OECD, 2014). But rather operate alongside or in conjunction with each other to stimulate innovations (Edler et al., 2012). Accordingly, the notion of policy mix has gained popularity among the innovation policy communities over the past two decades (Borrás & Edquist, 2013; Meissner & Kergroach, 2021) as recognition of this essential interaction between supply and demand interventions. Without disregarding the importance of supply side measures, the central concern in this study is the use of public procurement as a lever to drive technological development and innovation.

2.3.6 Rationale for innovation policies

Against the global recognition of the role of innovation in encouraging economic growth as well as the potential to address wider grand challenges (UNIDO, 2016), the importance of government intervention, particularly in creating favourable business environment and a providing a basis for innovation to flourish is well established in the literature (Dolfsma & Seo, 2013). Numerous ways to conceptualise and justify government intervention in the innovation process have been developed and adopted in recent years (Aalto & Gustafsson, 2020). The dominant rationale outlined in the literature includes the following:

- **Market failure** rationale which relates to information and appropriation asymmetry (Edler, Gök, Cunningham, & Shapira, 2016). In this view, policy intervention seeks to correct for market imperfection (Edler et al., 2016).
- **System failure** rationale relating to poor interaction and lack of coordination in the generation of innovation and knowledge. Fundamentally, the system rationale relates to the perspective that innovation entails risk, uncertainty, occurs in many ways and encompasses different actors, learning

processes, linkages, knowledge bases, institutions, and organisations. In the absence of government intervention, the possibilities of failure in the innovation process tend to be high (OECD, 2010).

- **Capability failure** is another fundamental rationale for government intervention. Broadly, capability failure relates to the inability of firms to learn, lack of flexibility inside the firm and/or resources enabling them to adapt to changes (Carayannis, Varblane, & Roolaht, 2012). For example Lee (2013) contend that developing economies do not have capabilities that lead to innovation in that they tend to rely on external technologies and hardly conduct in-house R&D which they consider uncertain endeavour with uncertain returns (Lee, 2013). This is considered as one of the reason many economies which are unable to achieve transformation to higher levels of economic growth, for example from imitation to innovation phase. In this case, argue that, Lee, Juma, and Mathews (2014) effective forms of government activism are needed not only in the provision of R&D funds but also in directly supporting access to knowledge and learning, diffusion of new technologies to capabilities of firms and sectors beyond formal R&D (Malerba & Lee, 2020).
- **Mission orientated** perspective. The mission orientated perspective argues that governments can influence the development and the direction of innovation through supporting strategic projects that are geared to solving "grand challenges" such as global warming, tightening of suppliers of energy water and food, public health or security amongst others (Edquist et al., 2015).
- **Policy outcome** rationale arising from economic and societal benefits from positive spillovers effects to firms, industries, regions, and economies. In this context public sector buyers aim to maximise economic, environmental, and social value of all public spending for citizens (Adjei‐Bamfo et al., 2023).

2.3.7 Public Procurement

In simple terms, public procurement is the commonly understood as the purchase of necessary goods and services to undertake government activities. In addition, public

procurement has been used to fulfil additional goals of creating employment; enhancing capabilities and competitiveness of certain industrial sectors encouraging innovation, shielding domestic industry against foreign competition; alleviating regional disparities; and furtherance of social and developmental agenda (Hoekman & Sanfilippo, 2018; Tiryakioğlu & Yülek, 2015; Watermeyer, 2012).

In terms of effects on innovation, the literature provides numerous explanations on the role of procurement (Edler et al., 2005). For example Uyarra and Flanagan (2010) outline that directly public procurement influences innovation in three ways: firstly, through the willingness to absorb the cost of innovation to drive certain political tasks or missions which generally involves higher cost at the beginning of life cycle of innovation and; secondly being an end user of the innovation; thirdly through provision of an environment to experiment with new product where proven option does not address the requirements (Kattel & Lember, 2010; Uyarra & Flanagan, 2010).

Indirectly, public organisations can stimulate innovation by influencing the size and structure of the certain markets, providing an incentives to invest in innovation and also R&D; reducing market risks and generating early economies of scale; influencing or promoting convergence to as a single standard; and also promoting the emergence of consolidation of markets, for example through effecting competition amongst bidding firms on the basis of performance and quality characteristics (Uyarra & Flanagan, 2010).

Public procurement as policy instrument

The economic significance of public procurement has made it an object of interest in its potential use as innovation policy tool (Appelt & Galindo-Rueda, 2016). At the same time public procurement has been considered an important industrial policy instrument. Public procurement from industrial policy can be classified into various categories such as offset, domestic input requirement, SME policies and forward purchasing commitment and locality rules ((Tiryakioğlu & Yülek, 2015).

In the domain of innovation policy wherein the ultimate objective is to mitigate problems impeding the innovation process (Borrás & Edquist, 2013), public procurement is increasingly recognised as a tool to address transversal failures relating to innovation processes (Chicot & Matt, 2018). These transversal failures relate to supply, demand and user-producer interaction failures (Chicot & Matt, 2018). Uyarra and Flanagan

(2010) contend that public procurement is in fact a multi-objective policy tool that in addition to ensuring the delivery of government services can enable policymakers to take advantage of the state's purchasing power to address various socio-economic challenges and national competitiveness.

2.4 Public Procurement of Innovation

2.4.1 Concept of Public Procurement of Innovation

Public procurement as an instrument to stimulate innovation has attracted attention across economies. However some ambiguity prevails on what public procurement of innovation entails (Rolfstam, 2013). Typically, two types of public procurement are distinguished: (i) regular procurement which is the purchase of standard, off-the-shelf products; and (ii) procurement of innovation (Edquist et al., 2015; Obwegeser & Müller, 2018). The traditional characterisation of regular procurement is that of procurement of items such stationery, fuel, and mature products where innovation is not a requirement, factors such as price, quality and performance are taken into consideration when the supplier is selected. Public procurement of innovation (PPI) on the other hand is considered procurement of goods and services that are not available in the market but that might be developed in a reasonable period of time (Edquist et al., 2015)

However, Lenderink, Halman, and Voordijk (2022) argue that while regular procurement innovation is not necessarily aimed at delivering innovation, innovation may come about as a by-product. Rolfstam, Phillips, and Bakker (2011) contend that from a diffusion of innovation point of view, off the shelf, mature product in one social system might be considered an innovation in another. Thus, from adopter's perspective, some off the shelf products may be considered as PPI. These perspectives present complexity in distinguishing PPI from regular procurement, particularly in the context of catching up economies as their innovation process often involves acquisition and adaptation of matured products from advanced economies.

Furthermore, the literature draws a distinction between procurement along the technology lifecycle. These are differentiation typically referred to pre-commercial procurement (PCP) or procurement of R&D; and public procurement of innovation (PPI) which refers to procurement during commercial stage (Cirera et al., 2020). The former is related to the procurement of expected research results and is a matter of

direct public R&D investment, but not actual product development. (Edquist et al., 2015). Edquist et al. (2015) contend that because PCP does not involve the purchase of units of a non-existent product, in the strictest sense PCP is not considered a form of PPI since products must be commercialised to constitute an innovation. The difference between PCP and PPI lies in different commercialisation stages (Cirera et al., 2020). PCP is rather more of an R&D funding tool geared toward specific goals defined by public needs (Cirera et al., 2020).

Often public procurement *fo*r innovation (PPI or PPfI) or public technology procurement (PTP) and public procurement *of* innovation (PPI or PPoI) are used interchangeably. The former aims at deliberately stimulating markets and assumes innovation takes place before a certain public function can be fulfilled. The latter refers to public procurement that attempts to open up innovation possibilities without targeting new products.(Lember et al., 2013). A summary of recent conceptualisation of PPI is provided Lenderink et al. (2022) and outlined Table 3.

Accordingly, there has been a broadening of the definition of PPI in alignment with the widely accepted understanding of innovation as defined in Section 2.3. Uyarra and Flanagan (2010) argue that the narrow definition which refers to procurement of product that do not exist yet is biased towards radical innovations and pays little attention to other categories of innovation. The broad definition attributes public procurement a broader role in inducing innovation and stresses that innovation is not limited to only new products but is also about new capabilities (Lember et al., 2013).

Therefore, the study adopts the second definition PPI defined by Rolfstam (2013) and Moñux et al. (2016) as purchasing activities carried out by public agencies that lead to all kinds of innovations such as introduction of new good or new method of production; opening up of new market, use of new source of supply of raw material or new ways of organising industries.

Table 3: Various Conceptualisation of PPI

Term	Source	Concept	Alternative or strongly related terms
Demand-side innovation policies	Edler and Georghiou (2007)	All public measures to induce innovations and/or speed up diffusion of innovations through increasing the demand for innovations, defining new functional requirement for products and services or better articulating demand	
Public procurement	Uyarra and Flanagan (2010)	The acquisition of goods and services by government or public sector organisations	Government procurement, public sector purchasing
Public Procurement for innovation (PPI)	Edquist, Vonortas, and Zabala-Iturriagagoitia (2015), Edquist and Zabala-Iturriagagoitia (2012)	Occurs when a public organisation places an order for the fulfilment of certain functions within a reasonable period of time (through a new product, service, or system)	Public technology procurement (PTP), Innovation Procurement
	OECD (2017)	Any kind of public procurement practice (pre-commercial or commercial) that is intended to stimulate innovation through research and development and the market uptake of innovative products and procurement	
Public procurement of innovation (PPI/PPoI)	Rolfstam (2013, 2012)	Purchasing activities carried out by public agencies that lead to innovation	
	Yeow and Edler (2012)	The commissioning and procuring of goods or services that are new to the purchasing organisation and enable a novel service to citizens or enable a more efficient or effective delivery of that service	
	Edler and Yeow (2016)	The purchase of a solution that is novel to the buying organisation in order to serve an organisational need	
Public procurement of innovative solutions (PPI)	European Commission (2014b)	Procurement where contracting authorities act as a launch customer for innovative goods or services which are not yet available on a largescale commercial basis, and may include conformance testing	
Pre-commercial procurement (PCP)	European Commission (2008), Edquist and Zabala-Iturriagagoitia (2015)	An approach to procuring R&D services, one which involves risk– benefit sharing at market conditions but excludes state aid	Small business innovation research programme (SBIR), Small business research initiative (SBRI)
Innovation friendly public procurement	Uyarra and Flanagan (2010), OECD (2011)	Conventional (regular) procurement practices that favour (or at least do not hinder) innovative solutions	
Innovative procurement	Kautsch, Lichoń, and Whyles (2015)	Buying something in an innovative way – i.e. in a way that is not usual for the situation in which the procurement is being undertaken	Innovative public procurement

SourceLenderink et al. (2022)

2.4.2 PPI Typologies and Dichotomies

Several authors have developed different typologies in order to understand the functioning systems of PPI from different perspectives (see Table 5). For example Edler and Georghiou (2007) distinguish between two forms of PPI in relation to strategic intent: (i) general and (ii) strategic PPI. In the latter, public procurement is arranged such that innovation becomes an explicit criterion in the call for tender and assessment. The former occurs when demand for certain technologies, products or services is encouraged in the form of an additional criterion in tenders.

Regarding the degree of novelty associated with PPI, a distinction is made between trigger demand which relates to the procurement of solutions that do not exist; and responsive demand, relating to the procurement of goods or services that exist in the marketplace, but are new for the organisation (Uyarra, 2016). Similarly Edquist and Zabala-Iturriagagoitia (2012) categorise PPI into three in relation to type of innovation: pre- commercial, developmental/radical or adaptive/radical PPI depending on degree of innovativeness of the innovation process.

Chicot and Matt (2018) defines PPI according to broad categories of failures that PPI might resolve. These are related to the three main types of failures: demand, supply, and user- producer failures in the innovation process. Four categories are proposed (i) transformational (encouraging the development and diffusion of innovation), (ii) diffusive (accelerating the uptake of products and services without targeting any supply side failure);(iii) developmental (does not aim to ease and accelerate wider diffusion of innovation, exclusively aimed at improving of public services) and (iv) adaptive/ absorptive (the intended innovation consist mainly of the introduction into the public sector of an existing technology not previously exploited in the sector).

Table 4: Classification of PPI typologies

Developed by	Typology according to	Typological categories
Rothwell and Zegveld (1981)	Market structure	Monopsony Polypsony Oligopsony
Edquist and Hommen (2000)	Type of innovation (technology life cycle, TLC)	Developmental Adaptive
	End users	Procurers as end-users Procurers as catalysts

Developed by	Typology according to	Typological categories
	Market structure	Monopsony Polypsony Oligopsony
Edler et al. (2005)	Strategic nature	General Strategic
	End users	Direct Cooperative Catalytic
	Market development process	Market creation Market escalation Market consolidation
Edler and Georghiou (2007)	End users	State in connection with private users
	Strategic nature	General Strategic
	Commercialization stage	Commercial Pre-commercial
Hommen and Rolfstam (2009)	End users	Direct Cooperative Catalytic
	Market development process	Early (Fluid) Middle (Transitory) Late (Specific)
Uyarra and Flanagan (2010)	Nature of procured items	Adapted procurement Technological procurement Experimental procurement Efficient procurement
Rolfstam (2012b)	End users	Direct Cooperative Catalytic Distributed
	Market development process	Initiation (Development) Escalation (Adaption) Consolidation (Standardization) Destruction (Removal)
Edquist and Zabala-Iturriagagoitia (2012)	Nature of innovation	Pre commercial Adaptive Developmental
Chicot and Matt (2018)	Innovation process failure to be addressed	Transformational Diffusive Developmental Absorptive

Source Li (2013), Edquist and Zabala-Iturriagagoitia (2012),Chicot and Matt (2018)

Government market position

In terms of government market position , Rothwell and Zegveld (1981) as cited by Edquist and Hommen (2000), distinguish three basic types of demand (market)

structures with which PPI might occur: These market types which refer to different configurations of demand (rather than supply), are: (i) monopsony, which refers to the situation when there is only a single buyer in the market;(ii) oligopsony type of buyer market in which there is a fairly high degree of concentration , that is few buyers, and (iii) polypsony referring to a diffuse market in which there are many buyers with no large shares.

Accordingly, Edquist and Hommen (2000) argue that in a situation of polypsony, PPI is often an impossible practicality because demand articulation is difficult and bargaining power is limited. Oligopsony on the other hand, with all buyers having fairly high levels of buying power, can offer incentives to firm to engage in competition based on innovation. The authors further point out that monopsony offers strong concentration of buying power or demand pull. However, one of the main disadvantages of this demand structures is that in later stage or mature stages of development, the interactions of buyers and suppliers tend to take on a high routine character. Product innovation is abandoned in favour of standardisation and price reduction. On the other hand, monopsony power can be used to contain product/ technology price levels(Chiappinelli, Giuffrida, & Spagnolo, 2023) and are likely to form a critical mass to facilitate innovation break throughs (Li, 2013)

Edler et al. (2005) suggest that PPI can also lead to market development in line with corresponding phases in technology life cycle. The authors distinguish three different stages where PPI can influence market development. First is in the market initiation stage. At this stage PPI can contribute by facilitating the expression of new demand by users, assist innovation to reduce uncertainties relative to demand that characterises the creation of novelty and improve the general context condition to make it more favourable for the origination of new knowledge (Chicot, 2017). Second is the market escalation stage where market requires further development in order for technology to be diffused and succeed commercially (Edler et al., 2005).

The third stage is the market consolidation stage. This may occur where standardised criteria or technical specification for technology to be used in the public sector lead to similar developments in the private sector (Edler et al., 2005). Rolfstam (2013) introduces the fourth stage, destruction, which relates to the end of the product in the technology life cycle. Destruction takes into account that innovation often associated with some kind of destruction or replacement of what currently exists. Rather than

being perceived as problem, destruction can help remove undesired components or products and introduce new desired products.(Rolfstam, 2013).

2.4.3 Rationale for PPI

Three rationales are commonly put forward in favour of PPI (Kundu et al., 2020). First is the buyer and user rationale, where government engages as a (first) user of a product or service. Because the significant purchasing power and potential economies of scale, the public sector is in a position to shape and enlarge the market for certain goods thus providing an incentive to innovate (Edler & Georghiou, 2007; Uyarra & Flanagan, 2010). Firms that may benefit from economies of scale include those that are characterised by heavy R&D requirements, scale dependent production, large generational leaps in technology, or high level of uncertainty.

The second type of rationale is the intention to resolve market and system failure. Accordingly Edler and Georghiou (2007) identify asymmetric information as one of the main source of market failure; and poor interaction between suppliers and users the main source of systemic failure. By bringing together users and suppliers, public procurement can counteract systemic failure associated with lack of user- producer interaction, information asymmetries and communication which often hinders innovation (Moñux et al., 2016).

The third type of rationale is the public service rationale where the application of public procurement as an innovation policy is justified on the basis of improving the provision of public services. (Kundu et al., 2020). In this instance, purchasing innovative solutions may enable governments to improve process efficiency and enhance the quality and availability of public services (Ghisetti, 2017; OECD, 2014).

Detelj, Markovič Hribernik, and Pihir (2015) provide a logic model for promoting innovation through PPI, shown in Figure 9. The model outlines reasons, inputs, outputs, and outcomes of PPI from a country level. The authors argue that two outcomes can be expected from PPI: more sophisticated products and services and increased international competitiveness.

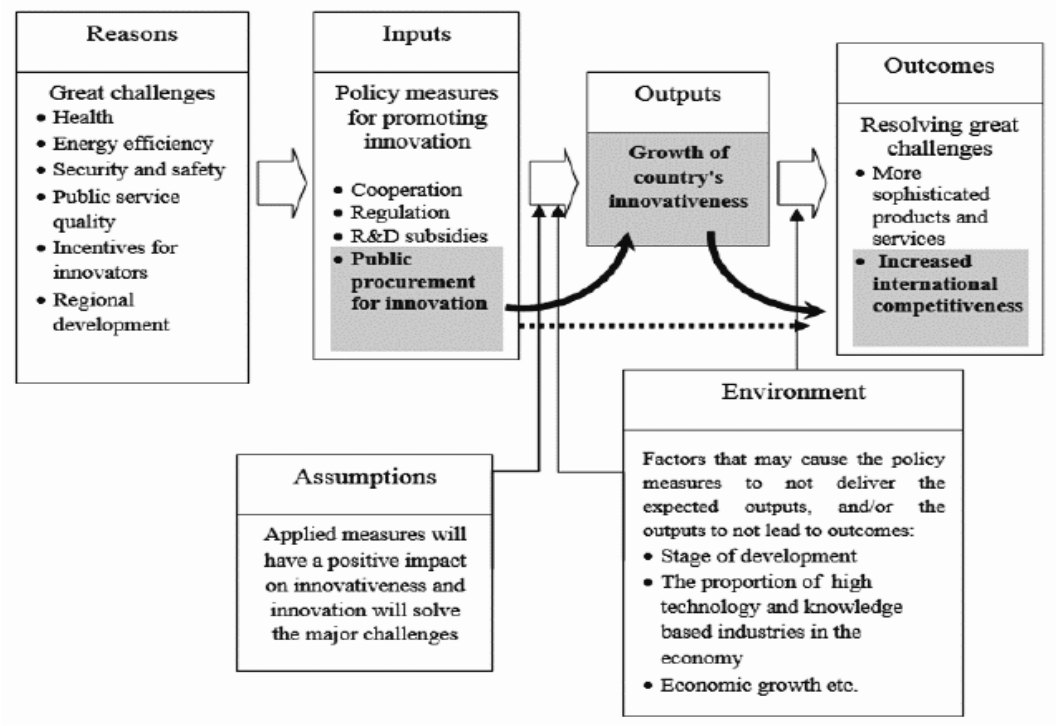

Figure 9 Logic model of possible channels for promoting innovation

Source: Detelj et al. (2015)

2.4.4 PPI policy modes

Dai et al. (2021) indicate that in practise, many regions and countries have launched policy initiatives to promote PPI as either a standalone instrument or as part of a more systematic effort such as policy mix or mission-oriented strategy. Accordingly Kattel (2010) identify four policy modes that have been used in influencing innovation through public procurement namely, (i) public procurement as part of technology (industrial) development policy'(ii) public procurement as part of R&D policy, (iii) generic PPI policy; and (v) PPI as a 'no policy' policy.

Public procurement as part of an industrial policy is used to endorse socially desired technologies, strategic industries sectors such as defence or biotechnology or direct technology needs of government (Uyarra, 2016). Public procurement as part of R&D policy is often used as a tool to fund industrial R&D which is deemed important to redress systemic and market failures in knowledge creation and technology development (Kattel, 2010).

Within the generic PPI policy, government expenditure and consumption as whole is used as vehicle for innovation and the innovation dimension is made a central and

explicit part of government procurement strategies and decisions across the public sector (Lember et al., 2013). In 'no policy' policy, procurement activities do not make any provisions to procure innovation (Uyarra, 2016). These opt instead for an efficiency- driven form of procurement, under assumption that perfect competition is the driving force of innovation (Moñux et al., 2016). In many cases this is what characterises the standard approach to public procurement for many economies where stimulating innovation is not the intention (Kattel, 2010).

Notably , Lember, Kattel, and Kalvet (2015) point out since the 2000's there is a shift towards adopting a generic PPI policy approach so that government procurement would become more effective in facilitating innovation across sectors. OECD (2017) provides a comprehensive analysis of OECD countries that have either introduced PPI as a stand-alone initiatives, or as general plan, or in other policy (Table 6). According to OECD (2017), about 26% of OECD economies have developed standalone action plan for PPI, 24% have adopted PPI as part of a general innovation or procurement strategy and 50% have no initiatives in place.

Table 5: Various approaches to PPI across OECD countries

Examples of countries with standalone innovation action plan	
Austria	Austrian Action Plan on Public Procurement Promoting Innovation "PPPI (2012) as a follow up of the Austrian Strategy for Research, Technology, and Innovation RTI (2011)
Canada	Build in Canada Innovation Program (BCIP) part of Economic Action Plan,
Denmark	Strategy for Intelligent Public Procurement published in 2013
France	The framework of procurement for innovation in France is part of the innovation strategy as a demand-side support tool.
Mexico	In 2013, President Enrique Peña Nieto instructed the Ministry of Economy to create a programme to drive innovation through public procurement
Netherlands	Innovatiegericht Inkopen which is standalone innovation action plan
Turkey	Program for Technology Development and Domestic Production through Public Procurement part of the National Development Plan
United States	25 Point Implementation Plan to Reform Federal Information Technology Management, issued by the OFFICE OF AMA
Russian Federation	The Russian Federation specifies requirements related to procurement for innovation in the law, including obligations (as percentage shares) for innovation products to be procured. State-owned enterprises (SOEs) are obliged to purchase

	innovations and to publish their plans for procurement for innovation.
Examples of countries with general action for PPI as part of other strategies	
New Zealand	Enabling environment for procurement generating new and improved solutions
Portugal	General legal system in Portugal supports procurement for innovation and specifies the scope for procurement for innovation policy, Public Contracts Code (2008)
Spain	Innovation action plan is both part of the country's general innovation strategy and part of the procurement strategy.
Sweden	No specific action plan but procurement for innovation is embedded into the Swedish Innovation Strategy (2012).
United Kingdom	Small Business Research Initiative is the main vehicle for promoting innovation
Colombia	National Development Plan (2014-18) specifies procurement innovation as a cross-cutting strategy targeted to generate a higher economic and social value to enhance the conditions for the development of business activities
Lithuania	Procurement for innovation is a part of Lithuanian Innovation Development Programme for 2014-20.
Malta	No stand-alone procurement of innovation, existing procurement structures allow for innovation to take place
Examples of other policy initiatives in OECD countries	
Estonia	The Ministry of Economic Affairs and Communications and the Ministry of Education and Research both developed strategies that clarify the concept of procurement for innovation and at the same time call on a need to further elaborate it. The strategies are entitled "Knowledge based Estonia 2014-2020" and "Estonian Entrepreneurship Growth Strategy 2014-2020".
Finland	There is no stand-alone procurement for innovation action plan. The country has an overall national strategic framework with objectives. The implementation takes place through various sectors and sector strategies. This allows for ownership and takes into account sector-specific characteristics and demands.
Germany	Procurement for innovation is part of the overall innovation strategy of the German federal government. The "High-Tech Strategy – Innovation for Germany" encompasses all research, technology, and innovation measures of the German government. Innovative procurement is the most important measure under the framework of demand-oriented policy instruments. Six federal German ministries agreed in 2007 to promote

	innovation-oriented public procurement.
Korea	To promote public procurement of innovation and ensure SME access, Korea operates the New Technology Purchasing Assurance programme, which includes elements to encourage procurement-conditioned research and development (R&D) by SMEs.

Source: OECD (2017)

2.4.5 PPI suitability consideration

While there is a vast literature providing different concepts, dichotomies and typologies, there is an emerging literature documenting how and under what conditions PPI can take place. For example, Chiappinelli et al. (2023) suggest that PPI may be suitable under three circumstances : (i) where the focus is on incremental innovation rather than radical, suggesting that PPI promotes technology diffusion rather than breakthrough innovations; and (ii) where there are new, small, and financially constrained firms; (iii) in catching up economies and economically depressed area.

Societal challenges are increasingly seen as legitimate drivers of public policy (Boon & Edler, 2018). Societal challenges considered poverty, employment, climate change and so forth (Uyarra et al., 2020). Essentially the primary goal of a policy instrument is to address a specific societal problem. In this respect, Moñux et al. (2016) argue that PPI is not an innovation policy instrument in the sense that innovation is not the primary aim. Rather, PPI is considered a mechanism to mobilise innovation for the purposes of improving efficiency or effectiveness of public sector or supporting targeted sectors and policy challenges (Moñux et al., 2016).

Lenderink et al. (2022) suggest that availability of resources in terms of time, budget and staff, the maturity of the organisation with respect to public procurement and its experience with PPI; the maturity/ technology readiness levels of solutions which may be offered by suppliers and the rationale for stimulating innovation are some of the factors to be considered in determining the suitability of PPI. Chiappinelli et al. (2023) outlines various design dimension that should be considered in PPI. These include: (i) whether PPI should be bundled or unbundled. Bundled refers to PPI covering all phases of innovation process, unbundled on the other hand refers to PPI covering just one phase; for example, R&D or commercialisation; (ii) extent of public retention of decision rights relating to the effort and knowledge of innovation;(iii) flexibility in the

award criteria, whether technology specific of technology neutral ;(iv) award procedure format: whether the contract should be awarded via auction or via negotiation; and (v) competition design, increased competition could be beneficial or detrimental to innovation depending on the degree of uncertainty in contract requirement and supplier characteristics.

Furthermore, the earlier studies linking PPI and TLC concept (Edquist & Hommen, 2000; Geroski, 1990), discussed in Section 2.4, suggest that due to technical uncertainties being highest at the early stage of technological development, public procurement could foster an important formative context necessary for the emergence of new innovation and problem-solving technologies (Cohen & Amorós, 2014). PPI in this perspective serves to increase overall level of R&D spending through introduction of R&D procurement programmes (Lember et al., 2013) to stimulate the development of new technologies. Accordingly, it has been suggested that public procurement seems to be rather more efficient in stimulating technology earlier in the technology life cycle than later (Edquist & Hommen, 2000; Geroski, 1990).

2.4.6 Typical PPI process

Public procurement consists of series of interlinked actions and decisions taken during the procurement life cycle from planning stage to evaluation stage (Uyarra et al., 2014). The notion of public procurement cycle is generally adopted to characterise the process with public procurement. While public procurement is considered a complex process itself, PPI is considered to be much more complex and challenging.

The literature (Edler et al., 2005; Edquist & Zabala-Iturriagagoitia, 2012) identified the following stages and processes with regards to PPI:

1. Identification of grand challenges, and its formulation in terms of lack of satisfaction of a human need or an unsolved societal problem.
2. Translation of the identified challenge into functional specifications.
3. A tendering process that entails opening of a competition by means of tender process; translation of the functional specifications into technical specifications by potential suppliers ‘and the submission of formal tender by potential suppliers.
4. Assessment and awarding of contracts

5. The delivery process which includes product development, the production of the product and the final delivery to the procuring entity.

Li (2013) categories the above process into three stages (Figure 10): pre procurement stages (involving 1 and 2 above), procurement stages (mainly focussing on number 3 and 4 activities) and post procurement stage (this includes number 5 activities). Whilst in most cases the procurement process assumes a linear model where early phase of the process determine the latter, PPI can be performed in more or less cooperative and interactive way (Edquist & Zabala-Iturriagagoitia, 2012).

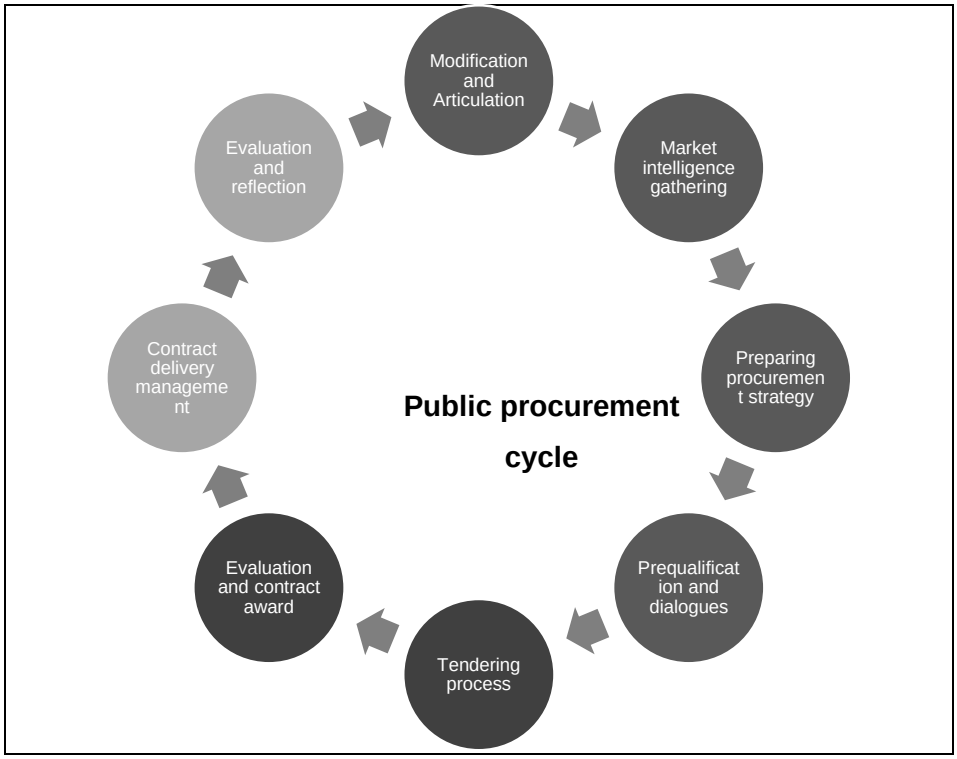

Figure 10 A typical public procurement process

Source: Li (2013)

2.4.7 PPI Organisational Structure

The literature suggests that there are three main types of basic structures for organising PPI purchasing: centralised, decentralised and hybrid (Bjørnaas & Schmidt-Horix, 2013; Li, 2017; Moñux et al., 2016). According to Thai (2009) centralization occurs when all of the rights, powers, duties, and authority relating to public procurement are vested in a central procurement office. Decentralisation on the hand occurs state entities covered by the relevant bodies are responsible for conducting their own procurement (Thai, 2009). It is argued in the literature that it is rarely found

that public procurement is fully centralized or fully decentralized; it may take on a hybrid form in many instances (Edler et al., 2005; Thai, 2009).

While there are strong theoretical arguments in support of centralised system for PPI in that it may promote standardisation, economies of scale for price negotiation, efficient policy deployment through strong political mandate, there is sufficient counterevidence that suggest good networks, economies of scale and innovative feature can appear in both decentralised and centralised system through cooperation and coordination (Bjørnaas & Schmidt-Horix, 2013; Edler et al., 2005)

Some of advantages with decentralised system include transparency, enhanced performance, accountability and autonomy in decision making (Bjørnaas & Schmidt-Horix, 2013; Munzhedzi, 2016). It is further argued while centralised procurement may reduce market risk for suppliers and justify their development cost, decentralised is able to achieve the same through cooperation and coordination amongst public institution (Edler et al., 2005). Accordingly, it is argued there is no single best practise in terms of procurement procedure, the choice is dependent on the culture and the circumstances of the country concerned (Edler et al., 2005; OECD, 2000). A list of advantages and disadvantages of centralised and decentralised system is outlined in Table 6.

Table 6: Advantages and Disadvantages of centralised and decentralized procurement

Centralised procurement	**Decentralised procurements**
Advantages	**Advantages**
Significant reductions in prices of goods and services	Reduced incentives for corruption via large-scale protectionism or favouritism
Better services at lower cost	A closer matching of goods and services delivered to the detailed requirements of end users;
Increased purchasing power for the centralised agency	Reduced scope for mistakes affecting large volume purchases that result in unnecessary over-spending
Standardisation	Less bureaucracy because of shorter time frames and fewer forms for both purchasers and suppliers
greater attention to contract management and better problem resolution	Greater possibilities for SME's to compete successfully for contracts
Lower costs of training staff because they are fewer in number and centrally located;	Opportunities for local purchasers to obtain lower prices for locally manufactured goods;

Easier performance management of staff;	More scope for employees to take individual responsibility and develop a “service” mentality
Increased transparency efficient recording and reporting of procurement contracts and transactions, effective management controls, clearer audit trail.	
Disadvantages	**Disadvantages**
May encourage corruption	Lack of financial control
Competition not encouraged	Duplication of efforts
lead to purchases of unsuitable goods and services as the specific, detailed requirements of all end-users cannot be taken into account.	Cost Anomalies
Risk of end user needs not fully satisfied	
Slow responses	

Source: OECD (2000);Bjørnaas and Schmidt-Horix (2013)

2.4.1 Locating PPI in catching up (developing) economies

Majidpour, Saber, Elahi, Shayan, and Khorasani (2021) suggest that in developing countries with large public sector such as China, India, and Brazil, firms were able to enhance their technological capabilities to the point at which they were able to compete internationally. With the scale and size of domestic market, latecomer firms are able to solve problems relating to technological complexity at the beginning of the catch-up process (Majidpour et al., 2021) and obtaining economies of scale in production, learning by doing, developing technological and marketing capabilities and growing in size (Landini, Lema, & Malerba, 2020).

From a catch up perspective, PPI is thus considered a strong incentive for local suppliers to develop or upgrade their technological and organisational capabilities in order to cope with demand imposed by government and build competitiveness (Lember et al., 2015; Ribeiro & Furtado, 2015). Rolfstam (2009) highlight that in the case of European semiconductor industry for example, had public procurement initiatives been implemented accordingly, the European firms would not be lagging behind American firms that were supported domestically by large procurement contracts.

Recently, Maleki and Yazdi (2018) propound for the broadening of the PPI concept and introduce the notion of public procurement for capability building (PPCB) orientated towards the needs of developing and less developed economies. While

bearing similarities to PPI, the notion of PPI follows that during catch-up local firms put technology transfer, learning and capability building in their priority agenda rather than creation of goods and services that are non-existent (Jassbi, Maleki, Naeini, & Yazdi, 2017; Li & Georghiou, 2016), the latter generally associated with PPI.

The authors suggest that PPCB can assume a hybrid demand-supply posture directed towards capability building on the supply side and procurement of new product or service on demand side. In PPCB the authors propose that the awarding of the contract should favour those firms who show greater capabilities at the time of tendering and who commit to more improvement in capabilities than those strictly supplying innovative solutions. While better evaluative evidence is needed to establish this argument, the advanced argument is that public procurement could potentially be a crucial tool in enhancing technological capabilities in catching up economies.

2.4.2 Factors influencing PPI implementation

Several studies have identified barriers and drivers of PPI to assist government in designing appropriate interventions ((OECD, 2017; Uyarra et al., 2014). For example, Rolfstam (2013) argued that from a public procurer perspective, PPI is affected by exogenous and endogenous elements. Exogenous elements include typical laws applicable to everyone, whereas endogenous are private collective agreements between groups of agents (Rolfstam, 2013). Other factors are summarised below:

i. Framework conditions

PPI is likely to be affected by cultural, regulatory, and institutional norms characterised as framework conditions (Dale-Clough, 2015; Georghiou et al., 2014). Framework conditions prescribe the rules of the game, that is, the degree of freedom public organisations have to design and implement procurement activities (Georghiou et al., 2014). The impact of framework conditions on PPI has been discussed extensively in the PPI literature (Edquist & Hommen, 2000; Foss, 2022; Georghiou et al., 2014; Moñux et al., 2016; Uyarra, 2016). In the main, the studies emphasise that favourable framework conditions are critical in realising PPI effects.

Building on the understanding of frameworks from the literature on innovation and public procurement, innovation framework conditions are those conditions that shape the context in which firms innovate and thus influence their performance (Allman et al., 2011). These include (1) human capital; (2) business environment and competition;

(3) entrepreneurship and finance; (4) infrastructure and services; (5) public research and knowledge exchange; (6) demand conditions (Allman et al., 2011; Liu, Kang, Zhang, & Chen, 2022). While public procurement relates to the conditions that provide legislative background and broader governance principle and procedures (Georghiou et al., 2014). These include: (1) laws and regulations; (2) public procurement governance, (3) political orientation; and (4) supply conditions (Georghiou et al., 2014; Liu et al., 2022).

Domestic laws

In general, domestic procurement laws and regulations comprise of a series of detailed rules on tendering processes, technical specification, along with deadlines for preparation and, submission and receipt of tenders(Dawar & Oh, 2017). Also included are guidelines on the evaluation of tenders and awarding of contracts, rules on post contract information, publications and domestic bid challenge system or dispute resolution mechanisms to support compliance (Dawar & Oh, 2017).

While open and restricted tendering laws and regulations may be suitable for procuring off the shelf goods, procurement of complex, technologically demanding solutions may require engagement with suppliers to address specific contractual needs and also for development tender specifications and contracts (Li, 2013). Often domestic laws and regulations do not allow such engagement with suppliers as this may undermine transparency and competition in the procurement process and may be susceptible to corruption and conflicts of interest (Dawar & Oh, 2017).

As such there is natural risk aversion form public procures out of fear of allegation of corruption. While some economies (in particular EU, see OJEU (2021)) allow for different forms of interactions such as competitive dialogue and innovation partnerships, which allow pre-qualified tenderers to engage in a discussion to fine-tune the solutions proposed (Uyarra, 2016), the challenge remains adherence to core principles of public procurement in these interactions.

International laws

Given that economies operate in a global environment, public procurement is also shaped by the demands and expectations of the global economy. Accordingly, a number of international guidelines exists that assist countries to manage and facilitate PPI procedures such as the United Nations Commission on International Trade Law

(UNCITRAL) and the plurilateral Agreement of Government Procurement of the World Trade Organisation (WTO GPA) (OECD, 2017). The most influential one on public procurement is WTO GPA (Li et al., 2020) which lays down rules guaranteeing fair and no discriminatory conditions for internationally competitive tendering and emphasises the need for transparency at each step of the procurement process (Dawar & Oh, 2017). The signatory countries are required to negotiate on the degree of openness of their home public procurement market during accession process(Li et al., 2020).

According to WTO (2023), the Agreement has 21 parties comprising 48 WTO members. Thirty-five WTO members participate in the Committee on Government Procurement as observers. The majority of the parties are developed countries (Lember, Kattel, and Kalvet (2014). Despite efforts by signatories of the WTO GPA to expand membership, very few developing economies have joined the WTO GPA, in part because of concerns regarding the implications for their ability to allocate government contracts to domestic firms (Hoekman & Sanfilippo, 2018).

While it is that argued international procurement agreements such as WTO GPA can provide policy space for signatory parties' industrial development, at the same time it can also limit parties policy discretion (Dawar & Oh, 2017) . For instance, WTO GPA prohibits the use of local content requirement although there are limited exemptions for developing countries. Local content may not be built into any procurement contract subject to provisions of the WTO GPA as these are generally considered to violate the cornerstone principles of national treatment and non-discrimination (Dawar & Oh, 2017). A large literature ((Deringer, Erixon, Lamprecht, & Van der Marel, 2018; Hufbauer, Schott, Cimino, Vieiro, & Wada, 2013; Kuntze & Moerenhout, 2012; Stone, Messent, & Flaig, 2015; WTI, 2013) observe that many economies, including developing economies persistently employ local content requirement as a public policy instrument to build up local manufacturing capabilities and competitiveness. This may imply incompatibility of domestic regulation with WTO GPA , posing tension for the implementation of PPI(Moñux et al., 2016).

Political Regime

Given that public procurement is generally perceived as a tool to pursue secondary objectives against primary procurement objectives, public procurement practitioners

expected to balance and coordinate the variety of often conflicting rationalities from different actors ((Rolfstam, 2013; Uyarra & Flanagan, 2010). PPI requires political commitment from other institutional actors to guarantee sufficient support to the policy including senior buy-in, clear delineation of roles and responsibilities mobilisation of resources to offset the cost and risks involved with the practise (Rolfstam, 2013; Uyarra et al., 2020).

Innovation System

PPI takes place within a complex set of relationships between different organisational groups including but not limited to procuring agencies, suppliers, end users, policy makers, and policy beneficiaries and is shaped by the laws, regulations and government and administration norms (Edler et al., 2005; Li, 2017). As such the PPI process can be understood through a systems perspective (Edler et al., 2005)

Li (2015) argues that special techniques and strategies are often required to implement PPI given that PPI processes possess characteristics of both innovation and procurement activities. Effective innovation systems therefore provide an enabling environment for interactive activities related to PPI. This would enable appropriate timing and procedures needed to conduct procurement on the other hand and capture innovation on the other.

ii.Public procurer organisational capabilities

In contrast to “off the shelf” or regular procurement, PPI procurement process by implications entails a procurement design that awards a contract based on criteria other than price, quality, and efficiency. Thus, adopting new criteria places substantial demand on public sector capabilities. One of the main impediments identified in the literature is the lack of public procurement practitioners’ technical knowledge or market understanding (Edler, Georghiou, Uyarra, & Yeow, 2015; Georghiou et al., 2014; Uyarra et al., 2014). PPI necessitates a unique subset of capabilities from public organisation. From the literature Edler and Yeow (2016) identifies five main capabilities required from public procurers:

1. Public procurers are required to understand and assess the market and opportunities in terms of what is already offered and in terms of what the market could deliver if requested.

2. Public procurers are required to understand their organisational ‘needs and the functional improvement possible through innovation.
3. Public procurers are required to establish incentive structures that reflect risk reward distribution to ensure that those organisational units that bear the risk also share some of the efficiencies or reputational gains associated with innovation.
4. PPI requires capabilities and procedures to overcome risk aversion through risk management practises
5. Public procurers must be able to implement the innovation and change organisational procedures, routines and capacities needed to do so.

From the above, PPI is often deemed to have higher learning and adaptation costs within the procuring organisation which stem from complicated procedures, high need for intra and inter organisational coordination capabilities, and novelty of resulting solutions (Edler & Yeow, 2016; Liu et al., 2022). These requirements are suggested to hamper the wide adoption of PPI.

iii. Capabilities and resources of domestic enterprises

Likewise, capabilities and resources of the domestic enterprises matter to the effectiveness of PPI (Rolfstam, 2018; Sánchez-Carreira, Peñate-Valentín, & Varela-Vázquez, 2019; Uyarra et al., 2014). The domestic enterprises challenges are mostly linked to the capabilities required to meet the demands and needs signalled by the public agencies and the technological challenges related to performance requirements as to meet procuring agencies need (Zabala-Iturriagagoitia, 2022). Other constraints include regulatory complexity, conflicts between policy objectives, and a perceived lack of a level playing field (Uyarra et al., 2014).

Sánchez-Carreira et al. (2019) outline several challenges including: lack of human and financial resources available to tender; lack of information and knowledge about tender calls, making it difficult to identify opportunities, lack of legal or administrative capacity due to the limited skills, time and experience devoted to prepare tenders; excessive financial and administrative requirements to participate in tenders; difficulties in finding cooperation partners; and delays in payment or the limited time to develop product or service.

2.4.3 Empirical Evidence of PPI

Given the strong importance placed on public procurement as an important source of innovation, empirical research, albeit very little is starting to emerge to understand the effects of PPI on promoting innovation as an alternate policy instrument (Ghisetti, 2017). Notably, these studies are mainly concentrated in more developed economies such as economies, UK, USA and most OECD economies while a few studies have been conducted in developing economies such as Brazil, India and China (Adjei-Bamfo et al., 2023).

Appelt and Galindo-Rueda (2016) examine PPI efforts across OECD economies. Using the 2012 Community Innovation Survey (CIS) data covering mining, manufacturing, energy, water supply and various other sectors. The authors find that about 14 -36% of companies involved in procurement activities over the reference period between 2010 – 2012 are reported to have undertaken innovation activity as part of a public procurement contract. However, the percentage is much higher in companies where the procurement contract specifies innovation as part of product offering. Moreover, those companies that are required to innovate as part of their procurement contract reported 85% product innovation rate and particularly high process, organisational and marketing innovation rates. Overall, the study concludes that while there is varying conceptualisation of PPI across countries, firms engaged in public procurement appear to have a greater propensity to undertake innovation activities.

Using the 2012 CIS data as well but focussing on 3 410 German firms, Czarnitzki, Hünermund, and Moshgbar (2018) find a positive and statistically significant effect of PPI on firms' share of turnover from selling new products and services. The authors find that the effect of regular procurement without explicit requirement for innovations remain insignificant. Further, the authors find that PPI raises turnover with products and services that are new to the firm but not new to the market. This is considered to arise from incremental innovations perceived to pose a smaller risk to procurers than radically new approaches. Consequently, PPI is suggested to be suitable for inducing diffusion of technologies and upgrading of already existing product portfolio.

Crespi and Guarascio (2019) analyse a panel of manufacturing industries for 24 countries observed over the period 1995 - 2012. The countries investigated include

the US, Turkey, Japan, Korea, and European countries. The authors find a positive and strongly significant association between public procurement and industries innovative activities, with patents used as a variable. Notably, the authors find that excessive openness to foreign competition seem to negatively affect innovation spurring effect of public procurement. This is a general observation of the US in particular, where it has made explicitly clear in its Buy American Act of 1933 to facilitate the purchase of goods and services produced locally. On the contrary, EU policies have been explicitly designed to prevent any discrimination likely to favour domestic producers.

Analysing whether there are practical barriers that exist in the EU member states' purchasing authorities that hinder the PPI, Amann and Essig (2015) found that consumption and complexity pose significant obstacles to achieving PPI objectives successfully. Complexity was found to be the most important barrier for PPI. The complexity mainly related to the strongly regulated public procurement process and the interaction of different stakeholders involved in the process of procurement. Time on the other hand mainly related to the investment required to undertake the procurement itself such as conducting market intelligence, developing tender specifications and assessing the received tenders, as well as management of contract delivery. The authors conclude that a system of monitoring innovation performance may be advantageous in reducing the hindrances to an acceptable level. Similarly Tsipouri and Athanassopoulou (2014), analysing the experiences and potential for PPI and PCP in Greece found that several factors hindered the adoption of PPI. First, the relatively small market of the manufacturing sector discouraged local suppliers from participating in the PPI initiatives. Second, the procurers were reluctant to undertake risky projects due to the possible litigations at every stage of tender process. Lastly, the lack of skills was highlighted as a critical factor. The skills that seemed to be absent were the skills to calculate risk premiums to organise guaranteed schemes, and the skills to identify the appropriate stage in the life cycle in an emerging large system. The authors caution against over-enthusiasm in adopting certain theoretically founded policy recommendations which are yet to be proven effective.

With respect to developing economies, Rocha (2016) examine the impact of PPI in the form of local content requirement (LCR) on national oil and gas sector in Brazil. Analysing the procurement activities of the state-owned enterprises, Petrobras, the

author finds that procurement policy has the positive effect on technological effort of suppliers. On the other hand, Ribeiro and Furtado (2015) analysing a similar case, find that PPI was unable to promote the development of high value-added R&D equipment due to the reluctance of Petrobras to assume the risk and costs involved. Furthermore, the authors contend that although Petrobras redirected its purchasing to the domestic market, local suppliers remain overly dependent on multinationals for technological development. Accordingly, the authors conclude that the approach of Brazil to PPI is arguably more of an import substitution strategy than driving technological learning.

Li, Georghiou, and Rigby (2015) analyse PPI outcomes for new energy vehicles in China. In this case government sought to create a lead market in the sector. To this extent, the authors suggest that PPI was partly successful as products were developed and came into use to socially beneficial effect. Although PPI induced large scale commercialisation, the authors indicate that the policy measure induced inter regional competition and aggravated protectionism posing a danger of sightless and low-quality industry expansion.

Moñux et al. (2016) study the suitability of PPI in three Latin American and Caribbean (LAC) countries. While heterogeneity in these countries makes it difficult to derive generalisation, the authors however identify common obstacles to PPI implementation. These include concerns over corruption, the need for legal umbrella that allows all elements necessary for PPI and insufficient local capabilities to meet R&D needs. In addition, the authors emphasise the importance of size and area of economic activity of the public procuring organisation. For example, too small public entity may not have the financial muscle to support PPI needs (Moñux et al., 2016).

Analysing the legal and institutional arrangement in Brazil for the design, implementation and accountability of PPI and how they have been adjusted or modified to enable their use in innovation policy, Foss (2022) finds that in general the Brazilian legal framework is conducive to advance PPI as a policy instrument, but due to the fear of sanctions and personal liabilities imposed by the court of auditors, government buyers are still unsure about designing and implementing the policy tool. Another challenge identified is that the policy rationale is not set and stable, and as such weak articulation affects the design, implementation of PPI as policy mechanism.

With regards to South Africa, Bolton (2017) assesses whether an existing public procurement regulatory regime enable the promotion of PPI. The author finds that while the country's Constitution leaves scope for the promotion of innovation in procurement, the primary focus of procurement in the current legal regime is addressing socio-economic challenges of historically disadvantaged groups of people rather than using procurement as a tool to drive innovation. The author concludes that while there is potential for PPI, how public procurement processes of SOEs facilitate innovation is yet to established.

While a range of possible impacts of public procurement on innovation are mentioned in the literature from greater efficiencies in production to incentives to innovation and capacity building and sales growths, Cirera et al. (2020) contend that the longer term impacts have not been understood so far. Partly due to the difficulty in assessing the influence of procurement on innovation and the overall complexity in policy evaluation of demand side policies (Edler et al., 2015; Tammi, Saastamoinen, & Reijonen, 2020).

2.5 Conceptual Framework

Accordingly the potential of PPI in developing countries could be large because public demand for infrastructure and services is growing with rapid urbanisation (Cirera et al., 2020). Not only does PPI constitute an opportunity for governments to improve quality and cost of public services delivery, but it can also serve as a tool to boost innovation, create new economic activities, and assist in overcoming current social challenges.

From the theoretical and empirical literature, it can be deduced that the implementation of PPI involves many challenges and demands coordinated action across a spectrum of actors and institutions. While the form of PPI may vary across countries and sectors, three common factors are outlined in the literature as barriers to its successful implementation. The conceptual framework outlined in Figure 11 considers that PPI is shaped by i) framework conditions; ii) public organisation capabilities and resources, and iii) the domestic firms/ suppliers' capabilities and resources.

The framework conditions provide an enabling environment for actors within the innovation system to engage in innovation activities. Coherent and coordinated policies aimed at fostering innovation are critical elements in facilitating PPI (Edquist & Hommen, 2000; Foss, 2022; Georghiou et al., 2014; Moñux et al., 2016; Uyarra,

2016), Further, the extent to which public procurers possess the skills, capabilities and resources along with the ability of domestic firms to engage in innovation activities, is suggested to hinder the implementation of PPI (Edler, Georghiou, Uyarra, & Yeow, 2015; Georghiou et al., 2014; Uyarra et al., 2014, Sánchez-Carreira et al., 2019).

It must be noted that all these three factors are equally crucial to the success of PPI. If all these elements are aligned, a range of innovation outcomes can arise from PPI such as enhanced quality and efficiency in the provision of public services while simultaneously fostering innovation capability building among domestic suppliers, thereby strengthening their competitiveness.

The elements outlined in the conceptual framework are by no means prescriptive or fully comprehensive, given the scope and focus of study but merely seek to illuminate some of the common elements outlined in the literature as contingent to the successful employment of PPI as a tool for stimulating innovation.

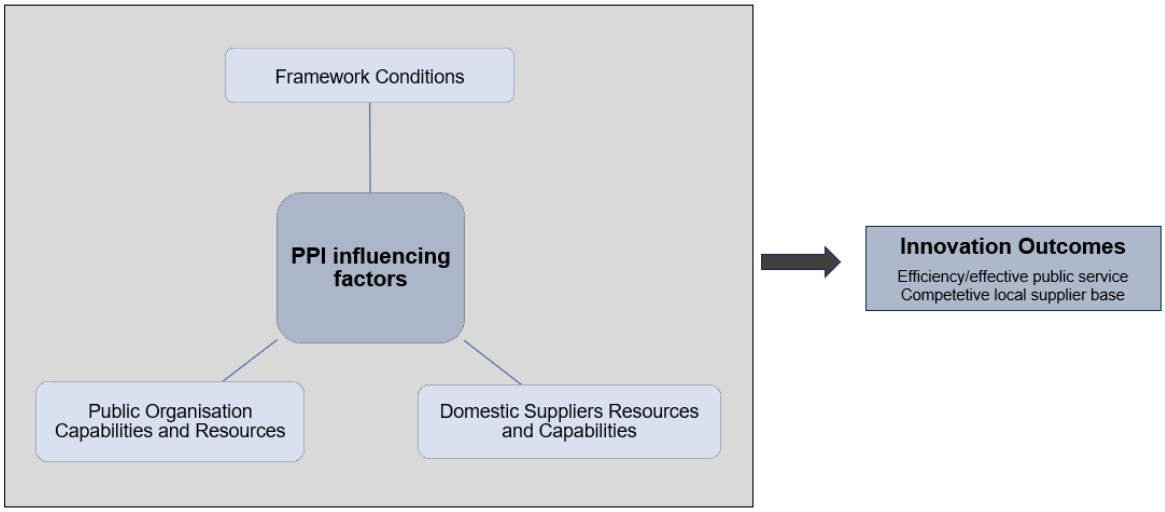

Figure 11: Proposed Conceptual Framework

Source : Author's own derived from Georghiou et al. (2014); Uyarra et al. (2014); Adjei-Bamfo et al. (2023); OECD (2017) Li (2013, 2017); Li et al. (2020) Liu et al. (2022); Rolfstam (2013);Dale-Clough (2015)

2.6 Statement of Propositions

This section outlines the statement of propositions in answering the questions posed in Section 1.8.

RQ1: What is the role of public procurement in stimulating innovation?

a) What approaches have been used to position public procurement as tool to stimulate innovation in the valve manufacturing sector?

P1: Due to its market size and significance, public procurement can be used to encourage innovation and capability building in domestic companies while at the same time improving the delivery of public services.

Many economies employ various approaches in launching PPI. PPI is most effective as a component of industrial policy.

RQ2: What are the conditional factors for effective implementation of public procurement of innovation?

a) Is the South African regulatory and organisational landscape conducive to employing PPI as a tool to stimulate innovation in the local valve manufacturing sector?

P2: Three main factors determine the success of PPI namely, framework conditions which relate the environment in which firms innovate and the legislative background; the capability and resources of the public organisation ; as well as the competencies and capabilities of the domestic firms (Sánchez-Carreira et al., 2019).

South Africa's regulatory, institutional and organisational arrangement are conducive for employing PPI as a strategic a government tool to stimulate innovation in the local valve manufacturing sector.

RQ3: How has public procurement improved the innovative performance of local valve manufacturing sector since its designation.

P3: Through demand articulation public procurement enabled the South African local valve manufacturing to pursue innovation, enhance their products and services and achieve globally competitiveness.

3 CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology adopted in this research study. It discusses the rationale behind the using the methodology, techniques and procedures answering the questions formulated for the study.

3.2 Research approach and philosophy

A qualitative research approach was selected based on the nature of the research questions. Broadly, qualitative research is generally employed to gain a deep and nuanced understanding of a given phenomenon from the participant's perspective (Merriam, 2002). Unlike quantitative research, which largely focuses on determining cause and effect and is predicated largely on the numerical , qualitative research is interested in exploring and understanding the meaning that individuals or group ascribe to a social or human problem (Creswell, 2014; Merriam & Tisdell, 2015). Qualitative research is especially concerned with the context of certain phenomenon (Saunders, Lewis, & Thornhill, 2019).

Saunders et al. (2019) point out that research can be classified being needs to fulfil an exploratory, descriptive, explanatory, or evaluative purpose or some combination of these. An exploratory study is defined as the means to discover what is happening and gain insights about topic of interest. A descriptive study seeks to gain accurate profile of events, persons, or situations. An explanatory study seeks to study a situation of a problem in order to explain the relationship between variables and evaluative study is concerned with assessing the effectiveness of an business strategy, policy, programme, initiate of process (Saunders et al., 2019).

Accordingly qualitative research is largely exploratory and seeks to explain how and why a particular social phenomenon or program operates as it does in a particular context (Mohajan, 2018). This study uses a combination of exploratory and evaluative approaches in addressing the research questions. The qualitative approach is deemed appropriate as the objective of the study is to gain deeper insight in the topic of PPI due to the youthful nature of the subject (Li, 2015), and evaluative in the form of assessing the suitability of PPI as a policy instrument to drive innovation from the perspective of various participants in the process.

Several philosophical paradigms have been advanced in the literature. Saunders, Lewis, and Thornhill (2007); Saunders et al. (2019) define research philosophy as a system of beliefs and assumptions about the development of knowledge. These assumptions include but are not limited to; the realities the researchers encounter in the research, human knowledge and the extent and ways the researcher's values the influence research process (Saunders et al., 2007, 2019). Research philosophy is essential in deciding research strategy and methodology and data collection technique and analysis procedures (Saunders et al., 2007). The study adopts an interpretivist perspective.

Interpretivism believes that true knowledge can only be obtained by deep interpretation of the subject (Rahi, 2017). It is interested in exploring behaviours, perspectives, feelings and experiences as it relates to particular phenomena (Mohajan, 2018). The goals is not to discover universals, context and value free knowledge and truth but to try to understand the interpretation of individuals about the social phenomenon they interact with (Rehman & Alharthi, 2016). Therefore, the study seeks to generating new findings that can inform the practice of PPI in a given context.

3.3 Research strategy and design

Research strategy is a general plan of how the researcher goes about answering the research questions, providing overall direction to the research the process by which the research is conducted (Haydam & Steenkamp, 2020). The study adopts a case study strategy. Yin (2009) defines a case study as an empirical inquiry that investigates a contemporary phenomenon in depth and with its real-life context, especially when the boundaries between the phenomenon and its context are not clearly defined. The purpose of the case study is to get in depth details as much as possible about an event, process, or person (Njie & Asimiran, 2014).

A case study can focus on a specific case such as an individual, group, institute or community (Rashid, Rashid, Warraich, Sabir, & Waseem, 2019). While a case study is considered a common framework for conducting qualitative studies, a case study can be accomplished by using either qualitative, quantitative or both depending on the research questions (Mohajan, 2018). Notably, case study employs a variety of data collection methods including document analysis, questionnaires, observations

and interviews among other collection data methods (Rashid et al., 2019). The power of case study research is its ability to deal with a variety of evidence such as documents, artifacts, interview and observations (Yin, 2009). The study employs a multimethod approach encompassing, document analysis and semi-structured interviews in addressing the research questions.

Given the various sectors that PPI can influence, the study is limited to the valve manufacturing sub sector, in particular, manufacturers of industrial valves supplying to Eskom. Furthermore, government officials responsible for public procurement policy and regulation development and implementation; public entity (Eskom) officials responsible for public procurement process; as well as valve end users within the organisations are considered appropriate to gain in depth knowledge of the public procurement dynamics and potential policy issues and dynamics within the valve manufacturing. Accordingly, a cross-sectional approach is considered. Cross sectional approach involves studying a particular phenomenon at a particular time (Sanders et al., 2018).

3.4 Data collection method

3.4.1 Document Analysis

Relevant documents from government websites analysed include annual reports, policy documents and research reports commissioned by government departments. Emerging themes from the conceptual framework will be used to categorise the data for analysis (Bowen, 2009).

3.4.2 Selection of participants

The participants in the study include officials from relevant government departments, local valve manufacturers supplying to the public entities and Eskom officials. Purposeful sampling was adopted in order to gain an in-depth understanding of public procurement processes and its potential effect on innovation from selected participants with knowledge and experience in the field of public procurement. Purposive sampling is non-probability sampling method used in qualitative research where the investigator intends to discover, understand and gain insight into a phenomenon and selects a sample from which the most can be learned, according to (Merriam & Tisdell, 2015).

With regards to the local valve manufacturers, a list of companies that are members of industry associations; Valve and Actuator Manufacturers Cluster of South Africa (VAMCOSA) and South African Valve Manufacturing Association (SAMAVA) was used to determine the population of local valve manufactures. It was found that while manufacturing of valve has been long established it was found that over the years the sector was affected by imports which led to the closure of manufacturing facilities. Utilising the list from the two associations it was found that there are less than 12 South African owned valve manufacturers and about 10 supply to Eskom (SACEEC, 2023; SAVAMA 2022). Most local valve manufacturers have become importers or quasi-importers.

Most of the manufacturers of valves are situated in the Gauteng Province to enable them to serve the mining sector as well which is another large sector utilising valve products. Only valve manufactures that are considered local and undertake actual manufacturing of valves and valve products were chosen. Local defined as companies that are owned by South African citizens. Due to time constraints manufacturers based in Gauteng were considered.

The government officials and Eskom officials were selected based on their positions as well as experience with the concept being investigated. The majority of the officials held senior management positions. The population of the participants are indicated in Table 7.

Table 7: Proposed research participants

Organisation	Proposed number of representative
Valve manufactures (South African registered companies)	9
Public Procurement Specialist (Government)	10
Procurement Officials and Engineers (Eskom)	10

3.5 Research methodology

3.5.1 Documents analysis

Document analysis is a systematic procedure for reviewing or evaluating documents which can be used to provide context , generate questions, supplement other types

of research data, track change over time and corroborate sources (Bowen, 2009; Dalglish, Khalid, & McMahon, 2021). Document refer to a wide variety of material pre-existing data including visual sources (Morgan, 2022).

Document analysis in qualitative research is an underused approach as many researchers favour other methods such as interviews of research because of their desire to participate in the creation of data and play a more active role (Morgan, 2022).While document analysis may be used as the sole method of research, (Bowen, 2009), in this study document analysis is used as complement to the interview method.

National policy and regulatory documents relating to public procurement are particularly important for the study as they provide the economic and political context within which the phenomenon occurs. Such information and insights assist in understanding historical issues and can indicate conditions that impinge upon the phenomenon currently under investigation (Bowen, 2009). Given that PPI can be applied as an explicit policy instrument, the understanding of major documentation and policy guidelines is extremely pertinent to understanding the policy context (Simons, 2020).

3.5.2 Semi-structured interviews

In addition to document analysis, semi-structured interviews were conducted The specific advantage of this approach to gaining in depth data and the opportunity to document multiple perspectives and experiences and establish which issues are most significant in the case (Simons, 2020). In addition semi-structured interviews provide for latitude to deviate from the core list of questions in order to collect most useful information (Patten, 2017). Also semi structured interviews are found to be successful in enabling reciprocity between interviewers and participants thus enabling an interviewer to improvise follow-up questions based on participant's responses (Kallio, Pietilä, Johnson, & Kangasniemi, 2016).

In conducting the semi-structured interviews, an interview protocol and guide which encompasses themes and questions relating research objectives and to encourage the discussion(Saunders et al., 2019) is adopted These include both open and closed ended questions to allow for flexibility and more questions to be added during the interviews.

The interview guide was developed with insights from public procurement of innovation literature in particular the questionnaires developed by OECD (2017); Edler et al. (2005); Georghiou, Li, Uyarra, and Edler (2010) and Li (2013); Uyarra et al. (2014). Local valve manufacturers, government department officials as well as officials responsible for public procurement at Eskom are considered key participants in the research. As such three interview guides were prepared for government officials, public organisation officials and valve manufacturers. The communication channels used were face to face and internet-based interview in case where face to face were not possible to increase participation and engagement. A full set of questions to guide the interviews are attached as Appendix 1 for valve manufacturers and Appendix 2 and 3 for government and Eskom officials respectively.

The interview guide is divided into two sections: the first section is related to general background of the participants which will assist in getting an overview of the demographic profiles; the second section concerns the participants' experiences of the practise and effectiveness PPI in the South African context.

3.6 Data analysis

Mohajan (2020) define data analysis as a dynamic process weaving together recognition of emerging themes, identification of key ideas or units of meaning and material acquired from the literature so as to answer research questions. As a general approach to qualitative data analysis, thematic analysis will be adopted for organising and preparing data for analysis. Gibson and Brown (2009) describes thematic analysis as the process of analysing data according to commonalities, relationships, and differences across a data set. In general thematic analysis involves examining commonality, difference and relationships is the data collected from the participants (Gibson & Brown, 2009).

Key elements of a qualitative analysis process include organisation and preparation of data, transcription of data, coding of data and interpretation of data (Creswell, 2014; Madondo, 2021). Notably transcription and coding individual opinions and experiences are central to the analysis of qualitative data (Madondo, 2021).

Gibson and Brown (2009) distinguish between two types of codes: apriori and empirical codes. Apriori codes are defined prior to the examination of the data,

generally directed towards exploring a particular issue, often although not always formulated in the form of research question. Empirical codes are generated through the examination of data itself (Gibson & Brown, 2009). For this study apriori coding is adopted. Four key themes: framework conditions; public organisation capabilities and resources; domestic supplier resources and capabilities and innovation outcomes are considered.

3.7 Limitations of the study

The research is limited to the manufacturing of valves used in power generation. Two important limitations of the study concern the short period in which the study was conducted and the topic of investigation which impacted had an impact on the number of participants.

Public procurement has received intense public attention over the past five years. Following the establishment of a judicial commission of inquiry into allegations of state capture, corruption, and fraud in 2018 which exposed how public procurement was utilised as a vehicle for corruption, public officials have become increasingly reluctant to discuss public procurement matters due to fear of self-incrimination. Assurance was provided through the submission of all the requested documentation relating to the study as well as through requesting participants who had already taken part in the study to convey their experiences of the discussion.

Furthermore, the concept of PPI is fairly new and not widely known South Africa. Therefore, the style of questioning took consideration of the level of understanding of the concept under investigation.

3.8 Data validation

Specific techniques have been advanced in the literature on establishing dependability and trustworthiness of the data (Patten, 2017). One such technique is triangulation. Triangulation is defined as a procedure conducted by using two or more independent sources of data or data collection methods within one study to ensure what the data is telling you or what you think it is telling you (Saunders et al., 2019). Accordingly the literature outlines four types of triangulation: (i) data triangulation which includes two or more types of participants in the data collection; (ii)method triangulation which uses multiple methods to collect data; (iii) researcher

triangulation of which researcher forms part of a research team, an (iv) theory triangulation involves approaching data with several hypotheses to see which fares in relation to the data (Merriam & Tisdell, 2015; Patten, 2017). Given that for this study data collection methods include different types of participants, data triangulation will be used seek convergence and corroboration of data.

Unlike quantitative studies where there are specific sets of data assessment criteria for ensuring validity and reliability, many argue that qualitative research, which is based on different assumptions about reality and different worldviews should be assessed from a different perspective congruent with philosophical assumptions underlying the paradigm (Merriam & Tisdell, 2015). Qualitative researchers have developed different criteria to quantitative validity and reliability measurement and proposed concepts such credibility, transferability, dependability and confirmability as criteria for assessment of trustworthiness of qualitative studies (Madondo, 2021; Merriam & Tisdell, 2015).

- **Credibility:** Relates to the truth value of the findings and is based on the environmental context of the participants (Mohajan, 2018). Accordingly, the study utilises data triangulation to ensure the credibility of findings.
- **Transferability:** Since the findings are specific to sub-sector of the manufacturing industry, which is the valve sector, it is impossible to demonstrate that the findings and conclusions are applicable to other situations and populations (Shenton, 2004), However by providing a full description of research questions, design, context and findings an interpretation, the readers are provided with an opportunity to judge the transferability of the study in another setting (Saunders et al., 2019)

i. **Dependability:** A dependable qualitative project is one that applies to other contexts if replicated (Madondo, 2021). In addressing these issues, a comprehensive record of how the processes undertaken in the research are provided to outline the extent of research practised followed (Shenton, 2004)

ii. **Confirmability :** The criterion is used to verify that the findings are based on grounded data more so than the researcher's own particular preferences and viewpoints (Korstjens & Moser, 2018). By describing how the decisions are made during the research process, interview recordings and the emergence

of findings and information about the data is provided to demonstrate that the findings are the results and experience of the participants.

3.9 Ethical considerations

Ethics are essential in any research. This involves professional regulation and codes of conduct that guide the researcher in his dealing with participants ((Mohajan, 2020). In this case consideration is given to issues relating to ethics and data protection. Prior to conducting the interviews, an ethics clearance for collecting and analysing data from the participants was obtained from University of the Witwatersrand.

A standard interview letter explaining the purpose of the research was prepared. The letter highlights to participants in the research that any information that the participants provided was going to be handled with confidentiality. The letter also states that the data collected through interviews was only going to be used for research purposes and that neither the names of the firms nor the particulars of the participants would be publicised in the report. Lastly, the letter states that any data resulting from interviews would be stored safely on password protected computers and would not be accessible to any other person than the researcher.

3.10 Summary

This chapter has elaborated on the methodology and methods adopted in achieving the objectives of the research. First the research philosophy was outlined followed by the adopted research design and strategy. The research strategy and design as well as the considerations of both qualitative and document analysis collection methods are expected to provide insights into the phenomenon under investigation. Finally, ethical considerations are outlined.

4 CHAPTER 4: PRESENTATION OF FINDINGS AND RESULTS

4.1 Introduction

This chapter presents the findings from data collected from a cross section of participants and as well as key insights from document analysis. The first section consists of the presentation of findings from the semi-structured interviews. The participants included government officials, local valve manufacturers and SOE officials.

Semi-structured interviews were conducted with the participants over a six-week period.

This is followed by the presentation of document analysis findings and results. The purpose is to analyse government documents relating to public procurement legislation and industrial policies as it relates to the scope of introducing PPI in South Africa.

4.2 Interview with Participants

4.2.1 Contexts and Profile of Participants

A total of 20 participants were interviewed and comprised of representatives from industry, government department and Eskom who are considered relevant to the purposes of the study. A total of six (6) participants were from the local valve manufacturers, seven (7) participants from three government departments and seven (7) participants from Eskom.

Due to time constraints, not all interviews were conducted physically. In terms of the valve manufacturers five interviews were conducted physically while the two were conducted virtually due travel commitments of the participant. The majority of government department interviews were conducted physically while the majority of interviews with Eskom officials were conducted virtually.

Prior to securing an interview appointment, an email communication with research information letter was sent to all the participants requesting their participation in the study. The email provided the purposes of the interview and how the interview would be conducted as well as assurance of confidentiality and anonymity.

The interview guide for the three groups of participants contained similar themes pertaining to factors impacting the implementation of PPI. However, the questions were adapted in line with the expertise of the particular group of participants. The interviews took about 30 – 60 minutes per person where participants were given an opportunity to share their experiences in the industry and insights on the research topic at hand.

I. Participants Profile

The local valve manufacturing firms were all based in Gauteng. The average number of employees at the firms was about 40. The firms varied in terms of percentage split of business activity between public and private.

Table 8: Local Valve Manufacturing firms profile

Category	Code	No of employees	% public: private
Manufacturers	MN1	70	10:90
	MN2	50	10:90
	MN3	40	70:30
	MN4	60	70:30
	MN5	20	60:40
	MN6	40	20:80

The participants interviewed from the firms occupied senior management or executive roles. This assisted in providing strategic view of the challenges faced by the company and the experience with public procurement.

Table 9: Local Valve Manufacturers

Category	Code	Position	Years in current role
Manufacturers	MN1	Managing Director	>20 years
	MN2	Sales Executive	>5 years
	MN3	Sales Executives	>5 years
	MN4	Chief Executive Officer	>20 years
	MN5	Managing Director	>20 years
	MN6	Managing Director	>20 years

The participants from government departments comprised of officials involved in public procurement policy formulation and implementation in particular officials at director and chief director level. In terms of implementation, officials particularly involved in implementation of local supplier development programmes and localisation were interviewed as these bear similarity to the concept of PPI.

Table 10: Government Officials

Category	Code	Area of Responsibility	Years in current role
Government Officials	PO1	Procurement and Industrialisation Oversight	>15 years
	PO2	Procurement and Industrialisation Oversight	>10 years
	PO3	Public Procurement Regulation	>10 years
	PO4	Industrial Procurement Implementation	>20 years
	PO5	Localisation Implementation	>15 years
	PO6	Procurement	>25 years
	PO7	Policy implementation and monitoring	>25 years

Participants from Eskom included engineers and procurement officials as well as supplier development officials. While the objective was to interview more participants from Eskom, the increased attention on public procurement in the public presented a difficulty with officials reluctant being to participate.

Table 11: Eskom Officials

Category	Code	Area of Responsibility	Years in current role
Eskom Officials	EO1	Engineering	>20 years
	EO2	Engineering	>30 years
	EO3	Engineering	>8 years
	EO4	Supplier Development	>5 years
	EO5	Procurement	>10 years
	EO6	Engineering	>10 years
	EO7	Engineering	>15 years

4.2.2 Presentation of results from interviews

This section presents the results in line with the questions outlined in Chapter 2. The main objectives were to determine whether participants consider PPI a tool that can be adopted to promote innovation in the local valve manufacturing sector and in parallel, improve service delivery.

4.2.2.1 The role of public procurement in stimulating innovation

Participants were asked whether public demand creates incentives to pursue innovation activities. The comments are captured below.

MN1: "Around 2017/18 Eskom held workshops with valve manufacturers to inform us about the future demands for the next five years. It provided some sort of indications of the supply opportunities. While Eskom showed that that they will be spending billions of Rands, the problem is that the tender system is competitive and all of us will need to tender for the opportunity. There was no guarantee of getting the tender. No one wants to take the risk before an order is placed"

MN3: "Previously there used to be tenders for long periods of time supplying a certain power station. Contracts now vary from once off to long duration. But those are not too many. Water Boards tend to give longer term contracts for two years or so. This can help manufacturers with planning of production and buying new machinery"

MN4: "There is quite a demand from Eskom as each power station uses lots of valves. Installation and replacement are done almost on a daily basis. But the problem is that the market is full of imports, particularly in the low pressure/ low temperature valves. Instead of buying local products, procurers would rather import"

MN5: "Demand is there for valves from the public sector but not adequate to set up the facility for new products. A manufacturing facility could cost up to R60 million, buying machinery and equipment. The demand is not enough to do this."

MN6: "The public sector no longer provides a significant market for us. Due to [a] competitive bidding process, we are focussing more on export"

PO1: "Government is a big spender. Sometimes there are only a few companies that can supply a certain product, and the companies survive on that. However, if there are a lot of players, there is no certainty that my company will get the tender, for example. No one is prepared to set up a factory without a contract"

PO2: In the past years, there were complaints about government demand planning where suppliers felt that government buys in a piecemeal fashion. Currently, SOEs would announce their future demands and indicate to the market what is required in the next three years, for example. This helped suppliers to plan better.

PO3: "The National Treasury requires that all organs of state submit their demand plans. These demand plans are consolidated and then published. What is also included in the publication is the estimation of when the public organisation is going to publish the tender. From there onward, the manufacturers can plan their participation. The risk is that one does not know if they will win the tender. The risk is incurring the capital cost and then ending up not being successful. That is what I think discourages local manufacturers from pursuing innovation.

PO4: "The history of manufacturing in South Africa was dominated by government business and creation of big SOEs. But since most of these companies were privatised, the demand from [the] public sector is no longer that big. I see lots of manufacturing companies also supply other sectors such mining and petroleum."

PO7: "Government procurement as a whole is huge. There are companies that have been established as a result of demand from the public sector. Programmes such as [the] NIPP were developed to leverage public spending. Some companies in defence, aerospace and rail were formed at the back of public demand"

EO2: *"Because of small volumes from Eskom, no one wants to build a factory in South Africa. Rather, companies are establishing factories in countries like Saudi Arabia where there are many projects and demand for products"*

EO4: *"I think the country has sufficient demand, so the suppliers should not rely on the public sector; they must look at opportunities in other sectors. What could possibly work is to have one public organisation consolidating the demand and putting out one big tender. Maybe that could assist with giving the suppliers the required demand"*

EO7: *"The demand is there but the issue is that the design of the plant does not allow for just any type of valve to be installed. Therefore, the market is controlled by a few large companies, especially in the high pressure/ high temperature valves"*

4.2.2.2 The conditional factors for effective implementation of PPI

The main research question under this section sought to answer whether the current regulatory regime and economic environment provide scope to make use of PPI as an instrument to spur innovation.

I. Regulatory environment

This section sought to understand how well public procurement is understood and whether there is scope for PPI. Some of the views include.

PO1: *"Public procurement is one of the levers governments use to pursue various objectives including local development. The notion of innovation is not widely understood it will be difficult to implement in public procurement"*

PO2: "*I think the importance of public procurement has not really been appreciated. Only now it has become an important focus in driving development"*

PO3: "*I do not think there is scope in the current legislation to include innovation as an award criterion. Myself included I do not think government officials are widely familiar with the concept of innovation or public procurement of innovation. But what I know is that there is*

procurement method called strategic procurement which is geared towards procuring products that are not available in the country. Also, there is an option to use sole sourcing, but this is considered a deviation from normal procurement process. "

PO4: "*There is no procedure that enables procurement of innovation. Unlike the United States where entrepreneurs are identified and then assisted by government to advance innovation, those mechanism do not exist in South Africa. Companies like Apple were assisted by United States to commercialise. The GPS system also was the same, entrepreneurs were given assistance to advance the technology. There is a serious lack of promoting entrepreneurship in South Africa"*

In terms of the regulatory environment for public procurement, participants were asked of their opinion on the changes introduced in public procurement in the past ten years as it relates to supporting local development. Some of the verbatim comments include.

PO1: "The PPR 2022 recently introduced removed the requirement for local content after the court ruled that the Minister of finance does not have the power to issue regulation relating to local content and also pre-qualification. But these must be included in the policies of public entities. Under normal circumstances nothing has changed, the obligation has been shifted from the Minister to the public entity. But many SOEs have considered intervention like local content to be an obstacle. Therefore, they will choose which criteria is used in the tender. Nothing will happen to the SOE if they choose to promote other objectives. Implementation is left with SOE" "

PO3: "There have been changes over the past decade in public procurement regulation. Amendments took place in 2011, 2017 and now in 2022. The 2022 regulations were amended following the Concourt decision that the Minister of Finance may have overstepped his powers in determining how organs of state must undertake preferential procurement. It was determined that it is not the Minister's call to direct organs of state but SOEs must determine their own preferential criteria. What must be

understood is that it is still mandatory to put conditions in the tenders to advance socio economic development. The 2022 regulations have given that power to the SOEs"

PO6: "The introduction of 2022 PPR regulations is one of the significant changes introduced in the legislation of procurement. Basically the 2022 PPR repeals the provision of B-BBEE requirements. The departments must now determine their own objectives. I am busy reviewing and benchmarking with other departments on how there are crafting their procurement policy"

MN4: "Public organisations are no longer required to push local development in the recently published regulation. What is going to happen is that local companies will lose to international OEMs because they no longer need to prove local content and BEE certificate when tendering. Manufacturing will continue to die"

MN2: "SOEs have not really enforced local development, the new regulations have given them more freedom to push for cheap imports"

EO4 "The changes introduced in the PPR 2022 is that BEE compliance is no longer a gate keeper in assessment of tender, the BEE compliance is only considered at contract award. If the bidder does not produce BEE certificate, they will not be disqualified but they would not be allocated points. But what we do we give them time to produce the certificate, if they do not produce the certificate, we allocate zero points"

The participants were further asked of their view of the new procurement bill with respect to whether it provided scope for innovation. Some of the comments include

PO2: "The new Bill is strengthening the issue of localisation"

PO3: The Bill seeks to establish the office of the Chief Procurement Office. At the moment, there is no law and CPO office cannot do much in enforcing the law"

PO4 : "The new procurement Bill includes innovation but does not have procurement methods for innovation"

PO7: "I believe the bill was too rushed to be introduced to parliament. There are still many elements that remain vague in the proposed bill. The challenge ahead, if approved, is the development of the appropriate regulations"

II. Innovation System

The participants were asked if there are platforms where government department, SOEs and the private sector meet to discuss policy implementation on innovation, public procurement, or local development. Below are some of the participants views:

PO2: There are no interdepartmental discussions on issues of industrialisation. Every department is doing their own thing. It will be really better to have a platform where everyone is brought together, private, and private to discuss how to support local development.

PO4: Government itself is not coordinated. There is no platform I know of between the public and private sector. Each department tends to drive their own development programmes.

PO5: Government has a lot of programmes to develop the local manufacturing sector but there is a disjoint in implementation. For example, one department may deal with funding for R&D and others with funding for capital expansion. At no point do all departments come together to discuss what is the best way to assist local suppliers".

PO6: "With regards to procurement, there is a quarterly forum arranged by National Treasury for all organs of the state's procurement practitioners. Also, each year there is PFMA conference organised by National Treasury to discuss various issues affecting public procurement. The focus of the conference over the years has mainly been corruption in public procurement"

MN3: "There is no platform I know of that calls everyone under one roof to discussion issues facing local manufacturers".

MN5: "A while back, a group of manufacturers came together to establish VAMCOSA. VAMCOSA was established to represent local valve

manufacturers and try to solve challenges facing the local sector at the time around 2011. We were the ones that approached the dti to designate some of the local components. We did various presentation to Eskom and other institutions to get support. We managed to convince the dti which resulted in designation. Other than our meetings with the dti, I am not aware of any platform"

EO1: *" I do not think there is enough conversation going on about how to go about industrialising the country. It seems the government is concerned about one aspect of the manufacturing, and they do not consider other downstream companies. That is why industrialisation is not working in South Africa'"*

EO4: "*From our side, there are supplier platforms that are held regularly where we try to unlock the challenges faced by the suppliers. But this is only between Eskom and suppliers. With respect to engagement with government departments and other SOCs, such platforms do not exist. At times, you find conflicting requirements from different government departments that we need to implement but there is no platform to discuss such issues.*

III. Public procurer organisational capabilities

The sections sought to get insights into whether public procurers have adequate resources and capabilities to undertake PPI. Some of the statements are captured below:

PO2: "*SOEs understand very well the public procurement process but lately due to forensic investigations, some SOEs have lost people and are struggling to find replacements. So, you find someone with an SCM background dealing with technical procurement issues"*

PO3: "*There is good understanding of the public procurement process across public organisations. In actual fact some have found loopholes in the system used to achieve other ulterior motives*. *The skills and capabilities are there and most of them are experts in the field of public procurement"*

PO4: *"Very few people understand exactly what public procurement is and they tend to limit it to supply chain, and it is much broader than that. But generally, SOEs have experienced people in the procurement offices"*

PO6: "It is important to have the correct skills and experience in procurement because we have to advise and deal with lot of legislation. Overall, departments and SOEs have qualified people in procurement offices. It is a demanding job"

P07: "There is adequate skills and experience in the public sector to drive policy objectives. For example, my team is made up of various experts monitoring a wide spectrum of sectors. It really depends on what is perceived as adequate"

MN1: "Eskom has lost a lot of skills and resources over the years and now they tend to rely on OEMs to assist them with developing specifications for new technologies. The one issue is corruption that takes place at Eskom"

MN2: "The procurement specialists at the Eskom know what they are doing but the challenge is that we struggled with getting someone to talk to regarding a specific tender. The specialists do not like to engage suppliers before a tender award and even after award. At one point it took us over a year to finalise the order and commence with manufacturing"

MN3: "We have had a good relationship with Eskom procurement specialists and with engineers to discuss design or installation issues, but the problem is the level of corruption. "

MN4: "Eskom has well experienced specialists, the problem is that they are bound by laws and regulations, and they cannot accommodate anything outside regulations"

MN6: "There is adequate skills in government and Eskom, the issues are the resources and the restrictiveness of PFMA"

EO1: "The challenge with procurement at Eskom, particularly with valves is that some of the stations have been built 20/ 30 years ago and certain specific valves installed. There is little room to replace with new valves, whether it is new material or anything because of fear of putting performance of power station at risk. Therefore, they would rather stick to what has been used, they replace like for like"

EO2: "Eskom has lost a lot of engineers over the years and some procurement capabilities.

EO3: "There are capabilities at Eskom, the problem is the risk that comes with trying new products. With things like load shedding being a problem, there is a huge risk of failure. Most of them stick to the brands they know"

EO7: "Procurement specialists have a good understanding of rules and regulations. But the problem arises when its repeat orders. Because there is a requirement to keep a certain number of spares in stores, they will order at their own initiative, but they look for the cheapest. Cheapest might have short lead time but of poor quality, Expensive valves might have long lead time but are of high quality. The specialist will always go the cheapest. The problem is when the order arrives, they might not have the expertise to determine the quality. They have skills in supply chain but not in dealing with technical requirements.

IV. Availability of Training Programmes

Government officials in particular were asked if there are training programmes for public officials on public procurement processes. The comments are detailed below:

PO3: "National Treasury runs public procurement workshops on a regular basis, but these are not accredited. There is also the National School of Government which runs similar programmes. Government departments are also allowed to source private institutions to provide training workshops if there is a need"

PO4: "There is a concept that has been going around called professionalisation of the public sector. The main objective is supporting the advancement of skills and capabilities in government

as a whole. But most of the time, procurement officials will just pursue normal academic routes with universities to try and advance their own skills"

V. Domestic suppliers' capabilities and resources

This section seeks to understand what barriers and challenges local suppliers faced in introducing new products or public procurement in general. Below are some of the comments from the participants:

PO2: "In the past, the suppliers complained about lack of information from SOEs in terms of their demand requirements. But now that has been resolved through the publishing of demand plans. The other issue will be the strict requirements in the tender specifications".

MN1: "Sometimes in the tender specifications one can see that it is directed at some local company because there is even a specific brand referred to in the documents. Furthermore, with high operational cost we cannot compete with cheap imports.

MN2: "There is so much bribery and corruption going on in the sector and within Eskom. The local manufacturers struggle to get tenders due to . cheap imports and also strict tender specification"

MN3: "Sometimes the tender specifications are not clear and therefore we cannot price accordingly. Another issue is that sometimes the company is awarded a contract, but the finalisation of the purchase order will take 4-6 months. The problem is that by that time there are steep price increases on materials and components. The price is no longer the same as at award stage. Another problem is all the forms that need to be filled when submitting a tender bid. It takes a lot of resources and time from the company to complete a bid document"

MN5: "The local manufacturers cannot compete with cheap imports. There are infrastructure problems and also the labour cost are too high. We are also required to comply to BEE requirements, there are too many compliance requirements"

MN6: "Our company had a good experience in introducing a new product to Eskom, we actually worked with Eskom on some product we were developing. They did the testing of our product. We do not have problem with the processes, it is just a requirement that all must comply with. It is for ensuring safety as well.

E04: Many suppliers struggle with completing tender documents, sometimes it will just be one document missing and the company may loose on that basis. But recently we are giving companies more time to submit missing documents"

4.2.2.3 Service delivery improvement and enhanced domestic suppliers' competitiveness

Manufacturers in particular were asked if they had introduced any new processes, machinery, or products or undertaken produced in the past five years undertake any R&D. The comments are captured below:

MN1: "We have in-house research and design office. We mainly get specifications from the client to design a new valve and then our team does an investigation. Lately we have introduced a failure detection system for one of our clients. We also have trademarks for our products"

MN2: "We have partnered with an overseas company on research and design of some component. This component is currently imported. But we are planning to produce in-house"

MN3: "We are the only South African company that manufactures a certain type of valve, and we are always looking at ways to improve our manufacturing process for example, buying new machinery. "

MN4: " We are currently conducting research on the component of the valve system. The component is currently not manufactured in South Africa. We are doing reverse engineering"

MN5: "We have recently acquired a new machinery to automate some of our manufacturing process. We have a number of registered trademarks"

MN6: We have a flagship product that is only manufactured by our company. We also have an R&D division that constantly experiments with the latest developments. We also attend a lot of global exhibitions. It is important to explore what other global companies are introducing so that we remain competitive"

I. High pressure/high temperature valve sectors

The participants were also asked to give their views on the high pressure/ high temperature valve sector, which is considered to require advanced technological and organisational capabilities Below are some of the views on the sector:

MN3: "The company does not have the capabilities to enter that market. It is costly to produce high pressure valves"

MN4: "At the moment it is cheaper to import high pressure valves from overseas but there is potential to build local capabilities"

MN5: "Because of the environment they are usually used in, they have strict design and quality requirements. For example, in the oil and gas, the valves need to be API compliant, this is similar to ISO but ten time stricter. To get API accredited, the company needs to spend about USD 7000 per year to remain compliant. Not only that, but also Tier 1 supplier need to have accreditation. The barriers to entry are too high"

MN6: "It is not that there are no capabilities, the product requires large capital equipment and unique engineering and design skills. "

E01: "High pressure valve market is not easy, there are very strict technical requirements. Local companies are unable to meet the strict requirements. It is difficult to procure these valves locally"

E02: "High pressure valves require a special type of forging capability, and these are not readily available skills. There was one company that was established in Mpumalanga, it was later closed because of lack of support and funding"

PO5: "We have supported about eight companies with getting training on manufacturing of valves used in nuclear power plants. To get the training we partnered with an overseas company to provide training

assistance. Some companies succeeded in getting accreditation and are now suppliers to nuclear power station"

II. *Companies or innovations launched through public procurement initiative*

This section sought to understand what innovations or companies that were established because of public procurement. Below are some of the comments:

PO1: *"Battery Energy Storage is one new technology that came about because of public procurement. Government is at the forefront of establishing the sector. The problem is that everything is currently imported from China. Even though government is pushing for localisation, it is not strongly enforced."*

PO4: *"Government has a programme called [the] NIP (National Industrial Participation Programme) whose objectives were to promote technology transfer from OEM to local suppliers and build capabilities. A number of suppliers were established through the programme and now form part of the OEM global value chain"*

PO5: *"There are currently local companies manufacturing electric vehicles for underground mines. While this was not public procurement per se, but government was at the forefront of supporting R&D in technology for electric vehicles".*

PO7: *"There are two companies in aerospace and defence that have developed technologies at the back of support from public procurement. The one company has now diversified into other sectors such as nuclear and automotive."*

III. *Localisation of the valve sector*

In this section the views of the participants were sought on the localisation efforts of the valve sector and how to improve public procurement. The comments are captured below

PO1: *"There is an overemphasis on value for money. SOEs tend to use this notion of local products are costly and therefore focus mainly on price. We have also seen a number of companies die post 2020. Some*

companies could not survive due to various reasons. The cheap Chinese imports impacted the sector. The challenge is as long there is a South African representative, the company is deemed to meet localisation requirements. There are no enforcement agencies that can go around and verify whether the suppliers are truly local"

PO5: "SOEs always use the excuse of cost of locally produced goods. I believe that companies can match the prices, but they refuse, that is why localisation fails. And to some extent is because they want to use a certain OEM"

MN4: The most important upstream sector in valve manufacturing is the foundry sector. There were about 70 foundries in South Africa that supplied metal casting to local valve manufactures but due to cheap imports and high cost of production, many foundries have closed. Therefore, it has become costly for local valve manufacturers. There was no consideration of the whole value chain of local valve manufacturing. The focus was on component and end product, not the inputs industries".

MN5: "Honestly designation can never be a permanent solution because of the cost attached to it. There is always a cost to industrialisation, and someone needs to absorb those costs. Unfortunately, some people found loopholes in the system at the demise of local manufacturers."

EO1: "When the local content was introduced, I believe they only looked at import volumes and based on that created a policy. The government completely forgot about foundries and forging shops. These companies acted like feedstock to the local manufacturers but there was no support for these companies. The prices of end product became costly"

EO2: "While we were committed to supporting local manufacturers, some were not able to meet the specification. It is very difficult to introduce a new product to the old plants. There were lots of defects we had to deal with. It was good to localise but there were no capabilities that could meet certain specifications"

”.

4.2.2.4 Proposal on how PPI could be positioned

The final question sought suggestion on how public procurement can be improved to encourage innovation in local valve manufacturers and/ or in general. The responses are as follows:

PO1: “Political drive to achieve the objective of local development”

PO5: “There is no harmonisation of policies from government and sometime implementation is fragmented. Government department work in silos.

MN1: “Vetting of local companies is important to ensure that they are really manufactures of middlemen. Also having security of demand is important for local manufacturers to undertake innovation”

MN2: “Find some way to reduce corruption, it is hurting the local companies”

MN3: “Government must look into easing strict tender requirements and the need to complete many forms”

MN4: “Improve the funding model for innovation. For example, the government says they offer funding but in fact it is a loan and must be paid back”

MN6: “Chinese manufacturers have partnered with local agents and supplying valves at a minimum of 25% below local price. We cannot beat these prices. Government needs to also strengthen anti-dumping policies”

MN7: “Government needs to hire people who are committed to driving innovation. We have good laws but sometimes we need people with bigger vision”

EO1: “Improve the ease of entering into public private partnerships”

EO2: “Mechanisms to monitor who is participating in government programmes. There are too many companies that claim to be local but in fact they are just agents”

EO3: "The misunderstandings amongst government institution, this causes problems when it comes to implementation of policy"

EO6: "There needs to be adequate consultation done with all stakeholders because some of the decisions made had a huge impact on the operations of the station"

EO5: "The top-down approach is not working, there needs to be a discussion with all affected parties. A majority of problem of loadshedding are due to procurement issues.

4.3 Document Analysis

This section analyses the key features of the South African public procurement landscape as it pertains to scope for PPI. The analysis includes relevant legal prescripts, policy documents and relevant departmental reports.

4.3.1 The South African Public Procurement Legislative Framework

South Africa's 1994 democratic transition was marked by significant institutional changes including a reform of the public sector procurement regime. Accordingly, the Green Paper on Public Sector Reform in South Africa released by the then Ministry of Finance and Ministry of Public Works in 1997 recognised public procurement as a crucial tool to achieve the social and economic transformation goals of the country. The Green Paper also underscored the importance of an effective and efficient procurement system that would enable organs of the state to deliver the quality and quantity of services demanded by constituents. Subsequently, several pieces of legislation have been put in place to deal with various aspects of public procurement.

4.3.1.1 Constitution of Republic of South Africa Act 108 of 1996

The South African public procurement system is informed by the Constitution of South Africa 1996 (the Constitution). Section 217 of the Constitution in particular provides the basis for procurement and stipulates that :

(1) When an organ of the state in the national, provincial, or local sphere of government, or any other institution identified in national legislation, contracts for goods or services, it must do so in accordance with a

system which is fair, equitable, transparent, competitive, and cost-effective

(2) Sub-section (1) does not prevent of organs of state or institutions referred to in that sub-section from implementing a procurement policy providing for

a) categories of preference in the allocation of contracts; and;

b) the protection or advancement of persons, or categories of persons, disadvantaged by unfair discrimination

(3) National legislation must prescribe a framework within which the policy referred to in subsection (2) must be implemented.

Essentially all organs of the state must effect the procurement of goods and services in accordance with the principles of fairness, equity, transparency, competitiveness, and cost effectiveness. Several pieces of legislations have been introduced to give effect to the procurement constitutional principles, most notably the Public Finance Management Act 1 of 1999 (PFMA), and the Local Government: Municipal Finance Management Act 56 0f 2003 (MFMA) which seek to regulate procurement in national, provincial department and national public entities; and municipal entities respectively. The National Treasury is the custodian of the PFMA and MFMA.

4.3.1.2 Public Finance Management Act 1 of 1999

The primary objectives of the PFMA are to regulate financial management in the national government and provincial government; ensure that all revenue, expenditure, assets, and liabilities of those organs of the state are managed effectively and efficient and to provide responsibility to persons entrusted with financial management and provide matters connected with the Act. The PFMA on the whole emphasizes transparency and accountability in the management of public funds and resources.

4.3.1.3 Preferential Procurement Policy Framework Act of 2000

The Preferential Procurement Policy Framework, Act 5 of 2000 (PPPFA) and the Regulation provide a framework for the implementation of public procurement policies as envisaged in Section 217*(2)(a)* of the Constitution. In terms of using public procurement for advancement of national objectives, Section 2*(1)(d*) of the

PPPFA stipulates that: An organ of the state must determine its preferential procurement policy and implement it within the framework which may include specific goals such as :

i. *Contracting with persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of race, gender or disability;*
ii. *implementing the programmes of the Reconstruction and Development Programme as published in the Government Gazette No. 16085 dated 23 November 1994*.

The Reconstruction and Development Programme (RDP) was the primary socio-economic programme following the democratic elections in 1994. The broader aim of this socio-economic policy was to establish a more equal society through reconstruction and development as well as strengthening democracy for all South Africans. The RDP outlined five key programmes: meeting basic need of people; developing human resources; building the economy; democratising the State and society; and implementing the RDP. The RDP recognised the weaknesses in the manufacturing sector including low levels of investment, low productivity, and high cost of production. It outlined the importance of developing strategies to strengthen and improve competitiveness of the local manufacturing sectors (Presidency, 1994). From this perspective, the PPPFA affords the state organs to articulate certain goals in the procurement of goods and services based on implementing the RDP programmes.

Section 2 of PPPFA prescribes a preference point systems with specific weight allocated to two criteria: price and specific goals. The formulae for calculating the points to be allocated are outlined in the regulations. The PPPFA provide that, any specific goals for which a point is allocated must be clearly articulated in the invitation to tender and must be measurable and quantifiable. The PPPFA further stipulates that the contracts must be awarded to the tenderer scoring the highest points unless the objective criteria in the addition to those contemplated in section 2(1)(d) of the PPPFA justify the award to another tenderer.

Section 5 of the PPPFA requires that the Minister establishes regulations regarding any matter that may be necessary or expedient in order to achieve the object of the

Act. Accordingly, there have been several revisions of the public procurement regulations (PPR) since their introduction 2001. Subsequently 2012, 2017 regulations were promulgated with the latest published in 2022. The main change between 2017 and 2022 PPR pertained to the application of prequalification criteria as well as the allocation of points thereto.

The 2017 PPR provided for the organs of the state to include a prequalification criterion related to advancement of certain designated groups such a black women, black youth and black people with disabilities and small, micro, and medium enterprises. Furthermore, the 2017 PPR specified allocation of the 20 or 10 points for 'specific goals' to the Broad Based Black Economic Empowerment (B-BBEE) status and/ or local production and content. The provisions for prequalification and functionality criteria have been removed in the 2022 PPR as this was considered to be inconsistent with the PPPFA which assigns the responsibility to organs of the state to prescribe such criteria in their procurement policies.

The 2022 PPR stipulates that a maximum of 20 points may be allocated to the specific goals for goods and services with the Rand value equal to or below R50 million and 80 points allocated to price. Whereas for contracts with a Rand value of above R50 million, 10 points may be awarded for specific goals, with 90 points awarded for price. The procuring entities are given discretion to determine their own specific goals and the allocated points thereto in pursuit of transformation and socio-economic goals.

Supply Chain Management Review

In line with the constitutional principles of undertaking government procurement in a fair, equitable, transparent, competitive, and cost-effective manner, supply chain management (SCM) is one of the key mechanisms enabling government to implement these requirements.

The 2015 Supply Chain Management Review (SCMR) identifies various interventions to address and improve the efficiency and effectiveness of SCM system. The Office of the Chief Procurement Officer (OCPO) established in 2013 is assigned with the responsibility of modernising and overseeing the South African supply chain management system and ensuring that the procurement of goods,

services and construction works is conducted in a fair, transparent, competitive, and cost-effective manner in line with the Constitution and all relevant legislation.

The CPO, however, is not directly involved in the procurement process but leads and manages procurement reforms, maintains the procurement system, and oversees the way in which government does business with the private sector.

- *Strategic Procurement Framework*

Among the first initiatives of the OCPO is the development of a Strategic Procurement Framework (SPF). The objective of the SPF is to provide procuring entities with a tool for procurement differentiation. Given the size and nature of goods and services procured by the State, the SPF recognises that one size fits all type of approach to procurement of goods and services impedes government from obtaining the best possible service and value from specific suppliers.

Considering that not all goods and services require strategic sourcing, the SPF provides a strategic procurement process which outlines a structured approach to the development and implementation of sourcing strategies. Accordingly, PPI can be explored within the scope of SPF.

- *Capacity Development Strategy*

The SCMR also recognises that an effective public procurement requires skilled, ethical, and professional people within appropriate structures who actively engage in continuous improvement, innovation and learning and who are supported by good leadership, oversight, and governance. The SCMR indicates that issues such as poor alignment between strategy, demand management and supply chain planning, poor bid specification, improper bid evaluation and adjudication, insufficient supplier performance management arise from weakness in capacity and capability within procuring entities undermine the effectiveness of public procurement.

In this regard, the public sector capacity development strategy (CDP) developed by the National Treasury provides a national framework to address overall financial management capacity issues in the public sector, including strengthening public procurement, and supply chain management processes.

4.3.1.4 Proposed Public Procurement Bill

The Public Procurement Bill (the Bill) was gazetted by the Minister of Finance in May 2023. The main aim of the Bill is to establish a more coherent regulatory framework for South Africa's public procurement system. Amongst others, the Bill seek to make provision for:

- Establishment of the Public Procurement office which will be assigned with function to provide advice and assistance to procuring institutions and ensure the professional development and training of officials involved in procurement;
- Implementation of a preferential procurement policy envisaged in Section 217 of the Constitution. Clause 17(2) of the Bill sets out the minimum requirement for the content of the envisaged policy and propose that the state policy must include:
  a) one or more preference point system and thresholds;
  b) measures regarding preference for –
    i. a category or categories or person or enterprises or a sector;
    ii. goods that are produced in the Republic; and
    iii. services provided in the Republic.

The measures outlined in subsection 17(2)(c) include the advancement of transformation, beneficiation, industrialisation, innovation, creation of jobs, intensification of labour absorption and economic development as well as balancing of economic impacts of imported goods or services, unless exempted by the Minister. Furthermore, the Bill provides that the regulations must be made regarding the application of subsection 17(2) on the preference point system and thresholds as well as the goods and services to be given preferences and this should be done so in consultation with the relevant Ministries.

The Bill, therefore, recognises the importance of advancing innovation and the importance supporting local production for economic transformation and development.

4.3.1.5 Broad Based Black Economic Empowerment Act 53 of 2003

The Broad-Based Black Economic Empowerment (B-BBEE) Act 53 of 2003 (B-BBEE Act) and its regulations thereunder, is a legislative framework which seeks to

promote meaningful participation of previously marginalised communities in the South African economy through increased ownership and control of existing and new enterprises, and increased representation in management structures. The inclusion spans wider to women, workers, youth, and people with disabilities.

The B-BBEE Act provides for the Minister of Trade, Industry and Competition to publish a framework for the implementation of the Act. Accordingly, the B-BBEE Codes of Good Practice emerged in February 2007 as an implementation framework for the B-BBEE policy and legislation. The B-BBEE Codes of Practise provide key concepts and specify elements against which an enterprise will be measured to determine its B-BBEE compliance rating; and the methods of measuring each element. Important to note is that the B-BBEE legislation places direct obligation on organs of the state and public entities to take into account any code of good practice issued in terms of the legislation in determining and implementing their procurement policy.

4.3.1.6 Non-compliance to public procurement legislation

In effecting the constitutional requirement for a public procurement system to be fair, equitable, transparent, competitive, and cost-effective, a number of legislations have been enacted that seek to address contravention of these principles. These include:

- Prevention and Combating of Corrupt Activities Act 12 of 2004 (Corruption Act)

  The Corruption Act inter alia seeks to: strengthen measures to prevent and combat corruption and corruption activities; provide for the offence of corruption and offences relating to corrupt activities; provide for investigative measures in respect of corruption and related corrupt activities; and to provide for the establishment and endorsement of a Register in order to place certain restrictions on persons and enterprises convicted of corrupt activities relating to tenders and contracts

  In terms of public procurement, it is stipulated that, any person who directly or indirectly accepts, agrees, or offers any gratification relating to procurement of specific supply or service shall be guilty of the offence. The Corruption Act provides for penalties with regard to such an offence.

Furthermore, Chapter 6 of the Corruption Act provides for the Minister of Finance to establish a Register for Tender Defaulters where the details of enterprises found guilty of an offence are entered into and made public as prescribed.

- Promotion of Administrative Justice Act 3 of 2000 (PAJA)

  Section 33 of the Constitution provides for all members of the public the right to challenge government action and decisions in a court of law. Accordingly, PAJA gives effect to the constitutional rights to lawful, reasonable, and procedurally fair administrative action. Essentially, the objective of PAJA is to:

  i. Promote an efficient administration and good governance; and
  ii. Create a culture of accountability, openness, and transparency in the public administration, or in the exercise of public power or performance of a public function, by giving effect to the right to just administrative action.

  Administrative decision is considered as a decision taken by an administrator as part of the function. This implies that a decision to award a public tender is subject to administrative action.

  Section 6 of PAJA provides that any person may institute proceedings in a court or tribunal for the judicial review of an administrative action if for instance: a mandatory and material procedure or condition prescribed by an empowering provisions was not complied with; the action was procedurally unfair; the action was materially influenced by an error of law; because irrelevant considerations were taken into account or relevant considerations were not considered; and the action was taken in bad faith or arbitrarily.

- The Promotion of Access to Information Act 2 of 2000 (PAIA)

  The PAIA gives effect to the constitutional right of access to any information held by both the public and private bodies. In terms of public procurement, PAIA provides for members of the public to access records, decisions, documentation relating to a procurement process. Essentially it seeks to promote transparency, accountability and effective governance of all public

and private bodies and assist the members of the public to effectively scrutinize and participate in decision making by public bodies.

4.3.2 International Agreements on Government Procurement

South Africa has been a member of the World Trade Organisation (WTO) which deals with rules of trade between nations since 1995. In terms of public procurement, the plurilateral Government Procurement Agreement (WTO GPA) is a framework within WTO that aims to mutually open government procurement opportunities among its parties. While South Africa is a member of the WTO, it is not a member of the WTO GPA. Therefore, South African government procurement activities are not subjected to the WTO multilateral agreements.

South Africa has also been a member of the United Nations since its inception in 1945. Accordingly, the United Nations Commission on International Trade Laws (UNCITRAL) published the 2011 UNCITRAL Model of Law on Public Procurement which seeks to establish harmonisation and modernisation of a legal framework for public procurement across nations. The 2011 Model Law on Public Procurement (the Model Law) is conceived as a template particularly for transitioning economies and developing economies to adopt in establishing laws of procurement process. The objective is to promote economy, efficiency, and competition, at the same time ensuring integrity confidence, fairness, and transparency in the procurement process. There is no compulsion on state members to adopt the Model Law.

4.3.3 Overview of Public Procurement as Policy Instrument

The National Development Plan 2030 (NDP 2030) was adopted in 2012 by a cross section of South African stakeholders, political parties, and civil society as the country's 'vision' towards eradicating poverty, reducing employment, and inequality by 2030. The NDP 2030 emphasises innovation as one of the key components to the attainment of these goals.

The NDP 2030 places emphasis on local procurement policies such as the PPPFA and its regulations on stimulating industrial development. The NDP 2030 argues for the stepping up of public procurement policies and strengthening of public procurement systems. Importantly, the NDP 2030 contends that while efforts should be made towards positioning public procurement to support the economic sectors

of the economy, measures should be taken not to create higher cost structures for government and business as this will in turn hurt growth and job creation.

In pursuit of NDP 2030 goals, a Medium-Term Strategic Framework (MTSF) is developed as a five year roadmap for achieving the NDP targets by 2030. These roadmaps are internalised by all public entities. The 2019 -2024 MTSF outlines interventions to be taken and sets targets to be met in the next five years to drive, among others: socio-economic transformation; spatial transformation and justice; sustainable economic growth and job creation; industrialisation; and improved social services. The 2019- 2024 MTSF focuses on seven national strategic priorities, and these include:

- Priority 1: A Capable, Ethical and Developmental State
- Priority 2: Economic Transformation and Job Creation
- Priority 3: Education, Skills, and Health
- Priority 4: Consolidating the Social Wage through Reliable and Quality Basic Services
- Priority 5: Spatial Integration, Human Settlements and Local Government
- Priority 6: Social Cohesion and Safe Communities
- Priority 7: A better Africa and World

Accordingly, Priority 2 focuses on building an inclusive economy that supports job creation. One of the key interventions identified is utilising public procurement to support localisation and industrialisation through procuring designated products and services. The following outlines policy developments and programmes implemented by various government departments to utilise public procurement to support local industries.

4.3.3.1 Department of Trade, Industry and Competition (the dtic)

South Africa has implemented a number of industrial policies since 1994, and public procurement has generally been identified as an instrument to support industrial development. For example, in 1997 the then dti launched the National Industrial Participation Programme (NIPP) to leverage government procurement in facilitating investment, exports and technology development. The NIPP sets out that all government and SOEs purchases or lease contracts with imported content equal to

or exceeding US$ 10 million were subjected to industrial participation programme. The NIP was revised in 2013 to include guidelines for participation.

In 2007, the then dti launched National Industrial Policy Framework (NIPF) to provide strategic direction to the economy with respect to issues of industrial development. Expenditure by SOEs was identified as an opportunity to revitalise local industries and firms in view of lost capabilities due to low investment. Furthermore, the 2007 NIPF identified that investment in innovation and technology were underprovided by the market due to its risky nature and long-time horizons. It recognised that greater support for innovation and technology was necessary to increase investment and sustaining research and development (R&D) expenditure to one percent of GDP.

The objectives of the NIPF were translated into the Industrial Policy Action Plan (IPAP) which sets out in detail the key actions and timeframes for implementation of NIPF programmes. Annual iterations of the IPAP were developed over the years with the last iteration being the 2018/19 – 2020/21 IPAP. Throughout the period, public procurement remained a key policy instrument in driving industrial development.

In the department's 2020-25 strategic plan public procurement still features as one of the key levers to drive industrial competitiveness and growth. It is particularly identified as an instrument to drive local content in goods and services procured by the public entities. The strategic plan states that by 2020, 27 products and/ or services were designated for local production, and the intention is to designate 10 more products by 2025. However, local content is no longer mandatory in public tenders following the enactment of the 2022 PPR. Public entities have been given discretion on which socio-economic objectives to pursue in public procurement.

Financial Assistance Programmes

The dtic has various innovation and technology funding instruments along the innovation process. The types of programmes are indicated in the Figure 12 below.

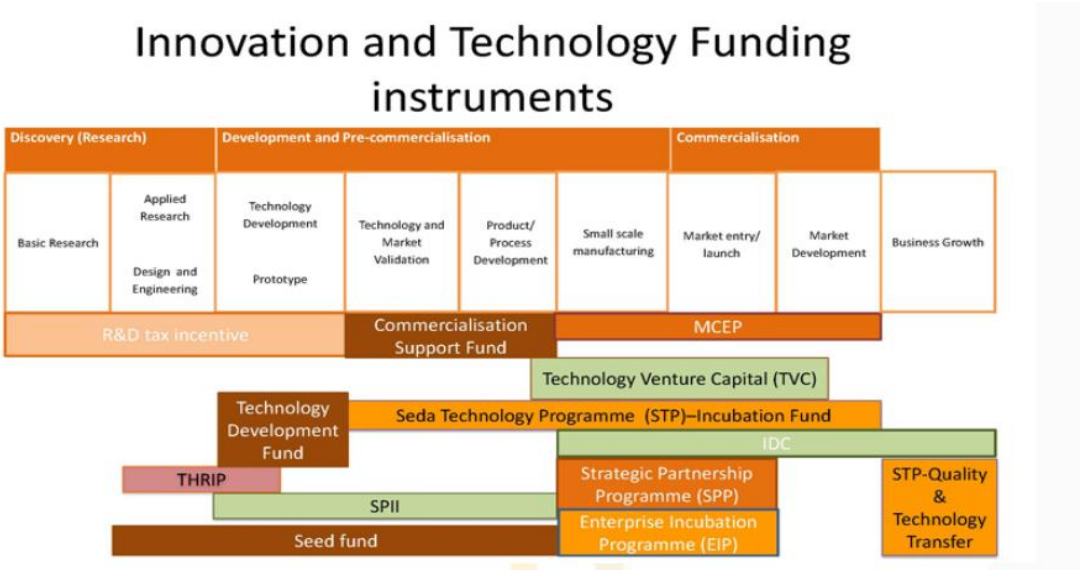

Figure 12: the dtic innovation and technology funding instruments

Source: the dtic (2023)

4.3.3.2 Department of Science and Innovation

a) Science, Technology, and Innovation Decadal Plan for 2022-2032

The 2019 White Paper on Science, Technology and Innovation developed by the then Department of Science and Technology (DST) (2019 STI-WP) sets out the government's long term policy approach for the science, technology, and innovation (STI) sectors. The 2019 STI-WP sets out policy intent for a vibrant, inclusive, coherent, and optimally coordinated National System of Innovation (NSI). It outlines that STI can be instrumental in improving public service delivery resulting in improved quality of life of South Africans, and that it can also assist in increasing competitiveness of existing firms, modernising existing industries, developing new industries, and thereby exploiting new sources of economic growth.

To give effect to the policy ambitions outlined in the 2019 STI-WP, a Science, Technology, and Innovation Decadal Plan for 2022-2032 (Decadal Plan) was developed by the DSI and adopted by Cabinet in 2022. The Decadal Plan sets out STI priorities and thematic focus areas for the decade to support the achievement of National Development Plan 2030 (NDP) objectives. The Decadal Plan focuses on five long term goals which are:

- An inclusive and coherent NSI.
- An expanded and transformed research system.

- Increased and future proof human capabilities.
- An enabling innovation environment; and
- Significantly increased funding for the NSI.

In terms of an enabling innovation environment, the Decadal plan identifies several limitations. These include, poor economic trajectory, inadequate linkages between traditional and non-traditional innovation actors, inadequate support for new innovative solution from SMMEs R&D investment efforts and lack of use of SMMEs innovative solutions to improve performance of government departments. Furthermore, the plan states that the current enabling environment does not incentivise diverse and interdisciplinary knowledge networks that support lifelong learning and innovative curricula. Therefore, there is a need to develop a pro-innovation culture across the economy and public sector.

Public procurement is identified as a mechanism to strengthen and support businesses as well as revitalising the role of the state-owned enterprises in driving innovation. The proposed implementation initiatives in this regard include.

- Allocation of a proportion of procurement spent on locally developed technologies.
- Expansion of the Competitive Supplier Development Programme championed by the SOEs to include locally developed technologies.
- Inclusion of the conditions related to locally developed technologies and technology transfer in all large government contracts.
- Development of innovation related training of officials from different levels of government through the National School of Government in collaboration with the Higher Education Institutions; and
- Forging an innovation compact among the STI intensive and other relevant government departments to ensure a coherent approach to stimulating innovation across policies. This compact is envisaged to serve as basis for the South African innovation strategy; and
- Development of a strategy to revitalise the role of the SOEs in innovation.

b) Technology Localisation Implementation Unit

The Technology Localisation Implementation Unit (TLIU) established in 2012 is an initiative of the DSI hosted and incubated at the Council of Scientific and

Industrial Research (CSIR) with an aim of strengthening capacity and capabilities of local manufacturing and services firms. The TLUI provides three support solutions for the development of the manufacturing industry, these include:

- Firm Technology Assistance Package

The aim of this package is to provide assistance to individual companies that are suppliers to either Eskom or Transnet and are therefore recognised as having the potential to produce a component or commodity linked to the localisation plans of SOEs.

- Sector Wide Technology Assistance Package

This package aims to create an environment where specialised services or common products can be developed so that the various companies in a particular sector can be supported.

- Technology Development Grant

This support solution assists SOEs to identify key and strategic commodities which should be developed in the country. The TLIU creates a partnership between the OEMs, SOEs and the relevant research and development bodies to launch a platform for the development of local Intellectual Property (IP).

4.3.3.3 Department of Public Enterprises

In 2007 the Department of Public Enterprises (DPE) launched a Competitive Supplier Development Programme (CSDP) with the aim of increasing competitiveness, capacity, and capability of local supply base by leveraging SOEs procurement. The CSDP consisted of demand side and supply side measures aimed at strengthening the capabilities of the local supply base. On the demand side, the CSDP sought to achieve several objectives including: fostering a culture in the SOEs that focussed on long term supply network development through the development of supplier development plan; identifying items which local supply could be expanded or developed or improved, and for setting targets in this regard; and developing long term partnerships with suppliers to achieve the best value for money over the product life cycle rather than lowest initial cost.

On the supply side, the CSDP sought to assist local suppliers to develop the capacity and capability to respond competitively to the SOEs demands through the

introduction of initiatives such as supplier benchmarking, skills development, funding for technology development as well as process and competitive improvement programmes. The CSDP is a departmental programme and the implementation and monitoring thereof was conducted by the DPE. Eskom and Transnet were the main SOEs that developed implementation plans for supplier development. In the department's 2023/24 annual plan, there is no reference made to CSDP, only that the department has directed all its SOEs to procure a minimum of 70% of their goods and services from local manufacturers.

4.3.4 Overview of the South Africa's National System of Innovation

The concept of NSI has been widely adopted in South Africa. The White Paper on Science and Technology published in 1996 (1996 STI-WP) introduced the concept of NSI and underscores the importance of science and technology in achieving the desired goals of transforming the economy.

Furthermore, the NDP 2030 makes reference to the importance of NSI in achieving global competitiveness and sustainability. NSI is positioned as a principal tool for creating knowledge, applying knowledge in production processes, and disseminating knowledge through teaching and research collaborations. The NDP 2030 acknowledges the small size of the South African NSI in comparison to other international standards and the challenges therein. The NDP 2030 proposes the development of a single framework to address the challenges in the NSI involving higher and further education, state owned enterprises and private industries. Importantly, the 1996 STI-WP directed that the NSI should work in a coordinated manner with broad common objectives aligned with national priorities.

The 1996 STI-WP produced one of the first analyses of the performance of the South African NSI following political transformation. The 1996 STI-WP noted that the newly elected democratic government inherited an ailing NSI. The country's NSI was considered fragmented, neither coordinated within itself nor with national goals; innovation capacity had eroded; national investment in R&D relative to the GDP was on the decline and that country's competitiveness had diminished despite being open to international markets. This suggested that policies and programmes developed to facilitate innovation may have not resulted in the desired effect.

The 1996 STI-WP called for strengthening of the NSI through development and implementation of coherent policies and programmes that promote capacity building within institutions and creation of an enabling environment for innovation to flourish. While public procurement was recognised as an important policy instrument to promote technology and industrial development, it did not articulate how it can enhance STI. A number of NSI reviews have been launched following the 1996 White Paper These findings of the reviews are summarised as follows:

2006 NACI Report: The South African National System of Innovation: Structures, Policies and Performance

The National Advisory Council of Innovation (NACI) was established in 1997 through the National Advisory Council on Innovation Act 55 of 1997 as an advisory body to the government on matters relating to the role and contribution of science, technology, and innovation. In 2006, NACI undertook a review of South Africa's NSI as part of the input to the forthcoming 2007 OECD country review. Overall, the 2007 NACI reported that significant progress was made in terms of strengthening the NSI since the publication of 1996 STI-WP.

Some of the improvements identified included: elevation of the science and technology function to its own central government department (DSI); increased participation in international S&T projects; improved linkages within the NSI through the implementation of various policy initiatives resulting in collaborations across actors in the NSI; improved understanding of the existence and role of various institutions with the NSI and increased R&D expenditure in both private and public sectors. Despite the strides made in the decade following the 1996 STI-WP, the report highlights that compared to other countries with similar levels of economic development, the country's NSI had fallen behind.

2007 OECD Review of the South African Innovation System

The OECD was commissioned by the then DST to conduct a review of South African's innovation policy, in effect the NSI. The report titled the 'OECD Reviews of Innovation Policy Report: South Africa 2007' (2007 OECD Report) was published in 2007 and provided a comprehensive review of SA NSI.

With regards to policy development and implementation within government structures, the 2007 OECD Report identified the absence of higher national body to

advise government as a whole about the entire spectrum of innovation policies. At the ministerial level though, the report outlined the existence of several forums/clusters responsible for drafting new policies and undertaking discussions on strategies and high-level initiatives. This is supported by forums at director general level to assist with policy and programme implementation issues. While there are established advisory councils at ministerial levels, these councils or agencies do not appear to have significant influence on overall government policy.

Furthermore, the report identifies issues of diverse vehicles for stimulating innovation, resource constraints within government organisations which inhibit focussed implementation of programmes and initiatives, as well as inappropriate articulation of national strategic missions and implementation. Other challenges identified in the 2007 OECD Report include weak human resources base for STI, lack of comprehensive support to innovation in small, micro, and medium enterprises.

2010 Ministerial Committee Review Committee on the Science, Technology, and Innovation Landscape in South Africa

In 2010, the Minister of Science and Technology commissioned a Ministerial Committee to perform a high-level diagnostic assessment of the science, technology and innovation landscape, its strengths and weaknesses, and the role of government and the private sector, as well as the offer of an assessment of the review conducted by the OECD in 2007. The main objective was to assess the degree to which the country is positioned to respond to the rapidly changing global environment and the shift towards a knowledge economy in ten to thirty years. The Ministerial Review Committee report on STI was published in 2012 and some of the findings include:

- Poor understanding of the concept of the NSI and innovation in all its dimensions;
- Limited level of coherence and integration between agencies in the NSI and the absence of a Cabinet level coordinating body to monitor the strategies for innovation and marshalling the resources needed;
- Underestimation of the role of business in both the established and emerging conception and coordination of the NSI; and

- Limited consideration of demand-pull approaches to supporting innovation, rather than state investment in innovation mainly focussed on supply push approaches; and
- Inadequate human capital development.

The report put forward 41 recommendations. One of the recommendations is policy harmonisation and coordination focussed on business and enterprise development State-owned enterprises, due to their large-scale procurement activities are considered vital in energising innovation and facilitating local adaptive innovation through international linkage and technology transfer opportunities.

2013 Academy of Science of South Africa (ASSAF) Report

Following the publication of the Ministerial Review report in 2012, Academy of Science of South Africa (ASSaf) in 2013 at the request of the DST undertook an assessment of the NSI. The main objective of the exercise was to determine the extent of the evolution of the NSI landscape since the 1994 post policy framework of the South African STI; and secondly, to identify the strengths and weaknesses of the STI system for consideration by the decision makers to enable the NSI to deliver on its potential and contribute to the achievement of NDP goals by 2030.

The 2013 ASSaf Report identified four key elements critical to a successful NSI; governance; interactions amongst NSI actors; openness to the world and consideration of demand side policies. The 2013 ASSaf Report highlights that while strides were made to improve the NSI post-1994, the NSI remained weak and fragmented. Similar to earlier reviews the report states that factors such as: lack of shared understanding of the concepts of innovation and system of innovation; lack of governance structure to communicate a unified vision of the NSI across government; weak linkages and interactions amongst actors within the system; poor education system compared to international average; and limited evidence of review of performance of various programmes and projects established to serve NSI, basically, lack of interactive learning to further the development of NSI impede the functioning and performance of NSI.

The report concludes that the South African government remains critical in driving ongoing improvement of the NSI and action should be oriented towards setting

framework conditions; ensuring supply and mobility of knowledge workers; promoting knowledge exchange and engaging in policy learning

4.3.5 South African Business Innovation Survey 2020

Given the importance placed on innovation as a means to industrial development, there have been efforts to measure the extent of innovation across various sectors of the economy. In 2020, the Human Sciences Research Council's Centre for Science, Technology, and Innovation Indicators (CeSTII) on behalf of the DSI published the South African Business Innovation Survey, 2014 - 2016 Report which measured the extent of innovation in the business sector. The survey covered over 15 517 business in industries and 26 018 businesses in services.

The survey design employed was informed by the methodological guidelines outlined in the third edition of the Oslo Manual, published in 2005 as well as applicable elements included in the update 2018 manual. The survey revealed that more than two-thirds of South African business had some form of innovation activity between 2012- 2014. Innovation activity included all scientific, technological, organisational, financial, and commercial steps, which actually lead, or are intended to lead, to the implementation of innovations.

The survey further revealed that product innovation was reported by more businesses than any other type of innovation. The four types of innovation being product, process, organisational and marketing. However, the levels of technological and non-technological innovation were similarly distributed in this period. In terms of the manufacturing, the largest proportion of businesses conducted product innovation (59.8%) followed by marketing innovation (43.4%) shown in Figure 13. The largest ticket innovation expenditure item during the period was acquisition of machinery and equipment for both industrial and services sectors.

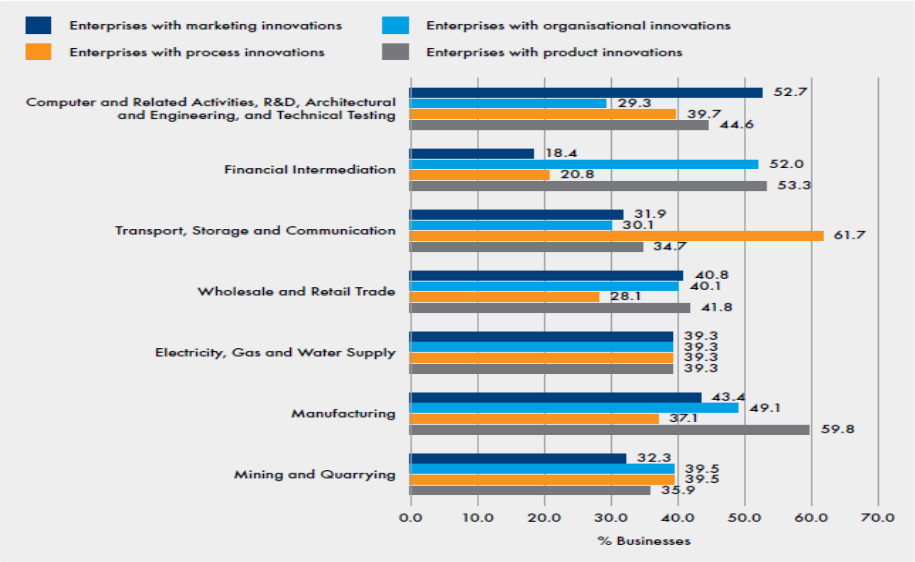

Figure 13: Types of innovation by sector

Source: CeSTII (2020)

The survey indicates that about 22% of all businesses indicated that they had contracts to provide goods and services to the public sector. Of these businesses, 51.7% in the industrial sector indicated that innovation was required as part of the contract, while 24.4% of businesses in the services sector reported that innovation was required. About 30% of businesses in industry that had procurement contracts indicated that innovation was not required as part of the contract, while this was true for only 14.6% of businesses in the services sector. More than 50% of businesses with procurement contracts indicated that they did not perform innovation, and it was not a requirement of their procurement contract (Figure 14). From this view, an inference can be made that South Africa is not fully utilising the potential power of public procurement to drive innovation.

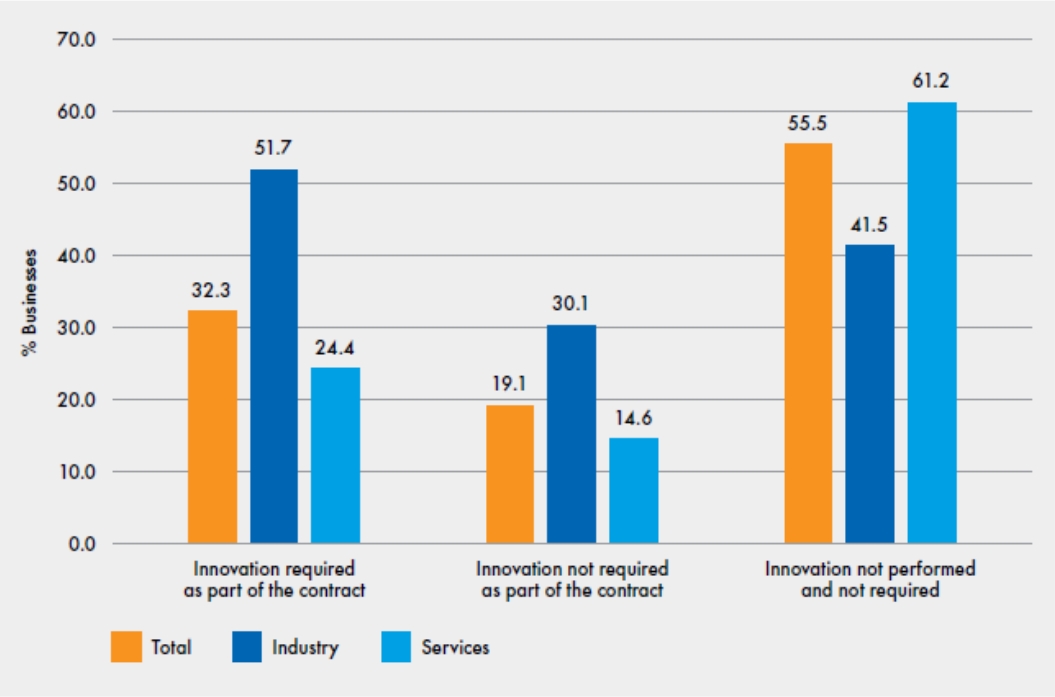

Figure 14: Businesses that provided goods and services from public procurement contracts

Source: CeSTII (2020)

4.4 Summary the research findings

The objective of this chapter is to consolidate the data from document analysis and fieldwork with respect to determining whether the South African regulatory, institutional, and organisational environment is orientated to employ PPI as an explicit government tool for stimulating innovation as discovered, most of the participants were unfamiliar with the concept of PPI. However, public procurement as general concept appears to be well understood. Furthermore, the participants offered diverse understanding of the concept of innovation.

There is a wide consensus amongst participants that public demand is no longer as significant as before to encourage firms to undertake innovation or set up new facilities. Because public procurement is now based on competitive bidding, the chances of securing a tender have become less certain. Furthermore, the participants indicated that the duration of the tender contracts also discourage manufacturers from exploring new technologies

While the regulatory environment appears to provide scope for innovation, the perception from the participants is that there is limited scope for including innovation as an award criterion in tenders. This could possibly be attributable to the varied understanding of what innovation entails and how it would be included in the tender specification. Unlike other objectives such designation and B-BBEE requirements which are clearly defined, the legislation provides limited guidance on innovation linked criteria in the awarding of tenders. Therefore, the participants are of the view that implementation of the PPI might be challenging.

Public procurement in South Africa is of decentralised nature in that organs of the state undertake procurement of goods and services independently. Of particular concern with changes introduced in 2022PPR is the removal of the provisions for prequalification and local content requirements While the majority of participants from government departments and Eskom understood that the 2022 PPR still require organs of the state to pursue socio- economic outcomes, manufacturers had a conflicting view. The manufacturers viewed these amendments as government no longer prioritising local economic development.

There is consistency in terms of findings from document analysis and interviews as they relate to the innovation system. Participants indicated that there is minimal coordination amongst government departments, various institutions and the private sector with regards to the programmes and initiatives to facilitate innovation. Correspondingly, the various reports reviewing South Africa's Innovation System highlighted significant lack of coordination and fragmentation in the implementation of policies and programmes that sought to promote capacity building within institutions and creating an enabling environment for innovation to flourish.

In terms of public procurer organisational capabilities, there was a general agreement amongst participants that public procurement specialists have adequate skills and are *au fait* with public procurement policies. The challenge is that procurement specialists are reluctant to take risks with procuring new products. The high cost of local products and risk of failure of untested products were some of reasons cited for not procuring new products. As such, they tend to replace 'like for like' items so that the cost and risk of engineering problems are minimised.

The manufacturers indicated the list of technical, regulatory, and health and safety compliance requirements in tender documentation can be burdensome and as such, discourage suppliers to participate t in the tender bid. In addition, corruption and bribery are suggested to be entrenched in public tendering. With regards to innovation capabilities, the majority of manufacturers indicated that acquisition of machinery and equipment to improve production processes as well as product R&D are some of the innovation activities that are undertaken. Public procurement was not particularly considered for conducting innovation activities.

Overall, the results from the document analysis and interviews reconcile to a great extent with regards to the scope for PPI in the South African policy context. It is established that PPI may be a complex tool with many factors involved its implementation. Its successful implementation is reliant on certain conditions being in place.

5 CHAPTER 5 DATA ANALYSIS AND FINDINGS

5.1 Introduction

This chapter presents an in-depth analysis and synthesis of the literature review in Chapter Two as well as the data presented in Chapter Four to answer the research questions. At the centre of the research is the determination of whether PPI is a suitable policy instrument of government to stimulate innovation in the South African context.

The starting point of the chapter is the discussion on the role of public procurement and the conceptualisation of the PPI found in the literature; followed by the analysis and the findings on the factors that influence implementation of PPI. The themes outlined in the conceptual framework, which include framework conditions; public procurer organisational capabilities; and capabilities and resources of domestic suppliers are employed in determining the suitability and implementation dynamics of PPI in South African context.

5.2 The role of public procurement in stimulating innovation

Public procurement is generally understood as the process for purchasing goods and services to deliver public services. It is suggested that economies such as the EU and the UK public procurement expenditure averages at about 20% of the total GDP (Moñux et al., 2016). According to Stats SA (2023), the South African government spent over R200 billion in 2022 in public expenditure representing about 3.3% of total GDP. Out of the total government expenditure, public entities account for about 36% of total capital expenditure.

Because of its significant power and potential economies of scale, public procurement is considered a powerful tool to drive the adoption of innovation and mitigate against the uncertainties associated with undertaking innovation activities. Furthermore, public procurement can provide an environment to experiment with new products where proven options do not address the requirements of the public procurer and promote the emergence or consolidation of markets (Kattel & Lember, 2010: Uyarra & Flanagan, 2010). In addition to its primary role as a vehicle to deliver public goods and services, public procurement is thus seen as an opportunity for economies to pursue various developmental goals, including fostering innovation.

The literature indicates that in recent years, the use of public procurement as a potential tool to address transversal failures relating to innovation has become increasingly popular. OECD (2017) highlights that many governments have explored various models of positioning public procurement as a strategic policy tool to drive innovation. While the literature suggests that there is no single approach to PPI, governments across the industrialised world have adopted PPI as either a stand-alone policy initiative, or as part of general innovation or procurement strategy (OECD, 2017). Moreso, it is found that PPI is largely pursued in governments that had, in prior decades, employed technology procurement policies such as United States and European economies. Only recently in the early 2000s, have developing economies such as China and Brazil begun to experiment with how to orientate public procurement towards the promotion of innovation.

A key finding of the study is that while South Africa has employed public procurement as a general tool to strengthen the capacity and capabilities of domestic enterprises, it seems to not have leveraged its full potential to specifically drive innovation efforts. This may be attributed to the complexity and challenges inherent in the implementation of PPI, as outlined in the literature.

Conceptualisation of PPI

The conceptualisation of PPI has evolved over time, from it being narrowly referred to as the procurement of new technologies (Lember et al., 2013) to currently being understood as public procurement purchases that lead to all kinds of innovation (Sánchez-Carreira et al., 2019). The definition of PPI has widened to align to the broad definition of innovation, characterising innovation as any novel product or process that is new in that particular context, whether new to firm, country, sector, or world. The broad definition considers that not all innovation emanates from R&D but also from incremental changes to already existing products or services. In the context of South Africa, innovation may not necessarily imply novelty in the global context but instead, novelty in the market or firm where the innovation is introduced.

While public procurement is well understood and clearly defined, the participants indicate that innovation is not widely expressed in procurement specific legislation documents. The one central concern is the operationalisation and implementation of PPI. In other words, how innovation will be incorporated as an award criterion in

the public tenders, the evaluation criteria applied, and measurement mechanisms post the award. Moreover, the broad definition of innovation is suggested to present complications in the implementation of the PPI as innovation can be subjective. Therefore, there is a strong need for articulating what innovation entails in each context and establishing specific criteria for its evaluation.

5.3 Conditions for effective implementation of PPI

As established in the literature, unlike regular procurement, PPI is a complex phenomenon and by extension demands for certain preconditions to be in place for its effective implementation. As argued by Moñux et al. (2016), while PPI is a promising policy instrument which seek to mobilise innovation, it is critical to ensure that a number of necessary conditions are first met, and development of PPI takes place gradually and sequentially than rushing into the roll out of the instrument.

The following section provides an analysis of South African context in the relation to themes outlined in the conceptual framework that are considered key conditions for the deployment of PPI.

5.3.1 Framework conditions

Regulatory and policy regime

PPI is positioned as a cross domain instrument which is a combination of procurement and innovation related interventions (Li, 2017) . The existence of favourable framework conditions is major factor in enabling and facilitating innovation throughout the economy. As Moñux et al. (2016) point out the slow implementation of PPI may be explained by the lack of sufficiently supportive legislation framework and regulations ..

The findings from the literature indicate that South Africa’s public procurement system has undergone considerable reforms since the dawn of democracy. At the centre of the reforms were the introduction of a preferential procurement system that sought to address the socio-economic imbalances through the acceleration of social and economic transformation of the historically disadvantaged groups of people. These objectives were enshrined in the 1996 Constitution.

Accordingly, the Constitution is the principal legislation regulating public

procurement in South Africa. Fairness, equitability, transparency, competitiveness, and cost-effectiveness are the core constitutional principles underlying South African public procurement processes and activities. These principles are articulated in various laws governing public procurement. Although there are over eighty legal instruments that govern public procurement (Manyathi, 2019), the primary national legislation that regulates the national, provincial government departments and public entities is the PFMA. The PPPFA and its accompany regulations provide a framework for the implementation of public procurement. All organs of the state are required to develop their own procurement policies in accordance with the framework.

It is established that neither the PFMA nor the PPPFA along with accompanying regulations make significant reference to innovation. Alternatively, the PPPFA affords state organs to formulate certain goals in the procurement of goods and services on the basis of implementing “specific goals” outlined in the RDP policy framework published in 1994. One of the outlined “specific goals” in the RDP is the development and strengthening of the South African economy. Given the importance of innovation in facilitating economic development, it is then implied that the PPPFA provides scope for procuring entities to include innovation as criterion in public tenders towards the attainment of the RDP aspirations. Specific goals may be allocated 20 or 10 points depending on the value of the tender contract. Though not as significant compared to the points allocation for price, organs of the state have the discretion to choose which specific goals to target in the public tenders.

It was found that there is a wide range of procurement methods that allow public entities to procure goods and services outside of the competitive bidding process. These include sole source; single source; limited procurement; urgent procurement to list a few. These require approvals from the accounting authority, in the case of government departments, the accounting authority is the director general, and for public entities, the board of directors is the accounting authority. In addition to these options, the National Treasury provides for strategic sourcing , which is considered an organised and collaborative approach to maximise the bargaining power of the size and nature of government spending (National Treasury 2016). From the above it can then be deduced that there are certain elements provided for in the public procurement regime to serve as basis for PPI.

Despite the absence of specific law or policy on PPI, South Africa appears to have adopted a generic policy disposition to facilitating innovation through public procurement based on the classification of policy modes by developed by Kattel (2010). For example, National Industrial Participation Programme (NIPP) launched by the dtic in 1997 seeks to leverage government procurement in facilitating investment, exports, and technology development. Similarly, National Industrial Policy Framework (NIPF) launched in 2007 identified expenditure from the SOEs as key in revitalizing the local industries and firms and that a greater support for innovation and technology was necessary to increasing investment and sustaining research and development (R&D) expenditure to one percent of GDP. From this perspective it can be concluded that even though PPI is not explicitly expressed many of the government policy documents, there are government programmes that are targeted towards leveraging public procurement to stimulate innovation.

The study found limited evidence of legislation specifically aimed at exclusively support innovation. Instead, the Department of Science and Innovation (DSI) develops a science, technology, and innovation (STI) decadal that sets priorities for innovation. The latest decadal plan was adopted by the Cabinet in 2022 focusing on the 2022-2032 period. The Decadal plan serves as a masterplan for all government departments. Public procurement is positioned in the decadal plan as an important lever for enabling an innovation environment through the leveraging of SOEs procurement spent.

The findings from the literature and policy documents indicate that public procurement is considered an important instrument in driving innovation. Public procurement finds expression in many of the government documents as an important lever to stimulate local development. On the contrary, the findings from the interviews highlight that not many participants view public procurement as strategic tool for government to stimulate innovation. This could be lack of awareness among the participants of the innovation-stimulating potential of public procurement in South Africa, and the heavy domination of supply side instruments (Georghiou et al., 2014; Walwyn & Naidoo, 2020).

In terms of the recent changes to procurement regulations, one significant change pertains to the removal of the prequalification criteria: local content and B-BBEE requirements from the previous 2017 regulations. The participants contended that

the revised procurement regulations have caused uncertainty about how organs of the state will identify specific goals in their procurement processes. It was noted that the majority of the public officials understood that the onus is on the organ of the state to determine socio-economic goals and that public entities still need to comply.

However, the challenge as outlined by several participants is the level of effort and support as public entities have on occasion indicated the burden caused by having to comply with the developmental objectives. This is argued by Uyarra et al. (2014) who found that in implementing PPI, not only education is required but also a fundamental change in the missions of organs of the state so that the promotion of innovation becomes an important objective.

Also, recently the National Treasury published the Draft Public Procurement Bill 2020. The Bill is undergoing parliamentary approval processes. Of note is reference made to innovation in several sections of the Bill. However, it is unclear how innovation will be promoted through public procurement. One participant was also of the view that the Bill appeared to be rushed and is vague on numerous aspects of its implementation. It is assumed that those subsequent regulations will provide a framework on how public procurement will be positioned to drive innovation.

The principles of competitiveness and cost-effectiveness as outlined in the literature requires that an organ of state should, while taking into account other factors, attempt to procure goods or services at the lowest possible cost. In other words, organs of the state should strive to achieve value for money. While price is not the only determining factor, it is allocated the largest proportion in the evaluation and awarding of public tenders.

The majority of the participants indicate that public procurement has become one dimensional with a total focus on the value for money to the detriment of local suppliers. The prevalence of the so-called middlemen (agents) or “importers” conducting business with public entities was provided as an example of strong inclination to buying the cheapest products, thereby discouraging participation of local suppliers in public procurement. Based on the nature of South Africa’s public procurement regime and market openness, it may be challenging to introduce restrictive rules that protect local business. This corroborates the findings by Crespi and Guarascio (2019) that import penetration reduces innovation enhancing effects

exerted by public demand. Thus, a key factor for successful implementation of PPI lies in effectively balancing the issues of value for money and advancing innovation capability building efforts of local suppliers.

The literature on innovation underscores the costly and risky nature of conducting innovation. Accordingly, procurement of innovation is associated with higher than usual cost (whether perceived or real) (OECD, 2017). Therefore, financial support whether through budget allocation or the establishment of a funding support structure is considered one of the key facilitating factors. The majority of the participants indicated that they were aware of programmes established to support innovation.

In terms of participating in financial support scheme, some of the manufacturers interviewed indicated to have participated in government support programmes related to innovation activities in their firms. Some of the programmes highlighted include R&D support, training and development and loan grant for purchasing equipment. Important to note is that the programmes referred to by the participants are mainly provision of inputs to the innovation process, but these were not necessarily targeted at procurement of any product or service resulting from the innovation process.

This supports the argument in the PPI literature that governments have traditionally directed their efforts towards the supply side interventions as opposed to the demand side. The literature suggests that most of the interventions to facilitate innovation are generally skewed towards the supply side. However, that does not imply that the supply side instruments are not as important in supporting PPI. In effect, pre-commercial procurement (PCP) which is generally used to procure goods or service that are not yet available can be considered as more of a supply side instrument. Given the imminent risk of failure and loss of financial investment, to encourage acceptance of these risks, financial instruments remain the important instrument to support procurement of innovation in the field of R&D (OECD, 2017) .Public procurement on the other hand as a demand side intervention, allows an environment to experiment with new products or services and create market certainty which are considered as equally important for innovation.

As Georghiou et al. (2014) argue, to harness the huge power of public procurement

in the direction of innovation, a systemic approach to policy development and implementation involving all stakeholder including officials responsible for supply side intervention is critical to ensure understanding of the role of public procurement in its relation to innovation. Notwithstanding the limited focus on the demand side intervention, some participants also highlighted the lack of coherence in the government programmes. Some participants however indicated the funding or support programmes are fragmented across the departments. For example, it was indicated that one department may only be allowed to support R&D while another department is involved in pre-commercialisation activities. These fragmented efforts are suggested to be some of the barriers that hinder the innovation performance of the local firms.

Given the complexity of PPI, stakeholder coordination have been identified as the top issues to be dealt within the PPI practices (Li, 2015) Strong coordination, effective communication and goal alignment across government departments and other institutions are considered to play a critical role in the implementation of PPI.

The literature indicates that many economies are signatories to international treaties such as WTO GPA an UNCITRAL which guide public procurement at the international level. Subsequently, compliance to these agreements in countries pursuing PPI is considered an issue in the implementation of PPI (Moñux et al., 2016). Since PPI is largely considered, to resemble a discriminatory tool favouring local industries, it is suggested that it is likely to violate some of the rules of these international agreements. However, the literature has highlighted that many of the developing economies are not signatories to the international treaties that govern public procurement and promote free markets. South Africa, although a long-standing member of WTO and the UN is not signatory to the instruments that govern public procurement. Therefore, South Africa is at liberty to employ PPI to advance local development.

Demand conditions

The literature outlines that South Africa's public procurement system is of a decentralised nature where each organ of the state is responsible for its procurement processes and control of their own procurement budget. The National Treasury exercises some element of centralisation but only in monitoring

compliance to laws and regulations, and the development of procurement frameworks.

Furthermore, the National Treasury publishes and maintains a database for all procurement plans of public entities and government departments. These procurement plans are published quarterly and annually on the National Treasury website. All tenders unless otherwise specified are subjected to competitive bidding. The disintegrated nature of demand across organs of state may not be as significant to encourage firms from undertake innovation. The literature indicates that pre-1994, procurement was centralised, and government managed all the procurement functions under the state board, but state owned enterprises operated their own procurement boards (Klaaren, Belvedere, Brunette, & Gray, 2022)

The literature highlights the various advantages and disadvantages of both centralised and decentralised system (Bjørnaas & Schmidt-Horix, 2013). The main argument for centralisation lies in its potential to attain economies of scale (OECD, 2000). The potential to achieve early economies of scale is argued to be an important incentive for local firms to invest in innovation and R&D. Instead of each public entity undertaking procurement individually, Edler et al. (2005) argue that a centralised agency may be able to direct research and technological development and or require harmonisation and potentially induce innovation.

The result from the interview supports the view that public procurement may no longer represents a significant market for local suppliers. While only a few attributed the changes to a decentralised system, the majority attributed the competitive nature of the tender system. It is acknowledged in the literature that PPI may require some flexibility and PPI friendly procedures which support some form of variation from the normal procurement procedure (OECD, 2017). But the empirical literature remains scant on how PPI is implemented in a highly competitive procurement regime.

The market position of the government with respect to the sector that PPI is intended for is another factor for consideration. The literature has indicated that PPI is more favourable in a monopsony where government is the only buyer and technology is at its early stage in its life cycle (Lember et al., 2013). Importantly though, economies of scale must be present to encourage firms to engage in competition

based on innovation. The results from the interviews indicate that the valve sector is relatively mature and that there are several established manufacturers. Furthermore, the valve used by government are also utilised by many other sectors. The majority of the participants indicated that their sales activities are conducted more with the private sector than with the public sector. Therefore, this support the argument that PPI may not be an appropriate instrument for a matured sector in which government does not have monopsonic power.

Innovation system

The importance of an effective innovation systems is emphasised in the literature as critical in providing an enabling environment for PPI. South Africa's national innovation system (NIS) is considered to have gone through fundamental changes since the 1990s, driven by radical changes in its political system and the opening of the economy to international trade, amongst others.

While significant strides have been made in improving the overall NIS, in general the literature contends that the South African NIS is performing poorly compared to its counterparts (NACI, 2006). Some of the challenges outlined in the various reviews of the country's NIS include poor understanding of the NSI and innovation concept; weak linkages and interaction amongst actors within the system; poor education system compared to the international average; limited consideration of demand pull approaches to support innovation, weak human resource base for STI, and absence of a higher national body to advise government on the entire spectrum of innovation policies.

In terms of a lack of understanding of the concept on NSI and innovation concept, the findings from the interview corroborates this observation. The majority of the participants seem unfamiliar with the concept of innovation, which presented difficulties in reconciling its linkages to public procurement. Many of the participants associated innovation with radical innovation. This may be related to the overuse of radical innovation as the main definition of innovation as outlined in the literature.

The majority of the participants indicated that there is limited consultation and linkages between government and the private sector. The majority of participants interviewed stated that they were not aware of any platform that discusses public procurement opportunities nor issues relating to the status of innovation in the

country. One example advanced on limited consultation and discussion between government and the private sector was the selection of sectors to designate and the determine local content thresholds.

Some of the participants were of the view that a top-down approach was taken in determining sectors to support. One issue emphasised was that there was little to no consideration of the impact of designating the valve products on the upstream sector such as the foundries. It was suggested the many foundries had closed over the years due to various economic circumstances and as such the valve manufacturers faced challenges with procuring metal castings for the manufacturing of the valves. The underestimation of the importance of interactions amongst actors within the system is suggested to be the cause of poor performance of some of the designated sectors. It is outlined in the literature innovation emerges from dialogues between government entities, businesses as well as users of innovation (OECD, 2017). Therefore, extensive communication and consultation with all stakeholders is key to limit the unintended destruction of other input or support sectors.

Fragmentation and lack of coherence amongst government department was also emphasised as a problem in implementing policies by the majority of the participants. The findings from the data suggest that while there is some coordination at the ministerial level, there are challenges at the programme implementation levels which support the statement made by the participants of poor intergovernmental coordination. This may cause challenges for the implementation of PPI as it requires strong coordination across the various stakeholders.

5.3.2 Public Organisation Skills and Capabilities

As pointed out in the literature, unlike regular procurement, PPI necessitates a unique subset of capabilities from public procurer and lack of technical expertise or market understanding are considered a key barrier in the implementation of PPI (Edler et al., 2015; Uyarra et al., 2014). Most of the participants indicated that there is adequate expertise in the public entities to conduct procurement in general. This was based on the specific set of skills and qualifications required to assume a procurement function role. It was highlighted that the procurement function exert pressure on the officials to be well informed about the rules and regulations and the implications of non-compliance.

However, PPI is suggested to exert additional requirements on public officials to go beyond decision making based on simple criteria such as price (OECD, 2017). The participants involved in procurement indicated that the supply chain system is well developed in terms of frameworks to provide guidance in the implementation of policies. For example, one participant indicated that in undertaking a procurement project, three bid committees are established, (i) bid specification committee; (2) bid evaluation committee and (3) bid adjudication committee. The critical committee is the bid specification committee as it comprises of a number of officials with various types of expertise to analyse the need that is required and whether the terms of reference (specifications) are clear in terms of the required product or service.

It is suggested that it is unlikely that one person will possess all the required expertise. Therefore, a range of expertise in different fields enables public entities to undertake complex procurement projects. One area of expertise considered lacking was the expertise in the specific field of innovation policy. Some participants indicated they have participated in strategic sourcing activity where the procurement processes bear similarities to PPI.

In terms of risk management, the majority of participants from Eskom indicated that due to the power station having established design and performance parameters, in most cases, engineers would not want to deviate from these by installing new components from different Original Equipment Manufacturers (OEMs). It was indicated that the risk of engineering failure or incompatibility may be too high. Therefore, to mitigate against potential engineering problems, the same product/component is procured from the OEMs.

The results from the interviews support the literature in that many procurers wish to avoid risk to ensure the shortest and the easiest way of covering public needs in short term (Edler et al., 2005). However, in the situation of Eskom participants, there appears to be limited room for experimentation with new machine parts or components due to the risk of increased power failures should the new product fail. Therefore, it may not necessarily be a matter of risk aversion, but rather consideration of possible consequences. Nonetheless, some participants indicated their involvement in the testing of prototypes provided by the local manufacturers. It was indicated that some of the prototypes failed while others were considered for future procurement.

The literature refers to the lack of interaction between buyer and supplier as a barrier to PPI (Uyarra et al., 2014). The majority of the participants confirmed that there are limited interactions taking place prior to official awarding of the contract. The only instance when buyer engages with the suppliers is during the tender briefing sessions where all potential suppliers are present, and queries related to the tender are addressed. Alternatively, an email communication is permissible during tender period only to seek clarification on the published tender.

The risk of being labelled as corrupt was considered a significant demotivating factor for interacting with potential suppliers outside these set parameters. Furthermore, the participants alluded to the absence of a framework to guide interaction between procurers and suppliers outside the formal briefing sessions. However, one participant highlighted that market engagement is permissible in the strategic sourcing approach. In fact, it was emphasised that market engagement was a critical element in strategic sourcing processes. The development of a framework for PPI projects would then be advantageous in guiding the extent and forms of engagements.

5.3.3 Domestic Supplier Resources and Capabilities

Lack of human and financial resources, and excessive financial and administrative requirements to participate in tenders are some of the factors that are considered important for local suppliers to participate in PPI related projects (Sánchez-Carreira et al., 2019). The majority of manufacturers confirm that the requirements to participate in public tenders can be overly restrictive, in addition to requiring significant time and resources. While the restrictive tender requirements were highlighted as factors by manufacturers as discouraging participation in public tenders, participants from government departments and Eskom stated that the majority of the tender specifications were simple to comply with. It was highlighted that most of the suppliers choose to ignore the requirements when submitting their tender proposals. This is considered a major factor in tender proposals being unsuccessful.

Another factor highlighted by manufacturers was corruption amongst public procurers. It was indicated that at times, it is not about lack of capabilities but the bribery and corruption that accompanies the tendering processes. It was suggested

that corruption does not only emanate from the procurers' side but also from the local suppliers' side.

5.3.4 Innovation outcomes

According to the general idea of PPI asserted in the literature, the objective of PPI is to mobilise innovation for the purposes of increasing effectiveness or efficiency in the delivery of the public service not only to enhance the development of new products (Moñux et al., 2016, Edquist & Zabala-Iturriagagoitia, 2012; Kattel & Lember, 2010).) Most of the participants indicated their unawareness of any innovation introduced by the valve manufacturing sector resulting in improved public services. Only one participant provided an example of a valve product that was introduced to resolve a persistent problem of water leakages in the power plant. This in turn improved the efficiency of power plant.

The majority of the participants provided the example of the establishment of the battery energy storage industry which was prompted by the increase in government's procurement of electricity generated from renewable energy sources. Despite a steep increase in renewable energy production over the years locally and globally, the participants indicated that the sector remains dominated by the Chinese and other overseas markets with little participation from local firms. The perception is that public procurement or government as whole has not done enough to support the establishment of locally based firms. As a result, the participants believe that there is a missed opportunity for creating employment opportunities and generating additional tax revenues. In terms of innovation capabilities, the majority of the manufacturers indicated that they conducted some form of innovation activity. The majority indicated that they have in house R&D capabilities, some have purchased machinery to improve production performance; while others in addition to the aforesaid activities, attend global exhibitions and conferences to find out about new developments in the sector. One particular participant made reference to reverse engineering as part of the firm's innovation activity. Furthermore, some of the manufactures alluded to being the only firms in the country to produce certain types of valves. This corroborates the findings of innovation survey conducted by CeSTII (2020), which revealed that many of manufacturing companies conduct

some level of innovation activities and that the majority conducted product innovation.

Accordingly, the literature on innovation theory suggest that more imitative and incremental innovations are more frequently observed in low to middle income countries than in high income economies (Fagerberg, Verspagen, & Srholec, 2010).The results from the interviews confirm this assertion as majority of the participants indicated that they conducted more of improvement activities on the product rather than introducing radically new products.

The majority of participants however indicated that the innovation activities to improve products or processes are not induced by participating in public tenders. Rather, many of the participants indicated that the private sector contributes to the stimulation of innovation activity. This supports the findings of the survey revealing that most of procurement contracts do not require innovation to be conducted as part of the contract. This may be due to the nature of public entities' technology requirements since most of the processes are well established, therefore tender requests may tend to be repetitive in the valve sector.

The findings of the study indicate that indeed manufacturing companies conduct innovation activities which are mainly incremental in nature, thereby supporting the theory of innovation associating the nature of innovation activity to the stage of economic development of an economy (Verspagen, 2001). Furthermore, the findings support the assertion of the TLC model, that competitiveness in matured technology is based on incremental improvements and economies of scale (Kalthaus, 2020; Lin et al., 2021).

Given the highly competitive nature, the deep import penetration, and the current technological lifecycle stage of the valve sector, results from the interviews support the literature suggesting that PPI may be more suitable in stimulating technology in early stages of the technology life cycle rather than at maturity stage (Geroski, 1990).

With regards to local capabilities to manufacture high pressure/ high temperature valves, some of participants indicated that it is not about the technical capabilities, but the financial resources required to manufacture these types of valves. It was indicated that due to the relatively small market in South Africa, it is not financially

viable to manufacture these products only for the public sector. Some of the participants maintained that the stringent safety and technical performance requirements, unavailability of technological capabilities and large capital requirement are the main barriers for local manufacturers to produce high pressure/ high temperature valves.

While the literature suggests that public procurement may be used to address transversal failures relating to the innovation process (Chicot & Matt, 2018), due consideration should be given to the maturity or technology readiness levels of solutions which may be offered by suppliers and the rationale for stimulating innovation (Lenderink et al., 2022). The technological lifecycle of valve manufacturing seems to have reached maturity given the indication of innovation efforts focussed more on process innovation activities than product innovation. Additionally, the findings point to a high concentration of imports in the sector with private sector demand playing a dominant role. Therefore, the rationale and the choice of sector for implementing PPI are crucial for achieving the desired outcome.

5.4 Conclusion

The conclusion from the review and analysis of the data collected suggests that in South Africa public procurement has been utilised in some form as a lever to stimulate innovation, although innovation was not as explicitly stated as the ultimate objective. Firstly, the study found that there is some provision made in the public procurement legislation to include innovation as award criterion in the evaluation of tenders. The main challenge is the operationalisation of innovation itself and the matrices to be used in evaluating innovation activities.

It was found that while local manufacturers engage in some form of innovative activity the concept of innovation remains unclear, not only to manufacturers but to the other participants as well. The participants' associated innovation was with breakthrough or radical type of innovation outcome. Therefore, the issue is not necessarily about whether there is scope for innovation to be included as an award criterion but rather about how it will be incorporated and evaluated in the tendering process.

Secondly, public procurement is included in many of the industrial policy documents and STI related documents as an important lever for government to support

innovation and the technological development of local firms. Therefore, the orientation of public procurement in South Africa corresponds to what has been proposed as a generic PPI policy instrument.

Lastly, the recent introduction of Draft Procurement Bill demonstrates government's efforts in placing innovation within the realm of public procurement. However, it is unclear how innovation will be promoted through public procurement. It is anticipated that subsequent regulations will provide a framework on how public procurement will be positioned to drive innovation.

While PPI has become a popular instrument in driving innovation is many advanced economies, its implementation is considered challenging. Unlike regular procurement, PPI seem to demand strong alignment and coordination at all levels of government; flexibility in the procurement processes; regular engagement between suppliers and procures; and additional technical expertise and financial resources from both the public procures and the suppliers; amongst others. These factors are considered key to the successful implementation of PPI. It has been suggested by the various reports reviewing the South African NSI that extensive organisational and institutional reforms are required to create an enabling environment for innovation to flourish. PPI will therefore require strong dialogue and coordination between key stakeholders and extensive review of regulatory framework for its mobilisation as an instrument to facilitate innovation.

6 CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The study explored whether there is scope to employ public procurement of innovation in South Africa. The case study of the local valve manufactures was employed to determine the suitability and implementation dynamics of PPI. The perception from the local valve manufacturers, government departments officials and Eskom were sought. The objective of this chapter is to summarise the major findings, draw conclusions concerning the regarding the suitability of the PPI and to make recommendations.

6.2 Research Question and Proposition

In the main, the objective of the study was to explore the suitability of PPI as an explicit government tool to stimulate innovation.

The research questions and the statement of propositions of research are as follows:

RQ1: What is the role of public procurement in stimulating innovation?

a) What approaches have been used to position public procurement as tool to stimulate innovation the valve manufacturing sector?

P1: Due to its market size and significance, public procurement can be used to encourage innovation and capability building in domestic companies while at the same time improving the delivery of public services.

Many economies employ various approaches in launching PPI. PPI is most effective as a component of industrial policy.

RQ2: What are the conditional factors for effective implementation of public procurement of innovation?

a) Is the South African regulatory, institutional, and organisational landscape conducive to employing PPI as an explicit government tool for stimulating innovation in the valve manufacturing sector?

P2: Three main factors determine the success of PPI namely, framework conditions which relate to the environment in which firms innovate and the legislative background; the capability and resources of the public organisation; the environment in which firms innovate and the legislative background; the availability of competencies and

capabilities within the procuring entities; as well as the competencies and capabilities of the domestic firms (Sánchez-Carreira et al., 2019).

RQ3: How has public procurement improved the innovative performance of local valve manufacturing sector since its designation

P3: Through demand articulation public procurement has enabled the South African local valve manufacturing to pursue innovation, enhance their products and services and achieve globally competitiveness.

6.3 Main Findings

Public procurement has become increasingly popular as a tool for the government to stimulate innovation in addition to its main objective. Due to its potential market size and significance, many economies such as the EU and UK are utilising public procurement as a vehicle to encourage innovation and capability building in domestic companies

However, the research reveals that there is limited knowledge of the concept of PPI. Moreover, the concept of innovation in general remains elusive to the majority of the participants. While public procurement is generally well articulated with extensive legislation guiding its processes and systems, the study finds that there is limited reference made to innovation in procurement specific legislation documents. The perception from the participants is that there is limited scope for including innovation as an award criterion in public tenders.

The one central concern identified in the study is the operationalisation and implementation of PPI. Essentially, the concerns relate to how innovation will be incorporated as an award criterion in public tender, the evaluation criteria applied, and measurement mechanisms post awarding of the tender. Unlike other criteria such as local production designation and B-BBEE requirements which are clearly defined and understood, innovation in its broad definition is suggested to present complications in the implementation of the PPI, as innovation tend to be subjective.

There is a wide consensus amongst participants that public demand no longer plays a significant role in encouraging firms to undertake innovation or set up new facilities. Given that public procurement is currently based on a competitive bidding system, the chances of securing a tender have significantly diminished. Furthermore, the

participants indicated that the duration of the tender contracts and scattered demand tend to discourage manufacturers from exploring new technologies.

Participants indicated that there is little coordination amongst the various government departments and institutions, as well as with the private sector. It was established across the various review reports that South Africa's Innovation System is uncoordinated and fragmented with regards to the implementation of policies and programmes that sought to promote capacity building within institutions, and to create an enabling environment for innovation to flourish. Given the demanding nature of PPI, these challenges inherent in South Africa Innovation System may impede the implementation of PPI in various sectors.

Most of the participants indicated that there is adequate expertise in public entities to conduct procurement in general. This was based on the specific set of skills and qualifications required to assume the procurement function role. It was highlighted that the procurement function exerts pressure on the officials to be well informed about the rules and regulations and implications of non-compliance. The challenge is that procurement specialists seem reluctant to take risks with procuring new products. The perceived high cost of local products and risk of failure of untested products were among the reasons cited for not procuring new products. The findings of the research highlight that there appears to be a greater effort in ensuring adherence to public procurement rules and regulations than exploring other opportunities that public procurement presents, such as advancing innovation.

The manufacturers indicated that the list of technical, regulatory, and health and safety compliance requirements in tender documentation are overly demanding and can be a barrier to participating in the tender bids. In addition, corruption and bribery are suggested to be entrenched in public tendering, and as a result many local suppliers have become discouraged to participate in public tenders.

With regards to innovation capabilities, the majority of manufacturers indicated that acquisition of machinery and equipment to improve production process as well as product R&D are some of the innovation activities that are conducted. However, public procurement was indicated as not playing a significant role in conducting innovation activities.

PPI is considered a complex tool with many factors involved its implementation. Its

successful implementation is reliant on certain conditions being in place. The case of the valve manufacturing sector sought to illuminate the complexities and dynamics in the implementation of PPI. While PPI has been considered a valuable tool to enhance the delivery of public goods and services and advance developmental aspirations by developing economies, the complexities and weaknesses inherent within the South African regulatory, organisational, and institutional landscape may present major difficulties for the implementation of PPI as a policy tool.

6.4 Recommendations

The recommendations are based on enhancing an environment for innovation:

- The South African innovation policy environment seems to be dominated by supply side instruments. There is a limited focus on demand side instruments. To create an environment where innovation can thrive, a balanced use of both supply side and demand side instruments is required. By elevating innovation to a more or less similar status as B-BBEE within public procurement may improve the conditions for firms to increase innovation output.
- The National Treasury and the DSI should lead efforts in developing a practical framework providing matrices for measuring innovation activity that will enable organs of the state to consider and/or incorporate it as part of the award criteria in their procurement policies.
- The selection of strategic sectors to designate for public procurement or any other support instrument should involve a comprehensive assessment of both local and global economic conditions and extensive communication and consultation across the key stakeholders. This is critical in determining the appropriate policy instruments to employ and mitigating against potential negative effects on the economy and the society.
- Reviews of performance of government interventions should be conducted regularly to determine if the desired objectives have been achieved or there is need for an alternative intervention.

6.5 Limitations and Further Studies

6.5.1 Limitations of the Study

The limitations of the study are as follows

- The research is limited to the manufacturing of valves used in power generation. Therefore, the study is not generalisable to all manufacturing sectors due to different contextual factors.
- Due to the increased attention on procurement activities at SOEs, more engineering officials were interviewed than procurement officials, as procurement officials have become more guarded in discussing public procurement matters due to fear of self-incrimination.
    - The study only focussed on the manufacturing companies that are owned by South African citizens. There are other manufacturing companies that are owned by foreign companies that are suppliers to Eskom.
    - The study only focussed on one public entity, but there are other public entities that utilise valves. Therefore, it may not be representative of all public sector perspectives, but some of its insights should nevertheless be transferable when justified

6.5.2 Suggestions for Future Research

The study only used the valve manufacturing industry as a case to determine the suitability of PPI as an instrument to drive innovation. The valve sector is relatively mature and therefore studies should be considered which could look at nascent industries like battery energy storage where demand from public procurement reflects as lead users of technology.

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APPENDIX : 1

Interview Guide : valve manufacturers

PART A

INTRODUCTORY QUESTION

i. Name:
ii. Role in the company and area of responsibility.
iii. Percentage split of your business between public entities and private entities
iv. Number of people employed in the organization.

PART B

FRAMEWORK CONDITIONS

1. What has been your experience on the role of public sector demand in the sustainability of local manufacturing firms?
2. In your experience, how has the public procurement system assisted in promoting local manufacturing?
3. In your experience, how has the tendering system changed in the past 10 years?
4. Is there scope in the tendering system to incorporate innovation (innovation considered as product/service that is new to the firm/industry/country/world) as a criterion awarding of the tender? If so, what is the best approach?
5. Are there platforms that exists that facilitate engagement between government, state owned entities, industry, research organisation and academia on public sector needs and public procurement in general?

PUBLIC ORGANISATION CAPABILITIES AND RESOURCES

6. What has been your experience in the engagement with procurement officials whilst pursuing a tender opportunity?
7. What has been your experience in introducing a novel product/ service to Eskom or any public organisation?

8. What are the kinds of risks do public procures face in procuring new/ novel products?
9. In your experience, what skills and resources are required in public entities to undertake procurement of complex/novel products?

DOMESTIC SUPPLIER RESOURCES AND CAPABILITES

10. What do you find challenging when participating in public tenders?
11. What new product/ process has your company introduced in the past five years?

INNOVATION OUTCOMES

12. What government programmes/initiatives does the company participate in aimed strengthening capability and capacity of local manufactures ?
13. What organisations/ institution does the company collaborate with in the developing new products/services?
14. Do you have any examples whereby public entity was the first user of a product/ service that was later adopted by various sectors?

PART C

CLOSING

15. What is overall your opinion on using public procurement as a policy instrument to drive innovation?

APPENDIX : 2

Interview Guide: Procurement legislation specialist/ government department

PART A

INTRODUCTORY QUESTION

i. Name:

ii. Position and area of responsibility .

iii. Experience in public procurement and/ or innovation

PART B

FRAMEWORK CONDITIONS

1. What has been your experience on the role of public sector demand in the sustainability of local manufacturing firms?
2. In your experience, how has the public procurement system assisted in promoting local manufacturing?
3. What changes have been introduced into public procurement in the past 10 years?
4. What are the types/models of public procurement that procuring entities can employ to procure novel/ complex goods? What are the processes prescribed in undertaking the procurement of novel /complex products?
5. Is there scope in the procurement regulations that incorporate innovation as a criterion in public tender? If so, what are the relevant provisions ?
6. What are the existing platforms that facilitate engagement between government, state owned entities, industry, research organisation and academia on public sector needs and public procurement in general?
7. Is there an agency that oversee the implementation and compliance to public procurement procedures across government?

PUBLIC ORGANISATION CAPABILITIES AND RESOURCES

8. Do you find that procurement specialist at public organisations/ state owned companies have difficulties in interpreting provisions of the PFMA and PPPFA? Which specific provisions are found to be for public procurers?

9. What kinds of risks public procurers face in procuring new/ novel products?

10. In your experience, what competencies are required to undertake procurement of complex/novel products? Are these currently available in procuring entities?

11. What skills development programmes exist to assist public procurers in undertaking procurement of novel/ complex products? If not available , what programmes are required?

DOMESTIC SUPPLIER RESOURCES AND CAPABILITES

12. In your experiences, what are the challenges hampering local manufacturing firms from participating in public tenders?

13. What programmes/ initiatives aimed at building local manufacturing capability and capacity through public procurement do you know of?

INNOVATION

14. Do you have any examples whereby innovative products/ solutions have been produced as a result of public procurement?

PART C

CLOSING

15. What is overall your opinion on using public procurement as a policy instrument to drive innovation?

APPENDIX : 3

Interview Guide : Eskom Officials

PART A

INTRODUCTORY

i. Name:
ii. Position and area of responsibility .
iii. Experience in public procurement and/ or innovation

PART B.

FRAMEWORK CONDITIONS

1. What has been your experience on the role public sector demand in the sustainability of local manufacturing firms?

2. What regulatory directives do you have to consider in procuring goods and services?

3. In your experience, how has public procurement system assisted in promoting local manufacturing?

4. In your experience, how has the tendering system changed in the past 10 years?

5. Is there scope in the procurement regulations to incorporate innovation as a criterion in public tender? If so, which specific provisions provides for the

6. Are there platforms that exists that facilitate engagement between government, state owned entities, industry, research organisation and academia on public sector needs and public procurement in general?

PUBLIC ORGANISATION CAPABILITIES AND RESOURCES

7. Do you find difficulties in interpreting provisions of the PFMA, PPPFA and its regulations in undertaking procurement? Which specific areas presents difficulty in the public procurement cycle?

8. What processes do you follow in the procurement of novel products/ services?

9. In your experience, what skills and resources are required to undertake procurement of complex/novel products? Are these currently available in public entities?

10. What are the kind of risks do public procures face in procuring for new/ novel products?

11. What skills development programmes exist to assist public procurers in undertaking procurement of novel/ complex products?

DOMESTIC SUPPLIER RESOURCES AND CAPABILITES

12. What challenges hamper local manufacturing firms from participating in Eskom tenders?

13. What new products/ services have been introduced by local valve manufacturers in the past five years? To what extent was it attributable to participating public procurement

INNOVATION OUTCOMES

14. Do you have any examples whereby innovative products/ solutions have been produced as a result of public procurement?

15. Do you have any examples whereby Eskom was the first user of a product/ service that was later adopted by various sectors

PART C

CLOSING

16. What is overall your opinion on using public procurement as a policy instrument to drive innovation?