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A paradigm-shift in mitigating health public-private partnership risk: A systems thinking approach.

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ABSTRACT

This study sought to explore whether a paradigm shift is needed to implement a Systems Thinking approach in risk mitigation strategies on Public-Private Partnership (PPP) projects. Underpinned in Principal Agent Theory and Systems Thinking, the study followed a qualitative methodology. Semi-structured face-to-face interviews were conducted over a month. Ten practitioners from the public and private sectors, with relevant South African health sector PPP experience, were purposively selected.

Key study findings revealed different perspectives held by public and private parties regarding risk identification, analysis and mitigation, driven by their conflicting mandates. Institutional knowledge loss within the public sector was found to erode the rigour of risk mitigation. Barriers to adopting a Systems Thinking Approach were: entrenched standards validated by existing international practice, culture of silo-ism; lack of leadership support for innovation and bureaucratic processes.

The study has business implications since optimal risk allocation influences private sector investment appetite. Private sector collaboration is critical to achieve the infrastructure goals set out by the National Development Plan. Key study insights propose policy amendments, knowledge management and a mind-set change to mitigate health PPP project risk. Areas for future research are delineated.

KEYWORDS: Health PPPs. Principal Agent Theory. Systems Thinking. Risk mitigation. Infrastructure Development.

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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CHAPTER ONE: THE RESEARCH PROBLEM

1.1 Introduction

The health sector in South Africa is in distress. During 2018, numerous reports in the public domain exposed the collapse of several provincial health services attributed to various reasons. The cases in KwaZulu-Natal, North West, and Gauteng in particular, made breaking news due to an unprecedented number of deaths in appalling hospital conditions. Equally, a number of healthcare articles and proliferation of grey literature covered in both print, electronic and broadcast media (eNCA, 2018; Power FM, 2018; Business Day, 2018) reported concerns of dilapidated hospital infrastructure and deteriorating health care service delivery. The Chairman of the South African Medical Association (SAMA) echoed the state of the health system by adding that "it is suffering from a crisis of leadership" (Lindeque, 2018). Other reported challenges include a chronic shortage of human resources and overcrowding of facilities with an ensuing disastrous impact on service delivery. The Office of Health Standards Compliance (OHSC) report amplified the seriousness of the situation through disturbing statistics. The OHSC report revealed that of the 696 hospitals and clinics inspected in 2016/17, only five complied with the Department of Health's 80% pass mark for norms and standards (Khan, 2018). Health sector Public-Private Partnership (PPP) projects aimed at improving existing hospital infrastructure have stalled in recent years (Ngamlana, 2018; National Treasury, 2018), contributing to the current crisis in health services delivery.

This research explores the use of a Systems Thinking Approach to mitigate health PPP project risk. The outputs of this research are important since improved risk mitigation and appropriate allocation thereof, have a direct bearing on the private sector's investment appetite. Private sector investment through PPPs has been articulated as a vehicle through which government can realise the National Development Plan's (NDP) public infrastructure goals (National Planning Commission, 2012). From government's perspective, if PPPs are seen to deliver value for money through appropriate risk mitigation and allocation, they can be utilised as an appropriate response to the health sector's infrastructure challenges and enable the government to improve delivery of health services.

1.2 Background to the Research Problem

One of the principles adopted in the constitution of The World Health Organisation in 1946 reads as follows: "*The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition*" (WHO, 1946, p. 1). Access to quality affordable health care should, therefore, be a developmental imperative for all, particularly developing countries. The responsibility which governments hold in ensuring the health of their people was further entrenched by the United Nations. Good health and wellbeing is goal number three of the United Nation's 17 Sustainable Development Goals (SDG) which represent a "*shared vision of humanity and a social contract between the world's leaders and the people*" (Ki-Moon, 2016). The SDGs were articulated as part of the United Nations 2030 Agenda for Sustainable Development adopted unanimously by 193 Heads of State and other top leaders at a summit at UN Headquarters in New York in September 2015 (United Nations, 2015). The World Economic Forum's Global Competitiveness Report supports this by highlighting that health and primary education are basic requirements needed for factor-driven economies to be competitive (Schwab, 2017).

With growing constraints on resources, governments in developing countries experience challenges in delivering essential public services to communities and continue to look for innovative ways to collaborate with private entities to leverage on their collective infrastructure, human capital and financial resources and expertise. According to The World Economic Forum's Global Competitiveness Report, PPPs can serve as an instrument through which governments and the private sector can collaborate on to resolve market failures in a country's economy (Schwab, 2017). Looking specifically at the health sector, the 2013 World Bank Group Strategy echoed this sentiment and indicated that they had incorporated PPPs and other vehicles which allow for private sector participation as a response to country health challenges (World Bank, 2016). Few studies focus on health sector PPPs. This study sought to fill that gap and may provide insights into the challenges experienced resulting in stalled health sector PPPs.

As governments across the globe seek to access the expertise and capital available in the private sector, researchers worldwide have explored various aspects of PPP policy

(Chan, Lam, Chan, Cheung & Ke, 2009). All concerned parties are exploring how best to deliver PPP projects. Success factors for PPPs have attracted interest from researchers around the world (Ke, Wang, Chan, & Cheung, 2009; Tang, Shen & Cheng, 2010; Olusola Babatunde, Opawole, & Emmanuel Akinsiku, 2012; Ismail and Ajija, 2013). The most successful country in implementing PPP infrastructure projects is considered to be the United Kingdom (UK) with PPP projects accounting for 11 percent of government spending in 2002 (Bing, Akintoye, Edwards & Hardcastle, 2005). This high success rate seen in the UK can be attributed to effective communication between the role players regarding the allocation of risk (Bing, Akintoye, Edwards & Hardcastle, 2005). China has enjoyed success since the implementation of PPP's in China in 1970 to promote infrastructure development (Adams, Young & Zhihong, 2006). The PPP approach was so effective in meeting their infrastructure development needs, it became the preferred financing approach. The projects in China have spanned across many different industries such as transport, construction, water plants and sewage treatment projects (Cheung & Chan, 2011). China has subsequently been the subject of considerable research on PPPs because of its vast experience across different industries. Some of these projects have not been successful, however, due to inadequate risk management. As further evidence of the research interest in PPP success factors, Osei-Kyei and Chan (2015) conducted a study to review studies done on PPP critical success factors selected from top-tier academic journals from 1990 to 2013. They found that the countries of focus for most research studies on PPP CSF's have been Australia; UK; China and Hong Kong. The main factors identified were appropriate risk allocation and sharing, a strong private consortium, political support, public/community support, and transparent procurement (Osei-Kyei and Chan, 2015, p. 8).

Despite the focus on critical success factors, the implementation of PPPs remains a challenge worldwide. PPPs have received acceptance from developing countries as a viable alternative to traditional government projects. Implementation however, remains a challenge as seen in developed countries. In a study investigating the critical success factors for PPP projects in Kuwait which were seen as a solution to resolve the severe public housing shortage, Helmy (2011) found that many obstacles were encountered in project implementation. These included regulatory and bureaucratic processes which inhibit private sector participation such as long document cycles which delay approvals, insufficient project skills to execute, and contractual disagreements between the public

authorities and the private parties, and within the different players in the private consortia themselves. Ismail and Azzahra Haris (2014) looked at the constraints in implementing PPP projects in Malaysia. These authors found that the issues causing hinderance were related to "*lack of government guidelines and procedures on PPP; lengthy delays in negotiation; prolonged political debate resulting in delays; lack of clarity around the government's objectives in pursuing the PPP model; and higher charges to direct users*" (Ismail and Azzahra Haris, 2014, p. 244). Sastoque, Arboleda and Ponz (2016) found that the implementation of social infrastructure PPP's is Columbia was even more challenging, because uncertainties regarding future cash flows and appropriate risk transfer, weakened the business case and private sector investment appetite.

PPPs are generally undertaken if they provide superior value for money over traditional government contracts. Value for money is demonstrated when private sector services are provided at a lower cost than the same quality and quantity of service provided by the government. Private sector efficiency is the advantage which allows the project to deliver value for money. This project efficiency translates into lower costs, fewer delays, and reduced budget over-runs due to superior project management skills. Sarmento and Renneboog (2014) argue that optimal risk allocation is a critical driver of efficiency in the PPP model since value for money can only be achieved when the private sector carries sufficient risk to incentivise the correct cost control behaviour. Sarmento and Renneboog (2014) also showed that most government's risk analysis approach is far too simple given the inherent complexity of PPP projects.

A study done by the World Bank showed that many countries use PPPs because they have no alternative due to capacity and financial constraints, as opposed to turning to the PPP model because it has demonstrated value for money. The PPP model is seen to create fiscal space, and in some instances, the value for money criterion is only applied after the decision has already been taken to implement the project via a PPP. In these instances, this renders the value for money analysis irrelevant as a decision-making tool (World Bank, 2013). The value for money assessment was also challenged by Henjewele, Sun and Fewings (2011) in their study looking at critical parameters influencing value for money variations in Public Finance Initiative projects in the healthcare and transport sectors in the UK. They argued that the value for money assessment changes during different project stages which renders it ambiguous and circumstantial. They go on to differentiate between the development stage, where value for money is demonstrated by achieving the best combination of quality and cost. This changes at procurement when value for money is demonstrated by the cost difference

between the PPP and a traditional government project. Finally, at the operational stage value for money is demonstrated by overall satisfaction with services. PPP projects in South Africa must pass the triple test which includes affordability, appropriate risk transfer, and value for money to get National Treasury Approval (National Treasury PPP Manual, 2004). If the current assessment of value for money is contested as a precursor for project success, this builds the business case to understand project risk mitigation and allocation practices better so that PPP projects can deliver the envisioned value for money.

The South African Development Community (SADC) has also recognised the challenges which accompany PPPs on the continent. Systemic problems such as limited experience and expertise, lack of organisational resources and inappropriate risk allocation put their successful implementation at risk. These weaknesses have an impact on project success (South African Institute of International Affairs, 2012). South Africa is not immune to the challenges experienced globally and in the SADC region in PPP implementation. According to The National Treasury, the number of new PPP projects in South Africa has declined over the past six years (National Treasury, 2018, p. 158). This decline is despite a sound regulatory framework to ensure transparency in procurement, manage associated risk, and provide a return on investment for the private sector. According to The Government Technical Advisory Service (GTAC), eight health sector PPP hospital projects were cancelled after the feasibility stage of the project cycle (Ngamlana, 2018). It is essential to understand why these projects stalled since this will ultimately impact negatively on the delivery of health services. The National Development Plan (NDP) of South Africa has suggested that public infrastructure spending should increase to 30% of GDP by 2030 to stimulate economic growth and improve delivery of services to communities (National Planning Commission, 2012. p. 44). An exploration into the rigour of risk mitigation on PPPs is therefore essential to encourage private sector participation.

Given the background described above, it is clear from the research problem that the PPP arrangement may not be the panacea of the distressed health system particularly in the context of a country such as South Africa. Much is required to bring solutions to the state of affairs of the collapsing health system through unpacking the PPP discourse. This research is important as it proposes a new way of thinking for PPP practitioners to analyse and mitigate risk through the project cycle.

1.3 Research purpose and objectives

The purpose of this research was to explore and understand how risk is currently mitigated in PPP projects. Of critical importance to this study was to establish whether a shift in paradigm is needed to identify, analyse and mitigate project risks particularly in health PPPs through implementing the Systems Thinking Approach.

The research objectives were framed to build on Loosemore and Cheung's (2015) study and sought to explore the following:

1. How project risk in health sector PPP projects is being mitigated.
2. The reasons why Systems Thinking is not widely adopted in the South African health sector PPPs.
3. The barriers to adopting Systems Thinking to mitigate risk in South African health sector PPP projects.

It is envisaged that a thorough exploration of these objectives could yield specific insights into the challenges experienced on previous projects and perceptions about the difficulty of moving to a new approach. It is hoped that the research will contribute to the development of an enhanced risk mitigation approach.

1.4 Research Scope

The scope of the study included South African health PPP projects. The focus was on those which have reached financial closure to date, those which have stalled, and those in the project pipeline. The study reviewed the current risk analysis and mitigation processes and explored perceptions around the desired change in the existing risk management practices of PPPs. The study limited itself to two main constructs: Risk mitigation and Systems Thinking.

CHAPTER TWO: THEORY AND LITERATURE REVIEW

2.1 Introduction

This study sought to propose a different way of thinking about how risk can be mitigated in health PPPs. The chapter commences with a review of relevant literature on the conceptual understanding of PPP agreements. It briefly gives an analysis of the PPP project cycle, current risk mitigation practices and the challenges of PPP project implementation. Through a review of existing literature, the chapter demonstrates that no single theory underpins the study of the PPP agreements. This view is shared in an editorial reviewing discussion papers coming out of a workshop held at the Sorbonne University, in June 2010 on "Contracts, Procurement, and Public-Private Arrangements" (Saussier, 2013).To that end, the theoretical underpinning of the research is eclectic. It borrows some elements of the Principal-Agent theory and proposes Systems Thinking as the more appropriate theory to manage risk holistically in PPPs.

2.1.1 Conceptual Discourse on Public-Private Partnerships (PPP)

Several definitions have been suggested for PPPs by both researchers and practitioners (Cuttaree & Mandri-Perrott, 2011). It was important for this study to clearly define PPPs and differentiate them from traditional government projects where the government pays for the upfront capital costs and the operating costs of the project. In traditional government projects, the state also assumes responsibility for project costs associated with late delivery and overruns. For this study, the National Treasury definition will be used which defines PPPs as:

> "*A contract between a public-sector institution and a private party, where the private party performs a function that is usually provided by the public sector and/or uses state property in terms of the PPP agreement. Most of the project risk (technical, financial and operational) is transferred to the private party. The public sector pays for a full set of services, including new infrastructure, maintenance and facilities management, through monthly or annual payments*" (National Treasury, 2018, p. 153).

Risk allocation is a crucial component of PPPs, as can be seen in the differentiation between traditional government projects where the state assumes the risk, and the

definition stated by National Treasury where project risk is transferred to the private party. The appropriateness of this risk allocation, however, impacts the private sector's investment appetite, and when inappropriate, limits private sector participation. Hwang, Zhao and Gay (2013) conclude that the risks should be allocated to the party best equipped to handle them at the lowest price.

The figure below demonstrates the upfront capital expenditure, the costs associated with project delays and overruns, on-going operational costs and the risks assumed by the government in traditional government projects. Once the project is completed, the budget for operations and maintenance is often open to debate, and may eventually be reduced or even postponed, particularly when there is fiscal pressure to cut government spending. Reduction in the operations and maintenance budget can lead to an escalation of overall project costs (NCPPP, 2012).

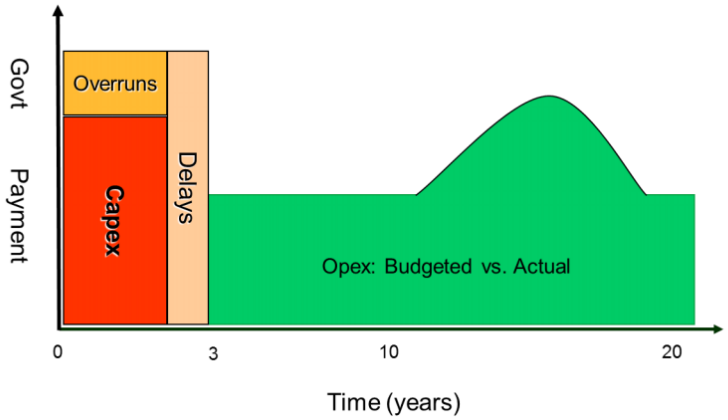


Figure 1: Traditional Government Project Procurement
Note: Reprinted from Pillay (2014) SADC PPP Network

Traditional government projects are contrasted with the following figure which demonstrates the PPP scenario where the government only begins to pay upon project completion and delivery. All services are bundled together in the PPP contract. Upon project completion, the annual payment received by the private sector is inclusive of operations and maintenance. The terms and duration of such payment are stipulated within the contract thus providing a guarantee that the facilities will be maintained and repaired (NCPPP, 2012).

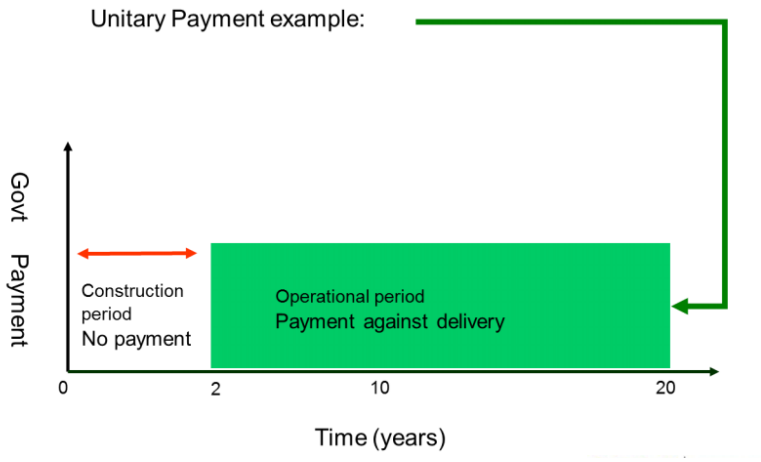


Figure 2: Government Unitary payments upon project delivery
Note: Reprinted from Pillay (2014) SADC PPP Network

PPP infrastructure projects were first introduced in South Africa in 1998 (National Treasury, 2018). As of 2018, there have been a total of 33 implemented projects with a total capital investment of R 89.3 billion. These projects have been in various sectors (National Treasury, 2018).

The figure below illustrates the typical PPP structure in South Africa where the private party enters into an agreement with a public sector entity through a special purpose vehicle (SPV) created for the project.

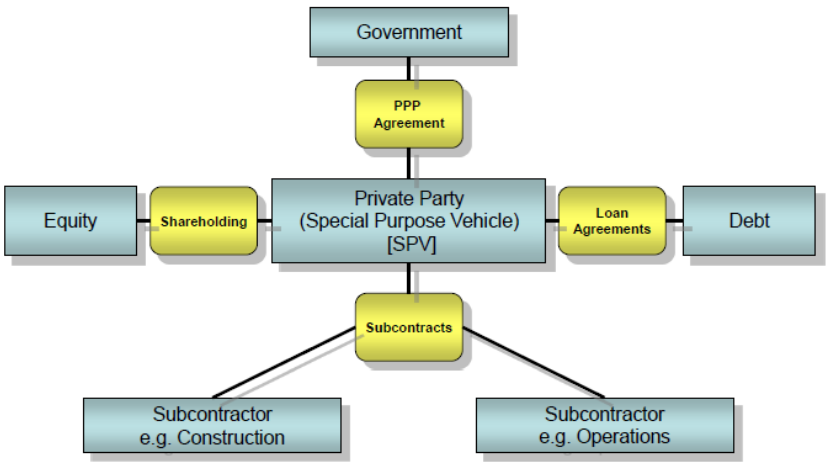


Figure 3: Typical PPP structure
Note: Reprinted from Aiello (2014) Government Technical Advisory Centre (GTAC)

PPP projects in South Africa can be classified according to the contractual arrangements involved, which are:

1. "*Design, finance, build, operate and transfer (DFBOT)*
2. *Design, finance and operate (DFO)*
3. *Design, build, operate and transfer (DBOT)*
4. *Equity partnership*
5. *Facilities management projects*" (National Treasury, 2018, p. 153)

According to National Treasury, "*of the 33 implemented PPP projects, 25 are DFBOT projects; four are DFO; two are DBOT; one is an equity partnership and only one a facilities management project*" (National Treasury, 2018, p. 154). The following departments have been involved – Department of Transport with the largest spend, Water and Sanitation; Correctional Services; Health; Tourism; Information Technology and Office Accommodation. Of the eight health sector projects reviewed in this study, five were DFBOT projects, one a DBOT project, one an equity partnership and one a facilities management project. (See Annexure A)

Montagu and Harding (2012) and Barlow, Roehrich and Wright (2013) argue that the mechanics and benefits of infrastructure PPP projects translate imperfectly in the health sector. They suggest that the confusion in the health sector comes from the different perspectives held by infrastructure professionals who seek to bring the benefits of access to private capital, transfer of investment risk and the ability to consolidate the financing, building, operating and maintaining activities into one contract which government can easily manage. Brown (2007) articulates that infrastructure professionals focus on access to private capital as the core benefit derived from PPPs. This perspective is contrasted with that held by service professionals who believe that the benefits of PPPs are to access private sector management expertise, operational efficiency and care delivery models to public hospital. The core benefits of hospital PPPs according to the service professionals group are to bring private sector management systems to improve efficiencies and service delivery in hospitals (Dorgan, Layton, Bloom, Homkes, Sadun & Van Reenen, 2010). According to Montagu and Harding (2012) because of these different perspectives, inappropriate models have been used to implement health sector PPP projects around the world which may have a bearing on project success. They propose that perhaps health sector PPPs should be categorised according to their focus- in other words, whether they are service or infrastructure focused. These proposed categories are shown in the following table.

Table 1: A proposed typology of PPPs in the health sector

PPP Model/Type	Common Term	Definition/Explanation
Health Services Only	Operating Contract (Performance-based contract)- Concession, lease	A private operator is brought in to operate and deliver publicly funded health services in a publicly owned facility
Facility Finance	DBFO; BOOT, UK's PFI	Government contracts a private entity to finance, design, build and operate a hospital facility. The government provides health services within the facility
Combined	BOT	A private organisation establishes capacity (through new construction or expansion of existing facility) to provide free or subsidised health care services to a defined population
Co-Location	Co-Location/Joint Venture	A public agency allocates a portion of a public hospital's land and/or premises for sustained use by a private organisation in exchange for payment and specified benefits to the public agency

Note: Adapted from Montagu and Harding (2012, p. 16) and Barlow Roehrich and Wright (2013, p. 148)
**PFI is Private Finance Initiative*

Government payments planned for PPP projects in infrastructure and related services (unitary payments) over the medium term by sector are illustrated in the table below. 17,4% of these are planned for the health sector. Numerous health sector projects have failed to reach financial closure and have been cancelled in the initial stages of the project cycle. Given the planned investment for future projects, this study sought to propose a new approach to identifying and analysing risk in health sector PPP projects, which would facilitate the path to financial closure and successful project implementation.

Table 2: Unitary payments of PPPs in operation over the Medium-Term Expenditure Framework (MTEF) by sector

	2017/18	2018/19	2019/20	2020/21	MTEF
	R million				
Transport	1 924	2 275	2 387	2 517	**7 179**
Accommodation	1 106	1 524	1 605	1 700	**4 828**
Health	1 003	1 016	1 069	1 128	**3 213**
Correctional services facilities	1 015	1 094	1 052	1 088	**3 233**
Total	**5 047**	**5 908**	**6 113**	**6 433**	**18 453**

Note: Reprinted from National Treasury (2018, p.155)

2.1.2 PPP Project Cycle

The National Treasury PPP project cycle is a process followed by government departments. This guiding document maps the steps required to get a PPP project to financial closure. These steps are articulated in the PPP Manual, a document which unpacks policy and provides procedural clarity. The PPP Manual sets risk-assessment standards which the government uses to optimise the private sector investment to ensure that affordable project choices are made for service delivery (National Treasury PPP Manual, 2004). In the preface of the PPP Manual, Mr Trevor Manual, Minister of Finance at the time, commits to pursue the PPP procurement model if it gives the government an affordable and cost-effective solution for a service and the transfer of financial and operating risk to a private party (National Treasury PPP Manual, 2004, p. I). Before National Treasury approval, the projects must demonstrate affordability regarding the allocated budget, value for money, which is the difference between the PPP costing and the Public-Sector Comparator (PSC) costing. The PPP alternative must show that it is cheaper, and transfers risk appropriately.

The project cycle covers two main phases, "*the Preparation Period and the Project Term. The PPP Preparation Period spans phases I to III of the project cycle: Inception, Feasibility Study and Procurement, and concludes with the signing of the PPP agreement. The Project Term spans phases IV to VI: Development, Delivery, and Exit*" (National Treasury PPP Manual, 2004, p. V). Treasury approval is required at various stages of the project cycle before the agreement is signed. The first Treasury View and

Review (TVR) occurs after project inception (Phase I) and on completion of the feasibility study (Phase II). The remaining approvals occur during procurement (Phase III). (See Annexure B)

The ultimate decision on whether to proceed via the PPP model is made after Phase I, after the feasibility study has been able to demonstrate a combination of affordability, value for money and appropriate risk transfer. Health sector projects have stalled at this crucial stage of the process, so this study sought to explore to what extent the current risk mitigation practices have been a contributing factor to this end.

2.1.3 Risk mitigation in PPP projects

Allocation of risk is a crucial element of the PPP contract. Appropriately allocated risk incentivises the private party to maximise the efficiencies and expertise they bring to the partnership, and deliver the project on time and within budget. According to Hovy (2015) allocating risk to the private party comes at a cost. If risk is transferred which could be managed by the public party, this could erode the value for money which the public party seeks. This is echoed by the United Kingdom National Treasury in a discussion paper titled "A new approach to public-private partnerships" (HM Treasury, 2012), where following a review on the UK PPP experience to date, a concession is made that in the past, risk allocation under the Private Finance Initiative (PFI) has not always delivered value for money. A recommendation is made that the public sector needs to retain and manage more project risk. Standards Australia articulates the following stages in the typical project risk management process: risk identification; risk analysis; risk evaluation; risk treatment; and risk monitoring (SA, 2009). This process represents a systematic approach to modelling risk and seems to be accepted in the project risk literature. Qazi, Quigley, Dickson and Kirytopoulos (2016) argue that although systematic, this framework does not take into account the interdependency between project risks and complexity. These authors built on the work of previous researchers (Vidal and Marle, 2008; Geraldi, Maylor, & Williams, 2011; Bosch-Rekveldt, Jongkind, Mooi, Bakker, & Verbraeck, 2011; Saunders, Gale, & Sherry, 2015) who asked whether risk in an element of complexity or whether they are two distinct entities. Many of these scholars isolated risk from project complexity. Qazi, Quigley, Dickson and Kirytopoulos (2016) conclude that a disintegrated approach which seeks to analyse risks and complexity in silos undermines the interdependencies between the two, and may result in the adoption of suboptimal risk mitigation strategies

Typically, PPP practitioners allocate risk based on what may be argued are somewhat simplified assumptions on which party is best able to manage specific categories of risk. Hovy (2015) contends that although it may not be necessary to re-invent the wheel, this type of category-based risk matrix should be used only as a starting point in the process. Hovy (2015) goes on to suggest that the following principles would enhance current risk mitigation practices:

1) Risk allocation should be about both managing the frequency of risk and the severity of the consequences of said risk.

2) The private party should share in the financial implications of compensation events (which are typically the public party's responsibility). Although this seems counter-intuitive because it asks the private party to share in risks outside of its control, this may maximise value for money because it incentivises the private party to engage in preventative risk mitigation practices and manage costs effectively.

3) Optimal risk mitigation solutions should include monitoring, negotiation and management costs thereby minimizing transaction costs.

Social infrastructure PPPs such as hospitals or prisons illustrate this principle well. Wear and tear risk is usually allocated to the private party whereas vandalism or misuse by the users' risk is assigned to the public party. The transaction costs of evaluation and negotiating whether it was wear and tear or vandalism are high. Hovy (2015) suggests that both risk categories (wear and tear, and user misuse) should be allocated to the concessionaire up to a pre-defined threshold to reduce transaction costs and minimize erosion of value for money.

4) Risk allocation should be informed by market conditions and take into account to what extent these risks are acceptable in the regular markets of contractors, financiers and insurers.

5) Risk allocation should be an iterative process which acknowledges that there are risks which are known and may be quantified at the beginning of the project, however, new previously unknown risks may emerge. There needs to be a guideline in place which allows some flexibility to deal with unknown, unexpected risks.

Using a case study of a hospital PPP project, Cruz and Marques (2013) echo this call for an element of predefined contractual flexibility premised on the notion that one can always assume uncertainty in PPP projects. They conclude that perhaps uncertainty represents an opportunity rather than a threat. They propose that contractual flexibility can be structured in a way which generates economic gains by increasing the Net Present Value of the project. The United Kingdom National Treasury echoes the call for contract flexibility in their new approach to Public-Private Partnerships discussion paper (HM Treasury, 2012). Cruz and Marques (2013) argue that the health sector, in particular, could benefit from flexible contracts because of the unpredictability of the demand side (disease patterns, population profiles) and supply side (medical treatments, drugs, medical equipment).

Below is a risk matrix table adapted from the South African National Treasury PPP Unit showing the associated risk categories and allocation. This type of matrix is used by PPP practitioners globally. The public party essentially carries only the political and regulatory risk. All other project risks are carried by the private party and associated contractors, the lenders and the insurers.

Table 3: PPP Project risk matrix

	PUBLIC	**PRIVATE**					
	Government	Lenders	Insurers	Consortium			
				Private Company	Contractor	Operator	Sponsors
Market Risk		X		X			
Design Risk					X		X
Construction Risk			X		X		X
Operating Risk			X			X	X
Political Risk	X						
Regulatory Risk	X	X		X	X	X	X
Environmental Risk		X	X		X	X	X
Inflation Risk		X			X	X	
Interest Rate Risk		X					
Exchange Rate Risk		X					

Note: Adapted from Aiello (2014) Government Technical Advisory Services

Maslova and Sokolov (2017) argue that the above matrix is flawed in that there is no consensus in the definition and description of risk. Many researchers who write about risk do not include what is meant by this concept. The broad interpretation of the term risk, therefore, is not aligned to the idea of rigorous mitigation of risks and their consequences. Maslova and Sokolov (2017) further outline that a category which talks to the risks which occur when the shareholders in the original consortium change, is missing from current practice. In addition to this, the traditional risk matrix often does not take into account sector-specific medical risks inherent in health PPP projects. These risks relate to the medical activities of the private party which may impact service delivery to patients. Depending on the type of service provided by the private party, examples of medical risks include diagnostic (incorrect diagnosis, loss of medical records); curative (adverse events, drug allergies; surgical risks and complications) hospital stay-related risk (falling, hospital-acquired infections); risks associated with supplementary processes (drug stock-outs, power outages in an ICU, water shortages); hygiene related risks (poor quality cleaning and sterilisation, risks related to catering (food poisoning, malnutrition) (Maslova & Sokolov, 2017).

In developing a risk matrix for PPPs, the PPP unit at National Treasury concede that the essence of PPPs is in the analysis and allocation of risk which occurs at the feasibility stage of project design. Forrer, Kee, Newcomer, & Boyer (2010) describe the tensions in the risk allocation process, in that the three main parties involved in the PPP, namely the public party, the private company and the private banking institution have different perspectives and analysis when it comes to identifying, quantifying and allocating risk. When too little risk is transferred to the private party, the project management efficiencies which government seeks are not realised because the private party is not incentivised to be prudent about cost control. When too much risk is allocated to the private party, this increases the risk premium which ultimately undermines value for money because of the higher unitary costs the government has to pay to the private party. Sarmeto (2010) adds to the debate on the tensions in the risk analysis and allocation process by arguing that perhaps the issue is uncertainty as opposed to risk. Uncertainty presents a problem to the government since it cannot budget for it. The public-sector comparator against which PPPs are measured can only budget for quantifiable risk. On the other hand, the private party cannot disregard uncertainty and must mitigate against it.

Further complexities in risk allocation arise because although theoretically the risk should be borne by the party best able to handle it at the lowest price, Medda (2007) points out that the final contractual agreement which governs the PPP is ultimately achieved

through a process of bargaining. Aiello (2014) acknowledges the shortcomings of the current linear risk assessment by concluding that the challenge is to develop an appropriate risk matrix which reconciles all party's interests. Loosemore and Cheung (2015) propose that implementing Systems Thinking could change how PPP project risk is mitigated and move practitioners from a linear reductionist approach to a more integrated approach which appreciates the complexity and interdependencies between the different risk categories.

Earlier in this chapter, it was proposed that the typology of health PPP projects should be differentiated from other sectors according to whether they are service of infrastructure focussed. Following from Maslova and Sokolov (2017)'s study, a further proposition is made that a more specific medical risk category should be included in health sector PPP projects to enable the appropriate risk mitigation strategies to be employed.

2.1.4 Health Sector PPP Case Studies

Three health sector PPP case studies were written by WITS Business School on the following projects: 1) Inkosi Albert Luthuli Central Hospital (IALCH); 2) Universitas Tertiary and Pelonomi Regional Hospitals (Universitas) and 3) Humansdorp District Hospital (Humansdorp) (National Treasury PPP Unit, 2007). Of note is that all three projects were conceived before 2004 when Treasury Regulation 16 was added to the Public Finance Management Act of 1999. As such, even though they retrospectively attempted to comply with the new regulations, the rigour in the feasibility studies was not what it should be, procurement was not always grounded on feasibility, affordability ceilings were not explicitly stated and adhered to, and perhaps too much risk was transferred to the private party. There is no evidence of a public sector comparator being done, and the contract measurement terms were not clearly stipulated. This uncertainty regarding the measurement terms makes the determination of affordability and value for money difficult.

Due to capacity issues in the public sector related to expert skills, project and contract management, transfer of significant risks often occurred late in the negotiation process, further adding to the project price at different stages of the project cycle. This example highlights the inherent complexities in these projects, the wrestling with appropriate risk allocations, and the consequences thereof. According to the PPP Manual of 2004, PPP

transaction terms of reference require that a close-out report is prepared for the institution, and a case study for the public (National Treasury PPP Manual, 2004). The purpose is to preserve the institutional knowledge of each project. Only case study three (Humansdorp) has records of a transaction advisors' close-out report, however, due to frequent changes in the negotiation teams and contract advisors, there was still a loss of tacit project knowledge.

2.1.5 Challenges of PPP Project Implementation

In a study reviewing PPP case studies in the SADC region, the South African Institute of International affairs recognised the challenges accompanying PPPs, particularly in the context of developing countries (South African Institute of International Affairs, 2012). These challenges were confirmed in social infrastructure PPPs in Columbia by Sastoque, Arboleda and Ponz (2016). Researchers across the globe have also shown interest in the difficulties encountered in PPP projects. Tam (1999) looked at the successes and failures of BOT projects in Asia, particularly in Hong Kong and Thailand. Findings of the study were that projects were successful in Hong Kong, but less so in Bangkok. Failures in the Bangkok projects were attributed to inappropriate risk allocation, mistrust between public and private partners and an unstable policy environment (Tam, 1999). More recently, Chou and Pramudawardhani (2015) suggest that most PPP project failures are due to inappropriate risk allocation.

In further recognition of the difficulties faced in PPP projects, Shaoul (2009) reviewed the contractual elements and proposed that conflict can arise from uncompetitive bidding. In these instances, private entities may demand that the contract is renegotiated and insist on terms favourable to them. This renegotiation can undermine the achievement of value for money which the public party seeks. The briefing stage was analysed in an Australian study done by Tang, Shen, Skitmore & Cheng (2012), recognising that this stage can be crucial in determining a successful outcome. Ng, Wong & Wong (2012) argue that it is however even more important for decision-makers to re-evaluate the criteria used at the feasibility stage that is used to adopt PPPs. This study sought to build on this argument by exploring why South African health sector projects have been cancelled after the feasibility stage in the project cycle.

2.2 Theoretical Perspectives underpinning PPPs

The duration, scope, and complexity inherent in PPP projects introduces a multitude of risks which are market; technical; financial; operational; network and interface; sponsor-related; industrial relations; political and regulatory (Akintoye, Beck, Hardcastle, Chinyio & Asenova, 2000; Grimsey and Lewis, 2002; Akbiyikli and Eaton, 2004; Medda, 2007; Ng and Loosemore, 2007). This complexity is not appropriately represented in traditional risk matrix structures. In further analysis of the complexity of these relationships, Loosemore and Cheung (2015) echo previous authors in describing PPPs as complex relationships lasting many years, with many parties in dynamic relationships which are inherently interdependent. These risks can follow many pathways which may unfold in unpredictable ways. If the risk detection and management processes are inappropriate, this can result in cascading failures (Loosemore and Cheung, 2015). The multitude of failed PPPs around the world (Tam, 1999; Soomro and Zhang, 2013; Chou and Pramudawardhani, 2015) seems to suggest that this cascading effect is pervasive, and that risk management of PPPs needs a fresh, holistic approach. South African PPPs have suffered a similar fate. Despite a sound regulatory framework and dedicated PPP unit providing advisory services, new projects are on the decline, with several projects in the health and security sectors having been cancelled early in the project cycle (National Treasury, 2018, p. 158).

A review of previous theories applied to various contractual elements of PPPs, suggests that there is no single theory of public-private agreement (Saussier, 2013). For this study, the tensions in the public-private party contractual relationship were assessed using Agency Theory, and a thorough analysis of PPP risk management through a Systems Thinking Approach.

2.2.2 Agency Theory

In a review of previous literature on Agency Theory, Eisenhardt (1989) describes the 1960's and early 1970's as a period when economists explored the notion of risk sharing among individuals or groups. The risk-sharing challenge was seen as one arising when two co-operating parties have differing attitudes towards risk. Jensen and Meckling (1976) built on this risk-sharing literature by articulating the agency problem which occurs when co-operating parties have different goals and division of labour. Agency Theory describes the pervasive agency relationship where work is delegated to the Agent by the

Principal using the metaphor of the contract. At its core, the agency relationship gives rise to two problems. Firstly, the desires and goals of the Principal and Agent are not aligned, and the Principal cannot check that the Agent has complied with the contract and behaved appropriately either because it is too costly to do so or because of incomplete information. Secondly, the two parties have different attitudes towards risk which may result in misalignment of actions based on their different risk preferences. The unit of analysis in the agency relationship is the contract. Eisenhart (1989) suggests that Agency Theory, therefore, seeks to determine whether the focus should be on a behaviour- based contract, or outcomes-based.

Over time, Agency Theory has developed into two streams, Positivist and Principal-Agent which share the same unit of analysis, the governing contract (Jensen, 1983). The Positivist stream identifies situations where the different party's interests are misaligned and describes various contract options and the governance mechanisms required to limit the Agent from extracting maximum rents. Two propositions are made, the first being that an outcome-based contract is more likely to align the Agent's behaviour with the interests of the Principal, the second being that this behavioural alignment can be further enhanced if the Principal can access information verifying the Agent's conduct (Jensen & Meckling, 1976). The Principal-Agent stream, in contrast, looks at establishing the optimal contract with precise specifications of assumptions followed by logical deduction and mathematical proof. For this study, the Positivist stream perspectives were used to discuss Agency Theory.

Many researchers have studied the risk allocation in PPPs (Bing, Akintoye, Edwards & Hardcastle, 2005; Ke, Wang, Chan, & Lam, 2010; Marques and Berg, 2011) primarily focused on project related risk and identification of which party is best equipped to handle those risks. More recently, while adding to the Principal Agent discourse, Moore, Boardman and Vining (2017) focused specifically on the social welfare perspective. They highlighted the tensions in risk allocation arising from the government's mandate to maximise social welfare versus the private sector's mandate to maximise shareholder value.

After reviewing previous author's work which looks at project related risk, De Palma, Leruth and Prunier (2012) argue that looking at only the projectonly risk is inadequate in the complex relationship between public and private parties engaging in PPP projects. They argue that risks associated with the PPP contract arrangement should be interrogated, particularly because of the hierarchical relationship between the Principal

and the Agent. Both parties inherently want to assume less risk and have a preference for transferring it onto the other party. Naturally, the Principal would wish to transfer as much risk as possible to the Agent or the insurer, as this is one of their key requirements for contracting via PPPs as opposed to traditional government projects. De Palma, Leruth and Prunier (2012) argue that in some instances where the risk premium for the Agent is too high, or where there is extreme uncertainty around macroeconomic shocks, which are therefore left uninsured, the partnership would benefit if the Principal were to assume more risk.

As highlighted earlier in this chapter, the concept of uncertainty presents a dilemma for both parties. The Principal cannot budget appropriately for it since it is unquantifiable, yet the Agent cannot afford to ignore it. Uncertainty can be seen as either project-related and or contract-related. Typically, the Principal is more exposed to contract related uncertainty as opposed to the Agent whose exposure lies in the uncertainties in the project itself. Contract related uncertainty usually arises out of asymmetry of information which is skewed in the Agent's favour. The Principal typically has no way of accurately assessing whether the Agent has the required competence and work ethic to deliver on the project and has less information about the construction risks associated with the project. In this instance of an uninformed Principal and an informed Agent, Oudot (2005) had previously described two resultant problems. Adverse selection happens as the Principal cannot be sure that the selected Agent is the best candidate to deliver the project, and moral hazard occurs when the Agent acts opportunistically at the expense of the Principal's goals.

De Palma, Prunier and Leruth, (2009) highlighted that in allocating risk and pricing, both parties are guilty of hiding information to gain an advantage over the other. In their review of Chinese PPP infrastructure projects, they also identified and highlighted the opportunistic behaviour which can arise from the Principal. A critique of the Principal Agent Theory in its application in PPP projects, states that the theory is blind to the potential losses which are incurred when the contract is breached or terminated Chang (2013). When the contract does fail, the costs of resuming the transaction are borne by the Principal. The Agent is also vulnerable to renegotiation demands made by subcontractors when a project stalls, and may engage in opportunistic behaviour to recover the resultant costs. In either scenario, there are substantial costs added to the project.

In recognition of the complexity of the PPP relationship and the limitations of the Principal-Agent Theory in so far as it's limitation in addressing the multiple interactions and interdependencies, Paez-Perez and Sanchez-Silva (2016) propose a dynamic Principal-Agent framework which incorporates monitoring of the infrastructure performance as an essential part of the interaction and risk management process. They conclude that there are still limitations to this approach because of information asymmetry between the two parties which doesn't address risk holistically.

This research proposes that the traditional fragmented and linear approach to PPP risk mitigation needs a paradigm shift. This study sought to build on previous work done by Loosemore and Cheung (2015) to test whether implementing Systems Thinking in risk management will mitigate South African health sector PPP project failure.

2.2.3 Systems Thinking Approach

Checkland (1981) describes Systems Thinking as an entity consisting of many interconnected elements, which are organised in such a way as to achieve a specific function for a particular purpose. Essentially Systems Thinking is an approach or methodology which addresses problems by looking at reality in terms of wholes as opposed to breaking them up into constituent parts. This approach also appreciates that the environment is an integral part of the system since it interacts directly with and may influence the system (Cordon, 2013). This approach was advocated by earlier systems thinkers (Von Bertalanffy, 1968; Senge, 1990, Wheatley, 2006) who recognised that the linear method of solving complex problems by breaking them down into smaller manageable components was no longer sufficient. This way of thinking was not a new concept. Cordon (2013) describes how early philosophers such as Aristotle had discussed the notion of thinking about things as wholes. When looking at the human body, Aristotle argued that the body was greater than the sum of its parts and went further to articulate that there is even more to the living body than the body parts, by introducing the soul as an essential part of being alive. Cordon (2013) contrasts this with Descartes another early philosopher's view. Descartes introduced reductionist thinking which said that to understand complex systems, they can be reduced to their individual constituents. Descartes' work informed many other scientists and biologists such as Newton and helped them to understand biological systems in relation to their physical and chemical properties. However, as science has evolved, it has recognised that constant change is

inherent in complex systems and the reductionist approach has been deemed inadequate.

The evolution of Systems Thinking has revisited Aristotle's original approach of wholeness, and various scholars have offered their contributions to how systems respond, particularly to change. Von Bertalanffy (1968) developed General Systems Thinking (GST) as a general theory which can be applied to any system regardless of the properties or elements within. GST recognises two types of systems, closed systems which are isolated from their environment and open systems which interact with their environment. In closed systems such as computer software, although users can interact with the system by entering data to use the system, no material enters or leaves the system, and the users cannot alter the structure or functionality of the system. Conversely, in open systems such as living organisms, there is an import and export of material which can change the integrity of the system. Complex systems can include elements of open and closed systems.

Norberg and Cumming (2008) describe another type of system, Complex Adaptive Systems which describe the evolution of systems from simple to complex through a process of reactive or proactive adaptive behaviour enabled by the ability to organise and learn. This adaptive behaviour occurs in response to changes in the systems conditions or environment. The central principle which underpins Complex Adaptive Systems is their ability to self-organise in order to adapt. In describing how systems adapt to change, Chaos Theory (Wheatley, 2006) which suggests that everything is interrelated and that order can emerge from chaos. Wheatley (2006) unpacks the relationship between order and chaos and describes that initially when change is introduced into a system, it results in chaos. If one scrutinises the system, one will see that the system is held within well-ordered and predictable boundaries. A feedback mechanism coupled with the systems' ability to self-organise, allows the system to revert to order and form.

As a way of applying Systems Thinking, Kapsali (2011) built on this earlier work and contextualised Systems Thinking in an organisation, describing it as a holistic approach viewing organisations as an interrelated complex of people, processes, and technologies working towards a common goal. Previously, Walther (1999) had illustrated the ability of systems to self-organise in the context of risk management. This self-organisation is described as a self-regulating system which allows all the interdependent connections within a system to change and adapt without external human interference or control. It is

this concept of self-organisation which ensures that complex systems settle at a critical edge. This critical edge is the point at which any change in the system, irrespective of quantum, could lead to catastrophic changes in the overall system. The critical edge is the end-point of a series of interdependent cascading processes occurring in different parts of the system. Walther (1999) referred to this characteristic of systems as self-organised criticality. Conceptually, this characteristic supports the notion that PPP risk management can no longer be viewed in its isolated, fragmented parts, as is the current practice since any small change could lead to failure of the project overall. The case for a holistic approach using Systems Thinking is thus built.

The field of Systems Dynamics (SD) has been as a method of operationalising Systems Thinking (Sterman, 2000). SD seeks to model and simulate the complex structure, dynamics and interdependencies which exist in complex systems. The SD model allows managers to experiment with different risk control strategies in a virtual world to optimise project outcomes. To test this model in a PPP context, Nyagwachi (2008) proposed an approach for planning and implementing PPP projects in South Africa based on a systems model to enable a holistic view of the project complexities for practitioners. According to Loosemore and Cheung (2015), other researchers have also used this model in different contexts, to test risk control to varying stages of the PPP cycle: SD has been used from a stakeholder point of view to examine the financial viability and business case of infrastructure projects. In a transport PPP project, SD was used by Jang (2010) to explore the interdependent risks in project construction and operation. In a PPP highway project, Xu, Sun, Skibniewski, Chan, Yeung, & Cheng, (2012) took pro forma financial statement produced during the feasibility study, and used SD to develop a model to arrive at a rational concession price.

At the 20th International System Dynamics Conference, Zagonel (2002) presented a conceptual model for SD. This SD model has four main stages with multiple feedback loops which promote continuous learning through an iterative process;

1. The first stage, "qualitative reflection" involves vital stakeholders who are asked to describe the elements of the system, its resources, constraints and their interdependencies. The objective being to create an aggregated picture which represents the primary systems, sub-systems and the relationships between them.

2. Stage two, called “model formulation and simulation” involves converting the aggregated picture of the systems into a computer model and simulation which shows how money, materials and information move in the system and the rate of increase or decrease in these movements over time.

3. Stage three is an iterative process called “simulation testing and evaluation” which tests and refines the computer simulation under different risk scenarios with the relevant stakeholders to check whether the desired outcomes are achievable.

4. In stage four, called “virtual intervention experiments”, various interventions are explored for the different risk scenarios, and the simulation is allowed to show which options will produce the optimal risk mitigation strategies which take into account combined outcomes for all stakeholders.

This model is fundamentally different from the linear reductionist approach in current risk management strategies. This feedback mechanism ensures that the process of understanding and managing risk in PPP projects is continuous and iterative and takes the whole system and its sub-systems and how they relate to each other into account.

The figure below illustrates the continuous feedback mechanism of the SD Model:

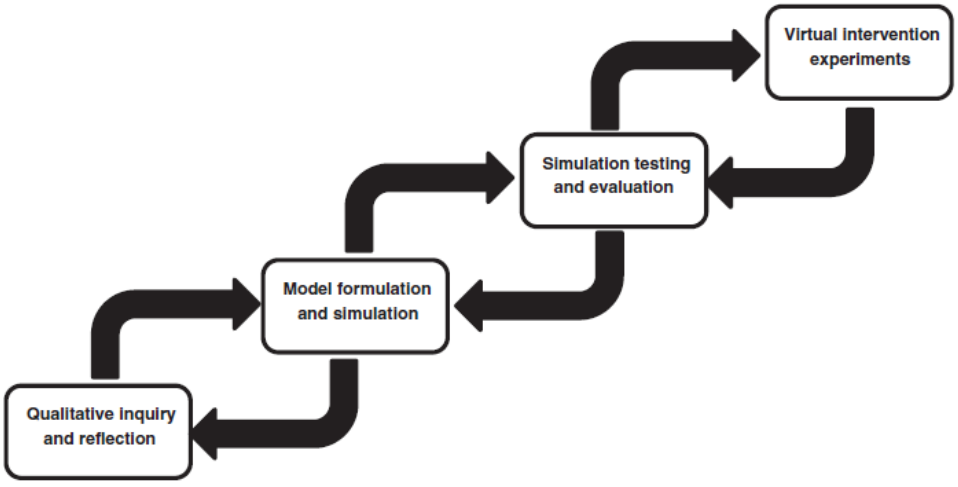


Figure 4: SD Methodology

Note: Reprinted from Loosemore and Cheung (2015: p. 1327)

2.3 Conclusion

Systems Thinking gives a fresh but challenging perspective to risk management. The challenge involves PPP practitioners adopting new ways of thinking which reflect the complexities, time horizons and interdependencies of PPP projects. Asking practitioners to think differently requires a trusting culture which allows a transparent sharing of risk-related information without fear of legal exposure or loss of accountability. This study sought to contribute to developing standards and guidelines which support this new way of thinking.

A critical review of Principal-Agent theory finds it lacking in its application to the inherent complexities of the PPP agreement. Gleaning from the literature on Systems Thinking, the chapter makes the argument that Systems Thinking might be the appropriate framework to analyse and mitigate PPP project risk. The literature review concludes by suggesting that a paradigm shift is needed to move to Systems Thinking. This shift would need to be supported by the development of new standards and risk assessment guidelines.

CHAPTER THREE: RESEARCH QUESTIONS

3.1 Introduction

The primary aim of this study was to propose a paradigm shift in mitigating health PPP risk using the Systems Thinking Approach. To that end, the three key objectives formulated were translated into research questions directed by the theory.

3.2 Research Questions

Research Question 1: How is risk currently assessed and mitigated?

Purpose of question: The question sought to explore current thinking around the parameters used to assess risk and how it is allocated.

Research Question 2: Why is Systems Thinking not widely adopted in South African health sector PPPs?

Purpose of question: The question tried to understand how entrenched the current thinking around risk assessment is and sought to understand whether there are considerations of an alternate approach.

Research Question 3: Are there barriers to adopting Systems Thinking to mitigate risk in South African health sector PPP projects?

Purpose of question: This question tried to understand the measures needed to change current risk assessment thinking. The question was used to explore whether there are structural or procedural barriers which exist in current practice which may act as barriers to adopting the Systems Thinking Approach. The overall objective being to contribute to a policy review which guides how risk is managed in future PPP projects.

3.3 Interview and Research Question Mapping

A summary of the research questions and secondary questions flowing from the research questions is given below:

Table 4: Research and interview question mapping

Research Questions	Secondary Questions
Research Question 1 **How is risk currently assessed and mitigated?**	• Is there a framework used? • Which are the biggest project risks? • Are the project risks clearly defined by the different stakeholders? • Should there be flexibility in the contract to deal with uncertainty? • Are the current risk mitigation strategies adequate? • Do PPPs deliver value for money for government?
Research Question 2 **Why is Systems Thinking not widely adopted in South African health sector PPPs?**	• Why is the current risk mitigation approach used? • Does your risk mitigation approach use Systems Thinking?
Research Question 3 **Are there barriers to adopting Systems Thinking to mitigate risk in South African health sector PPP projects? (Loosemore and Cheung, 2015)**	• Why isn't Systems Thinking used in practice? (Loosemore and Cheung, 2015, p. 1331) • Would it be easy to adopt a Systems Thinking Approach?

CHAPTER FOUR: RESEARCH METHODOLOGY AND DESIGN

4.1 Introduction

This chapter details the chosen approach to conducting this retrospective study. The study design was informed by the literature reviewed and presented in Chapter Two. A qualitative exploratory approach was chosen to address the purpose of this research which sought to explore and gain richer insights into current risk mitigation practices and whether a paradigm shift is needed to implement Systems Thinking among PPP practitioners.

4.2 Research Design

The research aim was to gain a deep exploration into the world of PPP practitioners in terms of their work, the PPP projects they have been involved in, their approach to risk and challenges experienced during the different stages of the PPP cycle. This concept of understanding the research subjects from the perspective of their world view and their interpretation thereof, is described by Zikmund, Babin, Carr, & Griffin, (2013) as the interpretivist approach.

A qualitative design was adopted since the study sought to gain deeper insights into how risk management of PPP projects can be re-evaluated and improved upon. Zikmund, Babin, Carr, & Griffin, (2013) describe qualitative research as that which focuses on developing insights into and understanding the thoughts, ideas and experiences of the participants. The overall objective was to record their realities. The study used two qualitative data collection techniques: 1) a content analysis of existing case studies and 2) semi-structured interviews with senior and experienced role players in health sector PPP projects.

Saunders and Lewis (2012) describe exploratory studies as those which explore a new phenomenon or where the area of interest or identified research problem requires further inquiry and insights. An exploratory approach was appropriate for this study since the objective was to explore and gain insights into current risk management practices and whether a paradigm shift is needed for PPP practitioners to adopt a Systems Thinking Approach.

The time dimension was a cross-sectional research 'snapshot', due to time constraints within which to complete the study.

4.3 Research Universe

A research universe is essentially all related entities that exhibit similar characteristics and are usually seen as a complete entity (Zikmund, 2003). The universe under study was the 33 signed PPP projects listed on the South African National Treasury Database.

4.4 Sampling Method and Size

Sampling was done from the universe of signed PPP projects in the National Treasury PPP database. The selected sample focused on the eight health sector PPP projects which were purposively chosen by the researcher to answer the research questions. According to Patton (2002), there are no specific rules for sample size when conducting qualitative research. The insights gained, and degree of meaningfulness and validity are more closely linked to the richness of the information gathered through the interview process, rather than the size of the sample. Therefore, the researcher deemed that the small sample of eight health sector PPP projects could still yield the required richness which the study sought. The sampling technique used was non-probability purposive sampling using participants who the researcher believed have the requisite knowledge of the PPP landscape and experience in PPP projects to answer the research questions which seek to understand whether the current risk mitigation strategies are sufficient, or whether a new approach is needed. Given the small sample size of eight health sector PPPs, the researcher found that the PPP practitioner community was small and well acquainted, therefore participants volunteered contacts they know who have worked on health sector PPPs. Snowball sampling was therefore also used.

Ten in-depth semi-structured interviews were done in total. The sample included PPP practitioners from both the public and private sectors to give a balanced view of current practice. Further details on the participants are provided in the table below. Interestingly, two of the study participants have played roles on either side of the Public Private Partnership and were thus able to give rich insights from both perspective.

Table 5: Sample description

Participant	Role in PPPs	Industry/Organisation
1	Private consortium bidder Department of Health advisor	Health Department of Health
2	Lead advisor to public partner Treasury advisor	GTAC- National Treasury National Treasury
3	Lead advisor to public partner	GTAC- National Treasury
4	Former Hospital CEO Former Deputy DG of Health	Dept of Health Dept of Health
5	Lender	Banking
6	Private consortium bidder	Health
7	Lender	Banking
8	Lender	Banking
9	Lender	Banking
10	Lender Advisor to National Department of Health	Banking Banking

4.5 Unit of Analysis

The unit of analysis for a study indicates what or who should provide the data and at what level of aggregation (Zikmund, Babin, Carr, & Griffin, 2013). The unit of analysis for this study was each health sector PPP.

4.6 Measurement Instrument

The research measurement instruments used were the in-depth semi-structured face to face interview and review of secondary data from case studies written on closed health sector PPP projects. The two measurement instruments were chosen to allow for triangulation to increase the internal validity of the study (Crowe, Cresswell, Robertson, Huby, Avery, & Sheikh, 2011). Of the factors described by Saunders and Lewis (2012) as which may impact on the validity of the study, mortality was identified in this study since some officials who worked on some projects had left the organisations or were not traceable. Of the factors that impact on reliability, this study was exposed to subject selection risk since the selection of research participants, and those who were willing to participate in the study were not fully representative of the identified research population. Due to researcher inexperience, there was an element of observer bias and error which

may have further impacted reliability risk. This reliability risk was mitigated by standardisation of the interview questions which in turn also addressed the issue of validity. At the end of each interview, the participants were invited to give any further inputs which they believed may add value to the study. They were also invited to send any further comments via e-mail which may have been missed or not mentioned during the interview process. This was done to increase internal validity. The focus of qualitative research is to establish the rigour, soundness and dependability of the research (Riege, 2003) as opposed to reliability in the quantitative sense.

4.7 Data Collection

The purpose of data collection is to establish the case of the research, to answer the research question, to explain and illustrate the research statement or to prove/disprove the research hypothesis (Zikmund, Babin, Carr, & Griffin, 2013) . Ethical approval for the study was received from both the Gordon Institute of Business Science (GIBS) Ethics committee, and the University of Pretoria Medical Ethics committee. Study data was collected in two phases.

Phase 1

The initial phase consisted of secondary data analysis. This was conducted through a review of written case studies on three health sector PPP projects published on the GTAC website (National Treasury PPP Unit, 2007). The purpose was to review whether the risk mitigation practices were highlighted in the case study, which framework was used by the involved parties, and whether there was any indication of a Systems Thinking Approach.

Phase 2

The second phase of data collection was done through semi-structured face to face interviews which were conducted over a period of a month. This method was appropriate since the potential participants in relation to the phenomenon under study were identifiable (Zikmund, Babin, Carr, & Griffin, 2013). The research participants were a representation of the different players in the PPP agreement and included: 1) senior GTAC project advisors who were involved in the risk analysis and mitigation of health sector PPP projects, 2) advisors to the National Department of Health, 3) project finance specialists from major banking groups in South Africa who have worked on PPP projects, and 4) investors who have been part of the private consortia in both closed projects and those which did not reach financial closure for various reasons.

Detailed steps undertaken included:

1. Seeking permission from the GTAC. The researcher wrote to senior leadership at the GTAC formally to introduce themselves, introduce the purpose of the study and request permission to conduct the research in their organisation. Permission was granted via a signed permission letter. (See Annexure E)

2. An invitation to participate in the study was sent via e-mail to all potential participants. This was accompanied by a description of the research project, an interview schedule to give the participant a sense of the nature of questions to be asked and an interview consent form which described how the interview would be conducted and recorded. The time commitment required of the participants was also clearly outlined. Willing participants confirmed their interest in participating in the study and an agreed time and venue for the interviews was confirmed. (See Annexure F)

3. The data collection was conducted through semi-structured face to face interviews done mostly at the participant's place of work. Permission to audio record the interview was sought again prior to beginning the interview. These interviews were recorded and transcribed verbatim. A face to face interview approach was chosen since the researcher required an in-depth exploration of the challenges in analysing risk in health sector PPPs and this was best done with open dialogue between interviewer and participant. This approach also allowed the researcher to develop a rapport with the participants who were encouraged to talk as openly and freely as possible about the challenges they have experienced and their view of the Systems Thinking Approach in this context.

The participants had varying levels of familiarity with Systems Thinking, and varying levels of experience with health sector specific PPP projects. These varying levels of experience and familiarity with the thoery was further justification for a face to face interview as it allowed the interviewer and the participant to clarify questions and context, so as to reach a shared understanding of what was being asked and answered. Participants were given the opportunity to express their individual perspective or experience of the current risk mitigation practices. This approach allowed the researcher to observe the participants as they engaged with the subject matter and the questions posed. These participant observations of expressive behaviour such as facial expressions, tones of voices and forms of body language served as further insights into

their responses and further data for the research. Brief field notes were taken at various times during the interview process either to emphasise a particular point made by the participants or as backup to add to the transcription.

The questions used in the semi-structured interview were based on the methodology used by Loosemore and Cheung (2015) in their study titled “Implementing Systems Thinking to manage risk in public-private partnership projects.” The specific interview questions and probe questions were developed from the research questions under study.

Research ethics were adhered to at all times since there may have been sensitivities around information received from officials at National Treasury and the various banking institutions. Accordingly, all the participants were guaranteed confidentiality and anonymity as far as possible and that they will not be disadvantaged through participation in this research. Participants were assured that although quotations from the interviews would be used in the final report, all such quotes would be anonymised.

4.8 Approach to Data Analysis

Zikmund, Babin, Carr, & Griffin, (2013) describe the process of data analysis in qualitative research as a means to develop as thick and rich and complete an account of the phenomenon under investigation as possible. The interview recordings were transcribed into text data. Transcription of the audio recordings was done via Temi transcribing software and edited whilst listening to the audio recordings for corrections. Content analysis was used to analyse the case studies under review. This content analysis was followed by immersion in the data from the transcribed interviews by reading through the transcripts and field notes and listening to audio recordings of the interviews repeatedly so as to begin to appreciate the nuances of the data (Zikmund, Babin, Carr, & Griffin, 2013). Thematic analysis was done to analyse the data by reviewing and studying recurrent emerging themes, developed after grouping and categorising the constructs to answer the research questions. Data analysis was initially done on a Microsoft Excel spreadsheet created by the researcher and then using Microsoft Word to organise the codes.

The researcher followed the following steps after immersing themselves in the data:

1. Generated initial codes. This process involved coding interesting features of the data systematically across the whole data set, and matching the data to a relevant code.
2. Collated the codes into potential themes until no new themes emerged.
3. Condensed the list of themes by grouping themes which logically fit together and then developed new themes which encompassed the themes collapsed together.
4. Identified the key themes in the data.
5. Presented a conclusion using the key themes which emerged during data analysis and related them back to the literature and research questions.

4.9 Study Limitations

Limitations are inherent in all research studies (Saunders & Lewis, 2012). Limitations specific to this were:

1. The subjective nature of qualitative research which is prone to researcher bias. The researcher is not a trained interviewer which may have affected data collection during the interview process.
2. The small sample size of eight health sector PPPs means that the findings of this study are not generalisable.
3. In some cases, the officials responsible for planning and implementing the PPPs, particularly at the outset, had left their respective organisations and were difficult to trace.
4. Identified study participants were not all willing to participate in the study which ultimately affected the number of interviews completed.
5. There were no architects, construction and legal specialists interviewed. These practitioners could have added to the perspectives and insights under study around risk mitigation approaches.
6. Some Public officials were reluctant to comment freely on challenges experienced on previous projects.

4.10 Conclusion

This chapter outlined the chosen research methodology which best allowed the research questions to be answered. Given the objective of the study and the research questions, a defence was given for the chosen approach, study design and data collection methods employed.

CHAPTER FIVE: RESULTS

5.1 Introduction

The following chapter reviewed the results from the data collection process described in chapter four. It begins with background information on the study participants, highlighting their involvement and/or expertise in PPP projects, particularly in the health sector. A description of the results obtained from the semi-structured interviews conducted with PPP practitioners with previous involvement in the risk identification, analysis and mitigation of PPPs, ensues. The chapter ends with a summary of the results obtained from data collection.

5.2 Background Information

As mentioned in Chapter Four, a non-probability purposive sampling technique, followed by a snowball sampling were used to identify the ten participants. These individuals were involved in at least one health sector PPPs on either the public or private party side of the PPP partnership and had varying levels of exposure to risk mitigation practices.

Educational Background

The participant's educational background was relevant as it gave insights into whether they had prior formal education on risk mitigation practices and to what extent these prior learnings would inform their current paradigm. Most participants either had a medical or finance educational background in terms of their junior degrees. One participant had a legal background, and another an information systems background. All practitioners with non-financial junior degrees, had subsequently gone on to study further in finance or management related disciplines.

Table 6: Educational profile of participants

Rank	Educational background	Frequency
1	Medical	3
2	Finance	7
3	Legal	1
4	Information systems	1

PPP Experience

The table below shows the participants experience as PPP practitioners.

Table 7: Previous PPP Experience of participants

Rank	Constructs	Frequency
1	PPP experience of between 0-5 years	2
2	PPP experience of between 5-10 years	4
3	PPP experience of between 10-15 years	1
4	PPP experience of more than 15 years	3

Health sector PPP Experience

Given the small sample of health sector PPPs, practitioners at GTAC, the National Treasury PPP unit, and those involved as Department of Health advisors had the most experience in health sector PPPs. These participants represent the public party in the PPP partnership. The private party participants consisted of two South African private consortium bidders in health specific PPPs who had been involved in two or more bids, and five lead advisors from the major banks in South Africa. One of the private consortium bidders had also been a consultant advisor to Department of Health on a PPP project so was able to share perspectives from both the public and private party side. The lenders generally had less health sector specific experience but had been involved in various PPPs across other sectors. One of the lenders had worked in the PPP space from inception, and had done some advisory work for National Department of Health, so was also able to share insights from that experience along with those of the bank.

Each participant's health sector specific PPP experience is highlighted in the table below:

Table 8: Health sector PPP project experience of participants

Participant Number	No of Health Sector PPP Projects	Role
1	3	• Private consortium Preferred bidder • Department of Health Advisor
2	4	• Lead advisor for public sector
3	3	• Lead advisor for public sector
4	3	• Public Hospital CEO • Deputy DG of Health
5	1	• Lead advisor for lender
6	2	• Private consortium
7	1	• Lead advisor for lender
8	1	• Lead advisor for lender
9	3	• Lead advisor for lender
10	3	• Lead advisor for lender

5.3 Results for Research Question 1

How is risk currently assessed and mitigated?

Secondary Question 1.1: Is there a framework used?

Table 9: Familiarity with risk framework

Rank	Constructs	Frequency
1	Yes	8
2	Not sure	2

The project advisors interviewed from GTAC the National Treasury PPP unit, and those participants who had been involved as public sector advisors, referred to the PPP Manual as their guiding document and the lens through which they assess risk. They referred to a generic matrix with standard categories, which was adapted from the UK Private Finance Initiative (PFI) model. This matrix is then modified according to the project. The GTAC advisors were intimately acquainted with the risk matrix, expressing that;

"*It's basically more like a copy and paste of the UK model".*

"The risk matrix evolves per project. It is generic, but overloaded with all the risks and made bespoke for that project".

"Yeah, there's a framework, I think it addresses the right issues. You mould it to the circumstances on the ground. You always have to tweak to the context".

The Department of Health advisors and private consortium bidders knew of the PPP Manual risk matrix in general terms, but were not intimately familiar with the details, with one of them stating;

"*No, not really. I wouldn't be able to speak to this confidently*".

The lenders to the private parties, described in length their approach to risk mitigation in similar terms across the different banks, saying;

"We methodically test every single concept in that financial model. It's very systematic to ensure, er that it's designed and fully costed from end to end."

"We go through a very rigorous process of appointing independent legal, technical, insurance advisors to cross check every single piece. Once we have all that done, we approach our credit committee, and we say to them, everything stacks up. This project will work provided that government gives us a guarantee that if the department procuring does not pay on time, central government will stand behind it".

"Ja, how banks view it is fairly similar, obviously this is constantly evolving, so different lenders might be at different stages uhm, of how advanced their risk framework may be".

They all highlighted the bespoke nature of each project, which was in alignment with what had been expressed by the public sector advisors, with one lender expressing it as;

"*So, you never use the same risk allocation for two projects. They are bespoke, that's the term we use. All bespoke and all unique".*

Secondary Question 1.2: Which are the biggest PPP project risks?

Table 10: Top ranking project risk categories

Rank	Construct	Frequency
1	Operations and maintenance	8
2	Financial risk (inflation and foreign exchange)	6
3	Design and construction	5
4	Environmental	1

Most participants agreed that the operations and maintenance are the biggest risk component in health PPPs, largely due to their complexity and managing the support services which include the equipment and technology; the cleaning; laundry and catering.

> "*Everything really revolves around the operator once it's been built. That's where the biggest risk sits".*

> *"Once you get to operational phase, your risks come at you from everywhere. It's the biggest risk, I mean operational risk on PPPs is big. It is really big and the worrying thing is it's a long term risk, it's 20 years, generally 15-20 years and people change. So, you can get something that works for 5 years and then the manager changes and the whole thing changes".*

One of the public party advisors alluded to an appreciation of specific clinical operating risks, saying;

> *"Under Opex risk there is clinical risk, things like child mortality; the risk of malaria outbreaks. These things need to be captured".*

Most of the lenders ranked the design and construction of the projects as being amongst the top risks. The public sector participants agreed with this view with one participant also highlighting that he thought another big risk on the public sector side was government's lack of a system to actually quantify the contingent liability at different stages of the project life cycle. Some of the comments on the design and construction were;

"*As part of our underwrite, we comment on the design and construction element and help structure it such that the risk allocation works for us".*

"There'll be a massive risk component during the construction phase, just like as well as all the technical aspects of kitting a hospital out, and once it's operational, it requires a completely different set of skills".

"If it's badly designed, you'll argue forever as to who's responsibility it is".

"Eish Albert Luthuli, you know, is not a good example to use for PPP in a sense that the government built the hospital. It was not initially developed as a PPP. The private came in to assist with operating. There were many alterations because the persons designing it were not the same as those who would operate it".

Most of the lenders spoke of financial risks in broad terms. They generally felt that they had the processes to manage those risks given their sophisticated risk models, but did mention that PPPs were different from their usual project finance deals because of the longer time frames. One lender highlighted inflationary risk in particular, given the length of the contract saying;

"I often find that PPPs are not the real world, they're like a made-up world. I mean where do you contract with somebody for 20 years, that I will operate this thing for 20 years, and if my costs go up, I have to suck it up. I can only ever charge what was agreed in like 1995 and it's like 2015 now. So, it's very difficult. For me, I mean, my opinion is, if the operator misprices because they don't get it right and they miss inflationary changes, then it's a problem".

Both participants who had been part of a bidding private consortium also spoke of financial risk commenting on the Foreign exchange risk being one of their biggest risks, saying;

"*Because of the IT, and the equipment which is often imported, we get hit, can get really hit with the exchange rate".*

Only one participant, a public party advisor commented on the environmental risk saying:

> *"For instance you can't build a hospital on contaminated ground. The due diligence for hospitals is complicated".*

Secondary Question 1.3: Are the project risks defined the same by the different stakeholders?

This interview question sought to understand whether the perception of the project risks was similar amongst the different parties in the PPP agreement. Most participants agreed that the risks were not defined in the same way, different stakeholders had different points of focus depending on which role they were playing in the partnership, and the information they had available to them.

Table 11: Reasons influencing the focus of risk mitigation among stakeholders

Rank		
1	Role in agreement	9
2	Information asymmetry	5
3	Sector regulatory framework	1

All participants agreed that ultimately, it depends on which role you are playing in the partnership with some of them stating that;

> "Depending on what hat you have on, you'll be considering different risks for different entities".

> *"As a lender, we might look at contractor risk completely differently to how a developer might look at it. A developer and lender might look at government risk completely differently, that's quite common as well. If for example, X & Y Bank are funding a deal and the sponsor is an American company, they will consider government risk completely separately to bank risk, er because if we are committing R 10 billion and they are committing capital as well, if we don't deliver, they'll have to manage that risk, or default in five to six years' time".*

All the public party project advisors spoke to asymmetry of information and mistrust as being a problem in accurately assessing risk, saying;

> *"One of the criticisms of the, I mean obviously interests are not aligned right? And, and, and, and often the public party doesn't know what the private party is doing and that they are doing the right thing and maybe that then talks to contract management, that oversight role".*

> *"Most of the time the department walks into the negotiation with blinkers because they weren't privy to the details. They had outsourced all the learnings to a third party so they can't catch the private party out".*

The lenders were acutely aware of the public sector's mistrust of them, but disagreed with the notion of information asymmetry, alluding to it as a misconception. They believed they had no ulterior motives, and that their processes were rigorous and transparent. They expressed that government needed the rigour and efficiency that the private sector brought, with all of them quoting the energy power plants Medupi and Khusile as examples of the cost and time over-runs which occur in traditional government projects, saying;

> *"They said, why do we need the private sector, the state can procure this. If we bring the private sector in, they're just there to make a profit but the real reality was that nothing got done".*

> *"Government doesn't trust the private sector… but government needs the rigour that lenders bring to PPPs".*

> *"It should give the public sector a lot of comfort that there are these multiple eyes over it (the project), so there really is unbelievable diligence in making sure that things are done right".*

Regarding whether stakeholders define the risks the same, the lenders gave the following insights, highlighting that their focus is often dependent on their view of the risk and reward profile of a particular sector, which then enabled them to formulate a whole sector specific strategy. Most of the lenders alluded to a preference for the renewable energy sector because of the increase in deal flow and the commitment and resources

which government has allocated to developing that particular sector. Some of the views expressed were;

> *"Absolutely not, so even if we look at lenders, let's say there are four or five lenders to a transaction. Even they will define the risk differently. Uhm, if we are lending to a particular sector where "X "bank might be overexposed and "Y" bank thinks they're underweight and they want to build up their exposure to that sector, they might look at risk completely differently. Our pricing will reflect that".*

> *"The first risk mitigation strategy feature would be, do we like the sector? If we like the sector, we'll develop a sector strategy".*

Secondary Question 1.4: Should there be flexibility in the contract to deal with uncertainty?

This interview question sought to understand how the inherent uncertainties which occur in a long term contract lasting 15-20 years are dealt with. Given the time frame of the PPP project life cycle, there are bound to be risk events which may not have been foreseen and mitigated against.

Table 12: Participant views on whether PPP contracts should be flexible

Rank	Construct	Frequency
1	No	9
2	Yes	1

Most participants from both the public and private parties held a firm view that there should not be flexibility in the contract, stating;

> "*Once you allow flexibility, you allow for different interpretations. It will become a case of who has a better lawyer, who has the resources".*

> *"It's not like there's a lot of wiggle-room, and you don't want that, you want certainty".*

Only one participant, a lender to the private consortium was in support of flexibility in the contract to deal with future uncertainties, expressing;

"Also you need to be flexible, you need more flexibility. I mean in the private sector, you can change things, things change, markets change. In PPPs you should have the ability to change, but I think it's hard with government, agility is hard".

Secondary Question 1.5: Are the current risk mitigation strategies adequate?

This interview question asked participants to reflect on their own perceptions of their current practice, the considerations in formulating a risk mitigation strategy and whether they thought it was adequate. All the participants felt that the private sector had the institutional depth of knowledge, experience, and resources to pull together all the skills required to formulate a rigorous risk mitigation strategy. Similarly, all of the participants expressed concerns about shortcomings in the risk mitigation practices on the public sector side, with some participants expressing that;

"I don't think they do that sufficiently. I don't think that health managers take risk, do risk, as meticulously as they should".

"A lot of problems with the health PPPs is there often wasn't enough budget to get the best advisors".

"*A big problem in government is that we don't have a system of putting a quantum to contingent liability, it's actually basically a thumb-suck. It's just shocking to think that our people don't understand what the real risk is, I mean the quantum. Well yes, if it all goes belly up, then of course, but what are your major ones, what are your minor ones, and what's the probability of these major ones actually happening?'*

One public sector lead advisor expressed that he felt the banks were the experts at risk mitigation, saying;

"No one can do a better job of developing a risk matrix than the banks. The bank will go and hire all the experts it needs to inform that business case".

The private consortium lenders were all satisfied with their risk mitigation processes, and commented that the project would simply not close and they would not disburse money until their credit committees were satisfied. This was expressed as;

"*Given that project finance, which is what PPPs are, has been around since the 70's, uhm, there's a pretty well developed framework of understanding what project finance risks are and how to mitigate those risks".*

"Where a project gets across a line, is where everyone is eventually aligned on what the risk is and what the price should be for that risk, otherwise a project is not going to close".

"All of these teams, from a bank point of view, have to satisfy our credit committee that we have assessed this risk and where there is a material risk, we've provided sufficient comfort to the bank that we have the right kind of risk mitigation tools in place to protect us should there be a default".

When discussing the bank's participation which is 75% of senior debt to fund the private consortium in your typical PPP agreement, which may go up to 85% if the BEE party in the consortium also requires debt funding to participate, one of the lenders remarked;

"It's our exposure, it's our risk, so we want to manage that".

The table below highlights the key constructs which emerged with regards to considerations and challenges when formulating a risk mitigation strategy.

Table 13: Considerations and challenges during risk mitigation

Rank	Constructs	Frequency
1	Technical complexity of health PPP projects	10
2	Lack of finance skills in public sector	8
3	Conflicting Mandates	7
4	Loss of institutional knowledge on public sector side	6
4	Affordability	6
5	Government guarantees	5
5	Risk Avoidance	5
5	Accountability	5
6	Poor project design at outset	4
7	Poor contract management	3

The highest ranking construct according to a frequency count related to the inherent technical complexity of health sector PPP projects. This was echoed by all the participants, with some stating;

> *"Hospitals are, it's, it's not an easy building. It's a specialised building that will, will facilitate people that you need to heal and stuff…I mean it's different than a normal building where people just move in and out, so, so it is more difficult…I mean people die, your risks with a hospital is much higher than a normal building".*
>
> *"Hospitals are very complicated especially with the equipment and maintaining it. The specialised equipment in hospitals is the nuance".*
>
> *"You need very detailed output specifications in health, I mean average length of stay; treating x number of patients; disease management. You don't' want to be dealing with one problem and then create another".*
>
> *"The model for Bara could never be arranged. It's very complex around the full serviceability of a hospital. Do you just do the property and own and operate the facility or is it all inclusive, the IT, the security? Does it include the equipment?". "I mean in a hospital, there's thousands of things that can go wrong, there's many rooms, there's complexities, so they're quite risky by nature".*

The second highest ranking construct among all participants was that of limited financial skills in the public sector which they felt impacted on their ability to fully appreciate the risks and scale thereof. Some commented that;

> "*Often you're dealing with government employees and I mean, they're not commercial. They don't understand how things work in the private sector".*
>
> *"I'm not sure that we as government have the technical skill or data that would support the identification of what the risk is".*
>
> *"You end up with this little group of managers, government managers, who know nothing about finance, nothing about law, who know nothing about business cases, but they're supposed to make these very difficult decisions".*

"The people negotiating in government are you know, often not the most financially literate people, so they are often pulled out of their day jobs to do this, so they don't have enough understanding".

The different mandate held by government as opposed to that of the private party, was the third highest ranking construct in most participant's responses. This construct often came up repeatedly in the same interview. Of note, some participant's comments were;

"*So here's the thing, hospitals are not economically driven, they are socially driven".*

"As government, our core service is to make sure people get services. Not to make sure the whole value chain of the hospital operates efficiently".

"The objective of the PPP was not we want patient's lives to be improved, the life or service for the patients to be improved. The objective of the PPP from the private side was that you supply 10 000 litres of gas a month. You supply 10,000 per month, you maintain the, the geyser, the boiler system or whatever, what happens when it reaches patient interface, is none of my business".
"But also, if you look at the two parties, I mean the private sector and the public sector. I mean they operate from such a very different core stance. The government has a mandate with the budget and private sector has the strategy and maximising the profits, so there's just this fundamental different way of approaching life".

"The beauty of the bank is that it's completely objective, it has no social aspirations. It couldn't give a flying hoot. They just say, I've got to do this right because I don't want any comebacks".

Participants reflected on the loss of project knowledge in the public sector either as a result of migration to the private sector or due to high turnover within government employees between the different projects. They remarked that this impacted negatively on the depth of skills and institutional knowledge which remain in the public sector, with some participants stating;

"*Another complaint from the private sector was actually that the government people kept on changing all the time, so you'd eventually explain something to somebody, and they'd move onto another project and then someone new would arrive to negotiate the next round of the PPP agreement".*

"The knowledge base just leaves after every project".

This view was echoed by two public sector lead advisor who commented that;

"*All the guys involved in the feasibility, once the contract is signed, they disappear. There is loss of institutional knowledge on the public sector side".*

"The private guys will say, if you help us navigate this project politically, we'll take care of you. Our guys, in one or two years, they're gone, they're working for that private company".

One of the lenders with 10yrs experience in PPPs across sectors, offered an opposing view. She felt that generally there have been too few PPPs , so even though the lenders did many project finance deals, even they had suboptimal depth of knowledge and skill in PPP projects. She remarked that;

"*All PPPs have been few and far between. Skills in other banks are gone. So, we're dealing with guys who haven't looked at PPPs in a while".*

Affordability is one of the three components that PPPs must demonstrate for government to proceed with this procurement model. This construct came up often amongst the participants who agreed that for a number of reasons, affordability is often eroded on these projects. Some public sector participants remarked that;

"*It is not affordable to run a facility, a hospital or a prison at the same level of quality as the private sector would, because it costs too much. You pay for that level of quality".*

"The bigger the mitigation, you know, it's a passthrough cost to us. It causes the cost of the deal to go up.

"Where there is social value, affordability is sometimes ignored".

The private party participants, particularly the lenders, viewed the affordability component as the price that government has to pay for transferring all the risk to them, saying;

> "*In the long run PPPs become cheaper. They're initially expensive but this is the cost of piquing the private sector investment appetite…. This is the school fees which government has to pay to develop a sector".*
>
> *"I think it's called public-private partnership because the private sector takes all the risk. They can do that, but they will do it at a price which might defeat the affordability objective".*
>
> *"The only failure of the affordability, of, of, the principle of an affordability test is that government gets the metrics wrong all the time. In the Public Sector Comparator, government doesn't take into account whole of life project operating costs, so they're comparing an apple and a porcupine. They don't measure the cost of government incurring government debt".*

All the lenders were very concerned with government guarantees, describing them as a prerequisite to receiving approval from their credit committees to participate in a deal.

> *"Where banks get involved obviously, is uhm, where, firstly in trying to quantify what the contingent liability might be, uhm and then agreeing on a reasonable guarantee structure with Treasury*".
>
> *"If it's a PPP, the biggest difference is there's a government feature such as a credit guarantee or some other feature which enhances the credit risk and or they will provide both a credit underpin as well as they may sign a lease and say well, we will, will service a lease for the next 15-21 years, which would then give the assurance the bank needs to put in funding for the next 15 years".*

Five of the participants spoke at length about the correct allocation of risk to the party best able to handle it, which was often a contentious issue, some remarking that;

> "*For example, what if someone sues a hospital in a PPP. Who's going to take that risk? In health that risk is there, but the question is who wants to take it?".*

"Government was just putting a lot of risk, too much risk back to the private sector, and we were just pricing for it, I mean you have to".

"There are typical standard risks which are clear as to who should take them. It's the nuanced risks that become a problem. There is always a tug of war in risk allocation".

"So for example, I mean lenders, we do take some, it's like a puzzle. So if you look at risk and say, overall my heritage, my concerns, um, everything seems fine, but then there's this one risk that I'm sitting with that maybe I shouldn't in the purest sense be sitting with it, but in the overall picture I can live with it because the overall risk of the project is acceptable to me. So that's how you look at it"

"I mean, risk by its very nature is risk and it's something that everybody wants to, wants to run away from".

Accountability or the lack thereof seemed to be an issue in the public sector which participants felt had an impact on the rigour of risk mitigation on projects. One remark was;

"I think it's about accountability, no-one gets fired in government. So, there's less incentive to do the right thing, to just do your job".

Some of the participants alluded to the role of project design in risk mitigation. One of the lenders who had 19 years of PPP experience commented on how important project design was in coming up with adequate mitigation strategies, expressing;

"*When you do a well-designed PPP, it's got to start with a massive consultation with all the stakeholders so that everybody understands what all the issues are, so that you don't get locked into false subsidies, or something which you can't unwind 10 years down the line, or 20 years down the line when it becomes apparent that it is not fit for purpose".*

In highlighting the importance of the design risk element, another lender and private consortium bidder shared their views on how as the private party they deliver according to the contract, nothing more and nothing less. Therefore if it was incorrectly designed,

and they delivered according to the output specifications, they were not willing to assume the risk if the design was not fit for purpose, stating;

> *"Once the contract is signed, the private party delivers what it signed up for. How that translates to service delivery, is not their problem".*

Contract management was described by some participants as being key to adequate risk mitigation. The lenders described a special team which was appointed to manage the contract for the life of the project cycle as follows;

> *"We have a whole team of people that manage, they're called transaction management advisors, who manage the project through the life cycle to ensure that we are complying with the obligations under the contractual framework".*

The public party advisors highlighted poor contract management as a short-coming in their mitigation process, stating;

> *"The part that we neglect is contract management".*

> *"The department must develop a contract management team and have people who go through all stages and understand what is at stake".*

> *"You need someone to manage the contract. To project manage at the calibre of a bank. No one does it better because all they do is run risk models all day. Who's going to manage the developers? You don't have that capacity in government".*

> *"Mitigation is only as good as the people implementing it. If you don't have a contract manager, so much for your mitigation system".*

Secondary Question 1.6: Does the PPP procurement model deliver value for money for government?

The table below highlights the participants' views whether PPPs deliver the envisioned value for money for government.

Table 14: Do PPPs deliver value for money for government?

Rank	Constructs	Frequency
1	Yes	6
2	Uncertain	4
3	No	0

Most participants who believed that PPPs deliver value for money belonged to the private party. The one public party participant who agreed with this view had previously participated as a private consortium bidder. The public party participants remained sceptical on this question. Views from the private party were expressed as;

> *"So they might be more expensive initially, or perceived to be more expensive but when you take into account that there's certainty and you're not going to go over budget, they provide value for money".*

> *"I don't think I've heard that risk allocation is an issue, but it's also like the view that they don't provide value for money and they're not affordable for the ministry. That's what. But we're saying what's the alternative"?*

> *"Yes, I think they do because of limited resources. So if, if government had the 10 billion and they ran the, the projects themselves, it'll probably cost less, however they actually need the 10 billion for other, for other infrastructure. Um, so the reason I'm saying the cost is small is because there are two additional parties who both want to make a return. So there'll be a private party, there'll be a developer and a bank who want to make a return, as they should, uh, now in a world with limited capital, that's the value PPP provides".*

> *"I think they do. I really do. And I'll tell you why. And is it a managed well, I'm thinking what I think it is. For me, it's the effect of certainty. So if you are government, you that a PPP will not go over budget almost most of time".*

5.4 Results for Research Question 2

Why is Systems Thinking not widely adopted in South African health sector PPPs.
This research question sought to understand how entrenched practitioners are in their current practice and whether there are considerations of a different approach.

Secondary Question 2.1: Why is the current risk mitigation approach used?

The advisors to the public party all highlighted current PPP mitigation practice as being firmly entrenched in the Treasury PPP Manual with participants stating that;

> *"By the look of things, the manual hasn't changed since inception, since it was developed".*

> *"There are people in the Department of Treasury who've been there since inception"…Even if you've seen an approach elsewhere and seen it work, there's also someone who hasn't seen it and is a firm supporter of what they've designed. The system that is there is their brainchild".*

> *"That was part of the challenge, the model, the framework was adopted, implemented and basically left to its own devices. It was assumed that it would work… They did not go back and ask, why did it fail? Is it working elsewhere and why is it not working here. Should we not revise the way we implement this".*

The lenders described their approach as based on global project infrastructure finance principles, describing their approach as;

> *"So, the framework that we look at is from a long term exposure using a debt instrument as our participation. Even though you do that, there are elements that you consider which de-risk the project from a lender, debt point of view, even though they may not relate to debt. These are classic project finance principles".*
> "*Ja, I think all the banks really, have a very classical approach to project finance and risk mitigation".*

Due to an understanding that the participants may have varying levels of exposure to Systems Thinking or none at all, a definition was given prior to the next interview question, which is followed by a table highlighting their responses.

Secondary Question 2.2: Does your current risk mitigation approach use Systems Thinking?

Table 15: Use of Systems Thinking in current practice

Role in PPP Partnership	Construct	Frequency
Lender	Yes	5
Advisor to public party	No	3
Private consortium bidder	Yes	2
Advisor to public party	Yes	1

The public sector advisors agreed with the principles of Systems Thinking but spoke of a silo mentality in government, which was expressed as;

> *"It happens sometimes with projects, but not nationally between departments which need each other for infrastructure".*

> *"I mean really, when you bring these different elements together, that's where you can make things work. You can't just sit in silos and I think that's one of the greatest risks. Why we are not getting ahead is because people that work in these silos and they've got these, I don't know, you can't just have a framework"*

> "*Uh, your answer is no, we have got no Systems Thinking, uh, even from a planning perspective and we talk about it but we don't plan".*
> *"No, there's no Systems Thinking in and systems planning in government. I think what drives silo-ism is how our budget process works…. I need to deliver a particular set of indicators based on my budget… So, I have no interest on your budget and your deliverables and your outputs".*

On the other hand, the private sector parties described in detail how their process looks at all the variables and analyses how they relate with and influence each other, and based on these complex relations and interdependencies, a strategy is formulated. They remarked;

> *"PPPs which are financed via project finance, I mean, as the deals themselves… I see them as puzzles. They are very complex and made up of many pieces. Even If you zoom in at the piece, you always have to come out and look at the whole puzzle as a picture….. If there's an issue with one risk, the whole picture changes. So, one puzzle may change, but it may require two, or three other puzzles to also change to actually still make the overall risk acceptable. We don't go like on a linear basis. It must all work as a puzzle".*

"*I mean you talk about a systems analysis, I mean you actually have to understand that the whole thing actually fits together, because nothing stands on its own. It's all how it interacts, and uhm you can't just look at one paragraph, you'd have to read the whole contract document from end to end to understand how the whole thing fits together".*

"Now if you're leading the deal, if you're the transactor in a project finance or PPP deal, you're co-ordinating and getting the contributions from various specialists who are specialised in a particular risk area".

5.5 Results for Research Question 3

Are there barriers to adopting Systems Thinking to mitigate risk in South African health sector PPP projects?

Secondary Question 3.1: Why isn't Systems Thinking used in practice?

Table 16: Reasons why Systems Thinking is not used in practice

Rank	Construct	Frequency
1	Entrenched standards and culture	4
2	Inability to influence upward	3

The public party participants believed that their current linear approach persists due to familiarity with the current approach which is entrenched in the PPP manual and based on international standards, and the culture within government which doesn't have a process to deal with innovation,

The highest ranking construct related to established standards and practices within the PPP framework and government culture, followed by the inability to influence upwards. Participants expressed this as;

"It's like for me, there's a big culture change that needs to happen".

"If you want to change something, you are told, give me a generally accepted standard".

"They're so stuck in the way that government delivers services that they are not leaving it open for innovation and efficiency to manifest and that makes it difficult". "There are a lot of people who think out of the box, but they're not in a position to influence".

"I think, okay, you can be exposed to something, but whether they interpret that exposure into something is the different story, we have been exposed. So we go to these places, Singapore and Ja, Ja, but when you get back home you ask yourself what happened? Because when you get back, you see none of that being implemented".

The private party participants confirmed that they are already using a Systems Thinking Approach in their risk mitigation strategies. They alluded to incorporating learnings from other sectors, across geographies and between the different banks, with one lender stating;

"Also project finance transactors move across all banks, they work in DFIs, they may move from DFI's and work in commercial banks and vice versa, so there's cross pollination of expertise, experience in the project finance space, globally".

Secondary Question 3.2: Would it be easy to adopt a Systems Thinking Approach?

This interview question sought to understand whether there are structural barriers that stand in the way of PPP practitioners moving to a Systems Thinking Approach.

Table 17: Barriers to adopting a Systems Thinking Approach

Rank	Construct	Frequency
1	Lack of leadership support	2
1	Bureaucracy	2

Although the public party participants agreed in principle with the value of a Systems Thinking Approach, they showed scepticism. They agreed that adopting Systems Thinking would be challenging. Lack of leadership support and bureaucracy ranked equally among participants as the barriers to adopting a Systems Thinking Approach;

"It was at the highest level of leadership when that decision was taken. A strategic leadership team was formed which consisted of the top five leaders in the province who held the same view that if you want to make a change, you need a systems approach".

"It needs that commitment, that will from the top".

Participants also alluded to current bureaucratic processes which would make the adoption of Systems Thinking challenging, saying;

"*New thinking is welcomed, as long as it doesn't interfere with policies and internal controls that the government has".*

You would have to make it into policy, now that's a process. You would need to make a submission to the minister highlighting the things which need to change".

"Even if logically and financially it makes sense, there's a formal process you have to follow".

"An idea might be good, but it needs to be tested. Hence you end up having these pilot projects. Some work, some don't".

5.6 Conclusion

This chapter presented the results from the semi-structured interviews conducted. The common constructs which emerged were grouped together and presented in a ranking order of importance according to the participant's responses. There was considerable rigour and diligence applied to risk mitigation practices by all parties involved on the private consortium side, particularly the lenders. The practice of structured project finance in the banking sector predates the PPP procurement model by approximately 20 years. This manifests in considerable depth of experience, institutional knowledge and sophisticated risk mitigation practices which naturally follow a Systems Thinking Approach. On a typical PPP project ,the banks usually have a 75-85 % financial exposure through debt financing to the private consortium. This exposure ensures that they conduct their own due diligence involving independent experts from all disciplines before they can proceed to financial closure. This was not echoed on the public sector side of the partnership, which experiences frequent change in leadership and high turnover of PPP practitioners who leave for the private sector with institutional knowledge of projects, resulting in a more fragmented and somewhat less rigorous approach to risk mitigation.

The focus from the public party is on their mandate to deliver a social service and less on the merits of the business case of the project.

Most participants spoke repeatedly about the difference in mandates between the public and the private parties in the PPP partnership. They also alluded to a trust deficit between the two parties as a result of the different mandates. This trust deficit was mentioned as contributing to the tensions experienced during contract negotiation and risk allocation. All participants commented on the complexities of health sector PPP infrastructure projects which were repeatedly described as not being just any building, but a very technically complex building, which fatal consequences if not done right.

Although they agreed with the principles of applying Systems Thinking, public sector participants alluded to entrenched practices which would require policy amendments to adopt a new way of thinking.

CHAPTER SIX: DISCUSSION OF RESULTS

6.1 Introduction

This chapter discusses in detail the insights from the research findings which were presented in Chapter Five. Insights gained from a content analysis done on three health PPP case studies authored by WITS Business School are also discussed in this chapter to triangulate the data emerging from the 10 semi-structured interviews conducted. The constructs which emerged from the interview data are juxtaposed against the literature review presented in Chapter Two and a review of the three case studies. An analysis ensues to answer the research questions which were posed in Chapter Three.

6.2 Discussion of results for Research Question 1

How is risk currently assessed and mitigated?

Secondary Question 1.1: Is there a framework used?

The interview data substantiated the notion that there is a fixed approach which PPP practitioners use to mitigate risk. The public party participant's approach is firmly entrenched in the PPP Manual formulated by National Treasury. The Manual sets risk assessment standards which the government uses to optimise private sector investment so that affordable project choices are made for service delivery (National Treasury PPP Manual, 2004, p. I). The focus is to transfer risk to the party best equipped to handle it, which confirms what is found in the literature (Bing, Akintoye, Edwards & Hardcastle, 2005; Ke, Wang, Chan, & Lam, 2010; Marques and Berg, 2011; Hwang, Zhao and Gay, 2013). The data showed that the private party also takes a systematic approach to modelling risk which is widely accepted in the project risk literature (SA, 2009).

The private consortium bidders were aware of the risk mitigation approach used but could not speak to it in any detail, most likely because the lenders who fund them mostly handle the project due diligence.

In case study one (IALCH), there was no record of full due diligence found, only a power point presentation summarising the feasibility study which had been accepted by the KwaZulu Department of Health in October 2000. Similarly, no feasibility study is on record for case study two (Universitas). The context and timing of these two projects are

essential to note, in that construction had already commenced before the issuance of the Treasury Regulations and PPP Manual in 2004. The guidelines contained in the Manual including the standard risk matrix as we know it today, were therefore not available to the parties at the time of conducting the feasibility study. Records for case study one (IALCH) show that key members of the project team were convened to attend a risk workshop on 16 October 2000, where the possible cost impact of each project risk was identified (National Treasury PPP Unit, 2007). This approach suggests a risk allocation format comparable to the current category based matrix in current use.

Secondary Question 1.2: Which are the biggest project risks?

Operational risk was the highest ranking construct followed by financial risk from the interview data. This is mainly in keeping with the profile of the study participants which was made up of public party advisors, private consortium hospital operators, and private party lenders. Data from the case studies confirmed the importance of these two risk categories evidenced by the majority of clauses speaking directly to operational and financial risk. The public party participants concurred with the other participants on the magnitude of the operating risk in health PPPs. The private consortium bidders are typically hospital operators responsible for the support services component in the hospital, so would naturally consider the hospital operations as their most significant risk. This finding is in keeping with literature which states that service professionals see the core benefit of hospital PPPs as their ability to bring private sector management systems to improve efficiencies and service delivery in hospitals (Dorgan, Layton, Bloom, Homkes, Sadun & Van Reenen, 2010). The private participant lender group offered a different perspective which was also in keeping with literature. They viewed the significant benefits of a PPP a being the government's ability to access private capital (Brown, 2007), transfer risk and the ability to consolidate the building, operating and maintaining activities into one contract (Dorgan, Layton, Bloom, Homkes, Sadun & Van Reenen, 2010). This perspective was echoed in their focus on the design and construction, and operations and maintenance as significant project risks. These contrasting perspectives are highlighted in the literature as possibly being the reasons why inappropriate contracting and procurement models have been used to implement health sector PPP projects globally (Montagu and Harding, 2012).

Government is typically only allocated the political and regulatory risk in the PPP project risk matrix (Aiello, 2014). The risk in the other categories is transferred to the private party. None of the participants spoke of any concerns regarding political or regulatory

risk, due to the well-established and sound regulatory framework articulated in Regulation 16 of the Public Finance Management Act. The political and regulatory risk may have featured prominently in the interviews had included multinational developers or construction companies since they would have a different perspective on country-specific risk. This view was substantiated in the interview data by one of the lenders. Multinational companies would need to consider the risk of legislation changing at their expense. As mentioned in the interview data, they would also need to consider the strength and availability of South African financial markets, and would, therefore, conduct rigorous due diligence on the lenders as well.

As financiers, naturally the lenders ranked financial risk as high from their perspective alluding to the length of the PPP project term as a particular concern for them. Given their 75-85% exposure in the form of debt financing to the private consortium, they need to ensure that the project yields sufficient future cash flows to generate their projected return on investment. Their usual project term for project financing is approximately five years, so the PPP model requires them to intensify the rigour of their due diligence to factor the lengthy project terms typical of PPPs. This concern is echoed by Hovy (2015) who argues that what is acceptable in the regular market conditions of contractors, financiers and insurers should be taken into account in the PPP contract to align it closer to real-world conditions.

Inflationary and exchange rate risk was a significant concern for the private consortium due to the hospital equipment and technology which is most often imported. One of the case studies confirmed this finding since one of the conditions of the contract in case study one was that the provincial government would take no risk for exchange rate fluctuations for the duration of the PPP term. This risk was transferred in its entirety to the private party operator. The case studies describe the detailed nature of the output specifications required for hospital PPPs. Details describe how frequently equipment must be serviced and replaced, and how often software upgrades must be done ((National Treasury PPP Unit, 2007). All of this talks to the availability of equipment which is an integral part of the operator's deliverables, and has a direct impact on the numbers of patients who can be serviced. These servicing and replacement schedules are typically based on the manufacturer's recommendations as shown in case study one. The operator would have to plan for both inflationary and foreign exchange risk in ensuring that they comply with the output specifications. The inflationary risk is more stable than the foreign exchange risk since the exchange rate is influenced by macroeconomic factors out of the operator's control, which presents a problem for the

operator. This situation could result in opportunistic behaviour on the part of the operator to recover costs thus adding to the overall project price. This situation supports Oudot's (2005) articulation of moral hazard which occurs when the Agent acts opportunistically at the expense of the Principal.

Only one participant spoke of environmental risk which is more likely a reflection of the profile of study participants. If a developer or any of the related contractors had been included in the interview sample, perhaps this risk category would have had a higher frequency count since environmental risk would form a considerable component of their due diligence. Appropriately in the first case study (IALCH), the private party was exempted from any claims arising from land rezoning or subsidence issues since it had not been involved in the initial construction of the hospital.

Secondary Question 1.3: Are the project risks defined the same by the different stakeholders?

The findings confirmed the literature which suggests that different stakeholders define or focus on various elements of risk depending on their role in the partnership. Forrer, Kee, Newcomer and Boyer (2010) contend that these different perspectives of the different stakeholders contribute to the tensions in risk allocation. Further to this, Maslova and Sokolov (2017) suggest that lack of consensus in the definition and description of risk renders the standard risk matrix and its categories flawed. This broad interpretation of risk may not align with the concept of rigorous risk mitigation. Almost all of the participants confirmed that their role in the agreement influenced their understanding of project risk. These different perspectives are in keeping with early theorists (Eisenhardt,1989) who described the problems economists had seen in risk-sharing when the co-operating parties have differing attitudes towards risk.

The second highest construct which influenced the interpretation of project risk was information asymmetry. The public party participants expressed that they often felt they had no way of knowing what the private consortium was doing and whether the contract was being honoured, and often entered the agreement with "blinkers on" since they had not been party to discussions at the commencement of contract negotiations. This situation confirms Jensen and Meckling's (1976) articulation of the Agency problem which arises when co-operating parties have different goals and division of labour. The participants echoed this in that the government cannot check that the private consortium has complied with the contract and behaved appropriately, either because it is too costly

to do so or because of incomplete information. From the participant's responses, it would appear that both of the reasons are a factor. The government cannot afford to have an independent contract management function and is often acting on incomplete information. The case studies confirm the absence of contract management but also shed light on the context of these initial projects where the Treasury Regulations did not require an active contract management plan (National Treasury PPP Unit, 2007). The positivist stream of Agency Theory proposes that the private party is more likely to behave in the interests of government if the contract is designed to align with the government's goal of service delivery. Alignment can also be achieved if the government has access to information which verifies the private party's behaviour (Jensen & Meckling, 1976).

Both public and private party participants alluded to the fairness and competitive nature of the procurement process. Guarding against anti-competitive behaviour was seen as essential to both government and the private sector. Treasury Regulations stipulate that the government institution should not begin with the procurement phase until Treasury Approval I has been obtained. The case study data, however, revealed that the information memorandum notes which should be regarded as Request for proposal (RFP) documents indicate that a dual process of obtaining Treasury Approval and pre-qualification occurred. This dual process casts a shadow of doubt on whether due process was followed regarding procurement on these projects. However, the context and the timing of these projects is important to note since the current Treasury Regulations were not in place yet.

The notion of adverse selection (Oudot, 2005) which occurs when the government cannot be confident that the selected Agent is the best candidate to deliver the job was not a concern raised by the participants. Literature, however, highlights this as a significant concern. The case study data shows that the construction companies and operators involved in the consortia were typically well established with proven track records to deliver on the technical aspects of the projects. The private participants did, however, allude to the inherent mistrust that government has of the private sector. Their experience was that the government felt that the private party would act dishonourably to maximise their profits. Government's sentiment is thus in keeping with the moral hazard problem described by Oudot (2005), which represents the private party as acting opportunistically at the expense of the government’s goals.

Additional insights were of the lender's perspective which spoke of a sector preference as an influencing factor in risk interpretation. Banks would look at a particular sector and participate if they liked the risk and reward profile.

Secondary Question 1.4: Should there be flexibility in the contract to allow for uncertainty.

All participant's responses confirmed what is found in literature about the inherent uncertainties in PPP contracts (Sarmento, 2010; Cruz and Marques, 2013; Hovy, 2015). However, only one participant felt that as a result of these uncertainties, the PPP contract should, therefore, be iterative and open to flexibility as suggested by the literature. Cruz and Marques (2013) propose contract flexibility using a hospital PPP project as a case study, arguing that flexibility can be structured in such a way as to generate economic gains by increasing the Net Present Value of a project. Nine out of 10 participants disagreed with this view, stating that certainty was critical for project success. Perhaps this reflects the mistrust which is present on both sides of the agreement where government views the private party as only concerned with maximising their profits at government's expense, and the private party sees government as a poor payer.

In the third case study (Humansdorp), this need for contract certainty is challenged, as it describes a rare case of a strong partnership and commitment between the public and the private party which allowed for relaxation or flexibility on some of the terms of the agreement (National Treasury PPP Unit, 2007). This particular project was a co-location model and is considered one of the more successful health PPPs. The relative success of this project compared to others, highlights the role of trust and commitment to building a successful partnership between the public and private parties. Creating a successful partnership requires stable and robust leadership with sufficient institutional knowledge to formulate a strategy which aligns both parties interests.

Secondary Question 1.5: Are the current risk mitigation strategies adequate?

The interview data showed a clear division between the public and private party participants, where both parties viewed the private party's approach as very good, and the public party's as sub-optimal. Most participants saw the private sector as having the depth of financial and project management skills required to formulate a rigorous risk mitigation strategy.

The top raking constructs which emerged from the data as being considerations in formulating an adequate strategy were the Technical complexity of health PPP projects; Lack of public sector financial skills; Conflicting mandates between the public and private parties; Loss of public sector project institutional knowledge and Affordability.

Many authors have written about the complexity of PPP projects (Vidal and Marle 2008; Geraldi, Maylor, & Williams, 2011; Bosch-Rekveldt, Jongkind, Mooi, Bakker, & Verbraeck, 2011; Saunders, Gale, & Sherry, 2015; Loosemore and Cheung, 2015). Qazi, Quigley, Dickson and Kirytopoulos (2016) built on these previous author's work and argued that although the project finance approach of risk modelling is systematic and generally accepted in literature, it does not take into account the interdependency between project risks and complexity. All participants spoke to the inherent technical complexity of health sector PPP projects which substantiates Maslova and Sokolov's (2017) proposition that a more specific medical risk category should be included in health PPP's to enable more appropriate risk mitigation strategies to be employed. The first case study describes the concession which was signed between the provincial Department of Health and the private consortium as a very carefully drafted document. The contract took into account the specialised nature of this particular project and how it differed from the standard provisions prepared by the Treasury PPP unit which were designed around a typical accommodation project and not tailored to a health sector PPP. This differentiation supports the participant data and literature which recognises particular complexities in health sector PPPs.

Lack of public sector financial skills was the second highest ranking construct, and loss of public sector project knowledge the fourth highest ranking. Weak public sector risk knowledge was also found to present a challenge to appropriate risk allocation in social infrastructure PPPs in Columbia (Sastoque, Arboleda & Ponz, 2016). This finding confirms that a strong public party is an essential component for appropriate risk mitigation and project success. This view is contrasted with the literature which often refers to the strength of the private consortium in previous studies delineating the critical success factors in PPP projects (Bing, Akintoye, Edwards & Hardcastle, 2005; Osei-Kyei and Chan, 2015). The authors of case study one and two found no records of the due diligence and close-out reports for either hospital. The terms of reference for PPP transaction advisors require that following financial closure; a close-out report is produced for the institution and a case-study for the public. The purpose of these documents is to serve as comprehensively summarised institutional records which detail all matters related to the transaction, all contracts, and financing agreements. This lack

of record keeping is consistent with the interview data which revealed loss of project institutional knowledge on the public party side. Data revealed frequent changes of project managers and leaders at the municipal, provincial and national level, resulting in an erosion of institutional knowledge. In case study three (Humansdorp) however, a close-out report was compiled, and there was evidence of continuity of the role players who stayed on the project for a long time. This project is referenced as one of the better performing health PPPs which further substantiates the importance of retaining institutional knowledge.

The interview data highlighted clear differences in the mandates held by the different parties in the PPP agreement. The tension created by these conflicting mandates is expressed in Agency Theory (Jensen and Meckling, 1976; Jensen, 1983) which describes an adversarial relationship between the Principal and the Agent due to misalignment of goals and unequal division of labour. This tension is magnified by the vertical hierarchy between the two parties. In the positivist stream, Jensen and Meckling (1976) conclude that an outcomes-based contract which aligns the private party with the government's mandate for service delivery would be beneficial in PPP projects.

The study findings confirm the tensions Moore, Boardman and Vining (2017) describe as a result of the two party's conflicting mandates. Case study two (Universitas) and three (Humansdorp) were both co-location projects where a private sector wing was added to an existing public hospital. In co-location projects, the public party benefits from private sector investment to refurbish the existing structure, and the ability to generate revenues from its excess capacity. The private party is responsible for non-clinical operations within the hospital and can introduce private sector efficiencies. Both parties are intrinsically intertwined with a sharing of specific risks for the duration of the project term. This interdependence suggests that the co-location model may be best suited for health PPPs since it better aligns the two party's mandates.

The findings showed that the public party participants held the view that PPPs were not affordable, but because the government's mandate for delivery of essential social service was so strong, the affordability test was often overlooked. The private party confirmed this view of the high overall price of PPPs but felt that affordability was often eroded by government transferring all the risk to them. This substantiates literature findings where De Palma, Leruth and Prunier (2012) argue that there is often excessive transfer of risk to the private party resulting in increases to the overall project price since the private party must price accordingly to make the desired return on their investment and make it

attractive for them to participate. This notion is evidenced by an R 20 million increase in the annual fee which was ultimately payable by the government to the private party in the first case study (IALCH) on account of increased risk transfer to the private party. All the case studies refer to lack of affordability limits being set by the public party, which substantiates the notion that the affordability test is sometimes overlooked. In the first case study (IALCH) in particular, even though the transaction advisors had expressed reservations at feasibility stage, that the project was marginally affordable, this appears to have been ignored (National Treasury PPP Unit, 2007).

What then constitutes the appropriate risk allocation when both parties have such different interpretations of the risks involved and different ultimate goals?

The tensions in risk allocation are well documented in literature (Sarmento, 2010; Forrer, Kee, Newcomer & Boyer 2010, Marques and Berg, 2011), as are instances where PPP projects have failed due to inappropriate risk transfer (Tam, 1999; Soomro and Zhang, 2013; Chou and Pramudawardhani, 2015). The study participants confirmed literature findings and described a tug of war which occurs during risk allocation which is ultimately settled through a process of negotiation (Medda, 2007). They alluded to acceptance by both parties on the final contract and risk allocation but conceded that this was most often in favour of the private party since they have the mechanisms and risk models to price for whatever risk they assume. The public party, however, often felt at a disadvantage. They were aware that there are instances where they should assume more risk, but due to a skills deficit and insufficient budget for independent contract monitoring, were forced to allocate all the risk to the private party. Ultimately this erodes both affordability and value for money, thus confirming Hovy's (2015) findings that assigning risk to the private party comes at a cost. If the risk transferred could have been managed by the public party, it could erode the value for money which they seek. This erosion of value for money by excessive transfer of risk to the private party is documented in the UK experience, followed by a recommendation that the public sector needs to retain and manage more risks (HM Treasury, 2012).

The lack of systems to put a quantum to the actual probability of a particular risk occurring and the severity of that risk further adds to the overall price of the project. In current practice, the public party mitigates for an event happening in its entirety. This whole of risk mitigation supports literature findings where Hovy (2015) proposes that the frequency and severity of risk needs to be clearly defined so that it can be priced for correctly.

The requirement for government guarantees confirms literature findings (Helmy, 2011; Olusola Babatunde, Opawole, & Emmanuel Akinsiku, 2012) as a prerequisite for private party participation. The private party lenders described in detail their process where a project was only signed off and approved if they had proved to their credit committees that they had the necessary Treasury Guarantees in place in the event of government default. Lower ranking constructs were lack of accountability in the public sector and project design.

Forrer, Kee, Newcomer, & Boyer (2010) reviewed the public accountability question in the context of PPPs. They contend that the dynamics of public accountability are different in PPPs. The difference lies in the involvement of private partners in government decision making and program delivery. The two parties, however, have conflicting mandates, which necessitates that the public officials have a comprehensive understanding of the terms and conditions of the private party's involvement. The PPP arrangement demands that the public party is aware of levels of accountability between partnership members. The public party must develop and implement mechanisms to hold the private party accountable and also develop those which hold government accountable to the private party, to build trust and enable a successful partnership. Participants revealed a lack of these accountability measures in the public sector which erodes the vigour of risk mitigation.

Secondary Question 1.6: Does the PPP procurement model provide value for money for government?

Interview data revealed that value for money is often eroded by excessive transfer of risk to the private party, which confirms both literature findings (Sarmento, 2010; Henjewele, Sun & Fewings, 2011; Hovy, 2015) and the UK experience (HM Treasury, 2012). It also appears that there is no common understanding of what constitutes value for money between the two parties, resulting in the private party believing unequivocally that PPPs deliver value for money and the public party remaining sceptical. The private party participant’s view was that PPPs give value for money since the government is not required to put up capital at the beginning of the project which allows them to allocate their budget to service delivery needs, thus confirming the World Bank's view that often the PPP model is used because it creates fiscal space (World Bank, 2013). Government is only required to start paying once a project has been delivered on time, and within

budget. The public party's perception or definition of value for money was intrinsically linked to the ability of the project to deliver on their social service mandate.

Treasury Regulation 16 states that “value for money means that the provision of the institutional function or the use of state property by a private party in terms of the PPP agreement results in a net benefit to the institution defined in terms of cost, price, quality, quantity, risk transfer or a combination thereof (National Treasury PPP Manual, 2004, p. 7)”. Two of the case studies found incomplete value for money reports, where there was no clear evidence of a Public Sector Comparator being done. Project measurement and sign-off had not been finalised at the time of writing of the case studies. Therefore there is no conclusion on whether value for money took place on the projects (National Treasury PPP Unit, 2007.

Henjewele, Sun, & Fewings (2011) found that the concept of value for money changes at different stages of the project life cycle which they contend renders this test ambiguous and circumstantial at best.

Summary to discussion of results for Research Question 1

The interview data showed that PPP practitioners follow very structured risk mitigation processes which are entrenched in their training and governed by industry standards, thus supports the work done by Loosemore and Cheung (2015). The private party is unambiguous about their profit motive and is therefore incentivised to perform rigorous due diligence and increase project efficiencies to maximise the return on their investment. The public party's mandate is fundamentally different. Their mandate is primarily to deliver an essential social service, and secondarily to do so at an affordable price with appropriate risk transfer which provides value for money. Affordability and value for money, however, are often side-lined in pursuit of the primary mandate.

6.3 Discussion of results for Research Question 2

Why is Systems Thinking not widely adopted in South African health sector PPPs.

Secondary Question 2.1: Why is the current risk mitigation approach used?

Both the public (National Treasury PPP Manual, 2004), and private (SA, 2009) party's practices are entrenched in accepted industry standards within the PPP universe. The study findings support the findings of Loosemore and Cheung (2015) who report on the path dependencies which lock people into established patterns of managing and mitigating risk. Both sides of the PPP partnership spoke to well documented and established norms within PPP practice or project finance which highlight the extent to which practitioners rely on established guidelines to inform how they approach their work. The lender group appeared to be more receptive to looking outside of their immediate universe to other geographies and had the agility to incorporate learning into their current practice, as long as it satisfies their credit committees. However, if one considers the global universe of project finance specialists, although there may be cross-pollination across different organisations and geographies, they are still somewhat limited by what is known and considered acceptable industry standards and norms in the project finance space.

Similarly, the public party participants felt they were bound by the standards and principles in the PPP manual which they often referred to as their "bible". They were acutely aware of their inability to innovate or influence practice based on external exposure or learnings unless it was formulated into policy. Even though the PPP Manual had not been revised or amended since it was adopted as a guiding document in 2004, the public party participants were bound by its processes and limitations.

Secondary Question 2.2: Does your current risk mitigation approach use Systems Thinking?

Although they appreciated the systems approach proposed by early systems thinkers (Von Bertalanffy, 1968; Senge, 1990, Wheatley, 2006), the public party participants' views confirmed that their risk mitigation follows a rather simplified linear reductionist approach which confirms literature findings (Sarmento and Renneboog, 2014; Loosemore and Cheung's 2015). Some participants alluded to elements of a Systems

Thinking approach within projects. However, this was limited by the lack of a Systems approach within national government departments.

The private party's interview data suggested an intimate appreciation of and use of a Systems Thinking Approach in their risk mitigation. Their approach spoke of the interconnectedness of the different risk categories and how they influence each other as described by Cordon (2013). This practice negates Loosemore and Cheung's (2015) findings which describe a lack of Systems Thinking by all practitioners in the PPP universe. This study's findings extend their work by highlighting the different risk perspectives and approaches held by the two parties in the PPP agreement which are influenced by the pursuit of their conflicting mandates.

The third case study (Humansdorp) shows elements of a Systems Thinking Approach being used by both parties. This project was a co-location PPP where the public and private parties were intrinsically bound on a daily basis through facilities management and shared services. Through a collaborative effort, mutual commitment to the project at the highest levels of leadership, and most importantly appropriate risk sharing, they were able to adopt elements of a Systems Thinking Approach.

Summary to discussion of results for Research Question 2

The data showed that the private party which is driven by a profit motive is more incentivised to naturally incorporate Systems Thinking into their processes to maximise profits, thus challenging what is found in the literature. The public party perspective confirmed literature findings which suggest that a simplistic linear reductionist approach to risk mitigation persists.

6.4 Discussion of results for Research Question 3

Are there barriers to adopting Systems Thinking to mitigate risk in South African health sector PPP projects?

Secondary Question 3.1: Why isn't Systems Thinking used in practice?

The interview data showed that although public party participants felt that they would benefit from incorporating a Systems Thinking Approach as suggested by Nyagwachi (2008), they were bound by the recognised and internationally accepted standards of PPP risk mitigation. This supports Loosemore and Cheung's (2015) findings which

suggest that Systems Thinking would have to be enshrined into international best practice to be adopted in the industry.

Another key finding was that practitioners felt that they were unable to influence management and senior leadership on new thinking or new process innovations. The three hospital projects in the case studies were conceived before the current Treasury Regulations in the PPP Manual. The PPP procurement model was at a nascent stage. On publication of the new guidelines in the PPP Manual of 2004, practitioners retrospectively attempted to comply. Without prior knowledge and experience, they were navigating uncharted territory. This procedural uncertainty is seen in case study three (Humansdorp) where the project faltered initially due to an absence of guidelines and unfamiliarity of the evaluation committee with the process of procuring PPPs. The project was revived only once the guidelines had been published, and the Eastern Cape Department of Health had brought the project to the attention of the National Treasury PPP Unit (National Treasury PPP Unit, 2007). Complete reliance on the published guidelines, would most certainly have set the tone and entrenched these regulations in current practice.

Secondary Question 3.2: Would it be easy to adopt a Systems Thinking Approach?

The public party participants revealed that adopting a Systems Thinking Approach would be challenging in their context because of the multilayers of bureaucracy in government processes. Helmy (2011) and Ismail and Azzahra Haris' (2014) findings also highlighted inefficient government processes and bureaucracy as critical challenges in PPP projects. Adopting new methods would require support at the highest level of leadership for the new approach to be incorporated into formal policy articulated in the PPP Manual. This supports the work of Loosemore and Cheung (2015) who suggest that Systems Thinking would have to be entrenched in international standards before being accepted in the PPP universe. In addition to the bureaucratic processes which are a part of public service, interview data alluded to an inability for the government to create the space for risk-taking which is an inherent part of innovation. Participants spoke of only being given a platform if they were presenting known and tested concepts, hinting at a culture which is not conducive for process innovation and lateral thinking. Participants shared instances where leadership attended international conferences where they were exposed to thought leadership and global trends. However, this did not translate into changed behaviours and implementation of new ideas, inferring that a Systems Thinking

approach is not an end in itself. Even if it were adopted and incorporated into policy, there might still be challenges with implementation.

One need only look at the NDP as an example of a well-crafted and well-intentioned policy, which continues to suffer from disjointed efforts and insufficient strategic leadership to ensure that the plan is implemented and outputs are measurable. Weak implementation is compounded by frequent changes of leadership with resultant changes in strategy. One of the public party participants described an instance where the provincial Head of Department had changed five times in the space of six months. Comments from both public and private party participants described this as a pervasive problem within all levels of government which made the articulation of a clear vision and buy-in from all stakeholders extremely difficult.

Additionally, the silo-ism which exists in government does not allow for collaboration between departments and joint accountability which adds to the challenges of policy implementation. An example given by one participant was that of the Department of Public Works which is responsible for public sector infrastructure and therefore the construction and refurbishment of hospitals. However, the Minister of Health is held accountable for hospitals in dilapidated conditions, even though he is not able to collaborate with nor influence decisions made at Public Works, thus confirming the persistence of vertical chains of authority in bureaucratic institutions such as government. Forrer, Kee, Newcomer, & Boyer (2010) state that the PPP arrangement challenges this vertical hierarchy and calls for horizontal relationships based on collaboration and consensual decision making which fosters organisational interdependence.

Although the data alluded to use of a Systems Thinking approach by the private party, there was no conclusive evidence thereof. Interview data from the lenders alluded to the organisation of banks according to product or sector lines, reflecting a form of silo-ism within the private sector, which may limit the full application of a Systems Thinking Approach.

The very constitution of the private party is made up of many different players which include the lenders, insurers, and the various members of the consortium. Helmy (2011) describes tensions and contractual disagreements between the public and private parties and within the members of the private consortia themselves in a housing PPP in Kuwait, suggesting that factionalism can occur between the members in the private party

which can entrench silos resulting in mistrust and asymmetry of shared information. The Code of Good Practice for Black Economic Empowerment (BEE) in PPPs informs how BEE must be approached. It governs the level of BEE participation in the private consortium and insists that preferential procurement is applied at all stages of the project term (National Treasury PPP Manual, 2004). One can conclude, therefore, that the partnerships formed in the private consortia are not necessarily built with long-standing business trusted business associates but in compliance with the Code of Good Practice for BEE. This scenario lends itself to contractual tensions within the consortia and asymmetry of information sharing.

Gleaning from Jensen and Meckling's Agency Theory (1976), we see that the Principal Agent discourse is applicable not only to the relationship between the public and private party but also within the different players in the private consortium. This point is illustrated by the developer contractor relationship where the developer is the Principal and the contractor the Agent. Work is delegated to the Agent by the Principal using the governing contract as the unit of analysis (Jensen, 1983). Although they are co-operating on the same project, these two parties have different goals and division of labour. Precise contract terms need to be negotiated and governance mechanisms put in place to limit the Agent from extracting maximum rents.

Summary to discussion of results for Research Question 3

The interview data suggests that private party seems to naturally follow a Systems Thinking Approach in the rigour of their due diligence and risk mitigation. On further analysis, however, this may also be limited by silos which exist within the private party members. The public party states that there is minimal Systems Thinking in government. Even though elements of this approach may be used within projects, there is no Systems Thinking within National Departments which need each other for infrastructure development. The culture within government has limited agility, is risk-averse regarding new ideas and is not conducive to innovation. Any processes which they follow must be standardised and must align with the prescribed framework articulated in the PPP Manual. Systems Thinking would, therefore, have to be formally entrenched in international best practice and incorporated into the Manual for public practitioners to use this approach. A thorough analysis of the data suggests that Systems Thinking is not an end in itself. The prevailing culture and mindsets in government leadership need to be changed to create an enabling environment for policy implementation.

6.5 Conclusion

The Study findings suggest that a mindset change may be required to enable a culture where practitioners can influence upwards, and get leadership buy-in to adopt new thinking in their work. The findings suggest that the challenge goes beyond adopting Systems Thinking as an approach. One may formulate new and progressive policies using a Systems Thinking approach; however, the ability to implement may still be limited. The more significant challenge for practitioners may be in shifting entrenched patterns and challenging prevailing mental models to facilitate policy implementation.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

The data collected through interviews was presented in Chapter Five and analysed in Chapter Six. These findings which gave insights into current risk mitigation practices and whether a Systems Thinking Approach is used, were juxtaposed against literature and case study secondary data analysis presented in Chapter Two. This chapter presents the principal findings of the study and proposes a conceptual framework for the required shift in mindset to enhance policy implementation. Business, policy and academic implications are presented, followed by limitations to this particular study. The chapter concludes with recommendation for future research.

7.2 Principal Findings

Key research insights are presented below.

PPP risk mitigation strategies are firmly entrenched in recognised and externally validated standards

There are set risk mitigation standards which PPP practitioners from both the public and private sectors adhere to. In government, these standards are based on the UK's Private Finance Initiative's guidelines, and have been incorporated into the National Treasury PPP Manual (National Treasury PPP Manual, 2004). The private sector's risk approach is based on globally validated standards in the project finance universe, which are widely accepted in project risk literature (SA, 2009).

There are different risk perspectives between the public and private party

A Key study finding revealed that the public and private parties held very different perspectives regarding the identification, analysis and mitigation on risk in PPP projects. Different members of the private party also held differing views depending on the role they played in the partnership. This adds to the tensions experienced in risk allocation, and may result in misalignment of actions based on their different risk preferences (Forrer, Kee, Newcomber and Boyer (2010). The driver of these different perspectives was found to be the conflicting mandates held by these two parties. The public party has a clear mandate to deliver on social welfare using a procurement model which is

affordable, delivers value for money for government whilst transferring appropriate risk to the private party. The private party has an equally clear but conflicting mandate to maximise their profits and generate an attractive return on investment for their shareholders. The tensions arising from the conflicting mandates were found to be exacerbated by the vertical hierarchical nature of the PPP procurement model, adding to the Principal Agent discourse (Jensen and Meckling, 1976, Moore, Boardman and Vining, 2017). This was evident in the interview data which described conflicting goals, misaligned actions based on different risk perspectives, and an uninformed Principle and informed Agent.

Instability of leadership within the public sector results in erosion of institutional knowledge and accountability

Frequent changes of leadership was found within the public sector at all levels of government and within the projects. This resulted in disjointed activity, and a loss of institutional memory and knowledge on most projects leading to erosion of the rigour of risk mitigation. The instability of leadership, coupled with the vertical hierarchy within government institutions makes the development and implementation of accountability mechanisms difficult (Forrer, Kee, Newcomber and Boyer (2010). Poor knowledge management in the public sector results in excessive transfer of risk to the private party, which erodes the affordability and value for money which the public party seeks (Sarmento, 2010; Henjewele, Sun, & Fewings, 2011; Hovy, 2015).

There are structural barriers to innovative thinking

Interview data showed that elements of a Systems Thinking approach were being used, particularly by the private party. Barriers to incorporating Systems Thinking in the public sector, were entrenched standards within the PPP landscape which are validated by international standards (Loosemore and Cheung, 2015). Additionally, a culture of silo-ism, lack of leadership support for innovative thinking and bureaucratic processes hinders adoption of new thinking in practice.

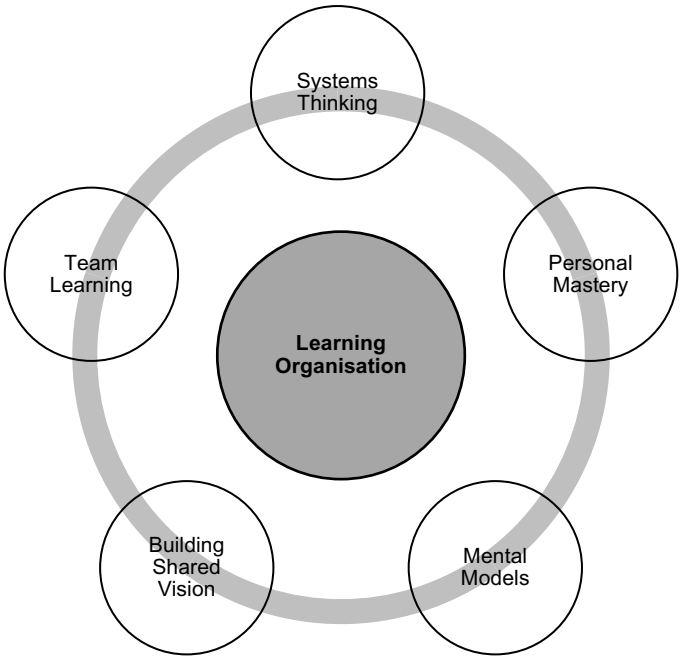
A change in mindset is required to enhance policy implementation

On further analysis of the vertical hierarchical nature of most bureaucratic organisations, this study proposes that a Systems Thinking approach is not an end in itself, even if it

were incorporated into PPP policy. This is particularly true in the public sector, which continues to experience challenges in policy implementation. Systems Thinking might be most effective if used as a mechanism to integrate the five disciplines of Senge's learning organisation which could stimulate the required mindset changes which allow new and expansive ways of thinking and continued learning to occur. This mindset shift supports the earlier work of Senge and substantiates Loosemore and Cheung's suggestion that where Systems Thinking may be most useful, is in its use as a mechanism to integrate the five disciplines of Senge's learning organisation that includes personal mastery, mental models, building a shared vision and team learning (Loosemore and Cheung, 2015). Senge (1990) describes a learning organisation as one where "people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together" (Senge, 1990, p. 2).

The figure below gives a diagrammatic representation of Senge's five disciplines:

Figure 5: Senge's Learning Organisation conceptual framework (1990)

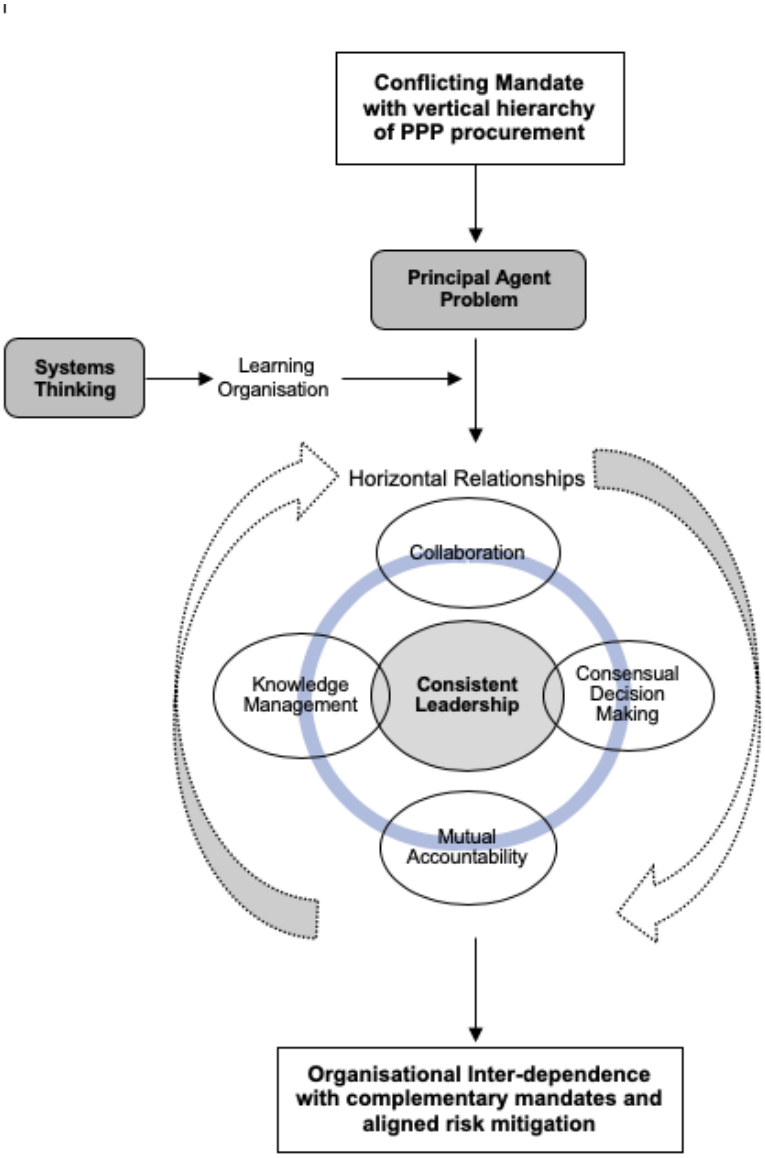


This study proposes that the culture of a learning organisation could enable the shift to the horizontal hierarchical relationship which the PPP contract demands. One where collaboration, consensual decision making, mutual accountability and knowledge management underpinned by strong consistent leadership results in organisational inter-dependence between the public and private party. In this way, although the two party's

mandates remain different, a shift can be made to a desired state where the mandates are complementary with improved alignment of risk mitigation processes.

This proposed conceptual framework is illustrated below:

Figure 6: PPP Project risk mitigation conceptual framework



7.3 Implications and Recommendations

Business Implications

The findings and conclusions of the study are important to business since appropriate risk allocation underpinned by an accountable knowledgeable public sector has an influence on the investment appetite of the private sector. Collaboration between the public and private sector has been highlighted by The Presidency as being critical to rebuilding the South African economy and achieving the infrastructure goals set out in the National Development Plan.

Policy Implications

Key study insights propose that a Systems Thinking approach is not the panacea to the challenges in health sector PPP project risk mitigation. Systems Thinking should be viewed as the catalyst required to shift the prevailing mindsets and culture which hinder policy implementation.

Academic Implications

The study extends the discourse on the PPP procurement model by highlighting the different risk perspectives between the public and private party. This is particularly true in social PPPs like healthcare. The research findings also add to the body of knowledge on health sector PPPs in emerging markets.

7.4 Study limitations

The study limitations were found to be the following:

1. The small sample size of eight health sector PPPs means that the findings of this study are not generalisable.
2. The qualitative design of the study was a limitation in itself. A mixed method using both quantitative and qualitative study could have enriched the study.
3. In some cases, the officials responsible for planning and implementing the PPPs, had left their respective organisations with the tacit knowledge and accumulated experience. They and were difficult to trace.
4. Not all identified study participants were willing to participate in the study which ultimately affected the depth of results that came out of the interviews held.

5. There were no architects, construction and legal specialists interviewed. These practitioners could have added to the perspectives and insights under study around risk mitigation approaches.

7.5 Future research

The study sought to explore whether a paradigm shift using a Systems Thinking approach is required to mitigate health sector PPP risk. It concludes that the challenge goes beyond the adoption of Systems Thinking and includes a mindset and culture change among PPP practitioners in both public and the private party which fosters the elements of a learning organisation. The study extends systems thinking research in the context of the PPP arrangement by highlighting the different risk perspectives held by the different role players in the contractual agreement of PPPs. Further exploration of the following areas can add to the body of knowledge on risk mitigation in health sector PPP projects:

- A study delineating the different risk perspectives of the key players in the PPP agreement.
- A quantitative study on the critical success factors required for health sector PPP projects.
- A qualitative study exploring the PPP model best suited to achieving a successful partnership in health sector PPP projects.
- A mixed qualitative and quantitative study to determine the financial feasibility of the PPP model for social infrastructure.
- A study exploring whether horizontal relational type contracts produce more holistic ways of thinking about risk.
- Unpacking knowledge management in PPP projects.
- Barriers to public policy implementation focussing on accountability and the shift in vertical to horizontal organisational hierarchy.

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APPENDIX

Annexure A:

Table E.1 List of PPP projects concluded in South Africa *(continued)*

Project name	Government institution	Type	Date of close[1]	Duration	Financing structure	Project value R million	Form of payment
Health							
Inkosi Albert Luthuli Hospital	KwaZulu-Natal Department of Health	DFBOT	Dec-2001	15 years	Debt: 70% Equity: 20% Govt: 10%	4 500	Unitary payment
Universitas and Pelonomi Hospitals co-location	Free State Department of Health	DFBOT	Nov-2002	16.5 years	Equity: 100%	81	User charges
State Vaccine Institute	Department of Health	Equity partnership	Apr-2003	4 years	Equity: 100%	75	Once-off equity contribution
Humansdorp District Hospital	Eastern Cape Department of Health	DFBOT	Jun-2003	20 years	Equity: 90% Govt: 10%	49	Unitary payment
Phalaborwa Hospital	Limpopo Department of Health and Social Development	DFBOT	Jul-2005	15 years	Equity: 100%	90	User charges
Western Cape Rehabilitation Centre and Lentegeur Hospital	Western Cape Department of Health	Facilities management	Nov-2006	12 years	Equity: 100%	334	Unitary payment
Polokwane Hospital renal dialysis	Limpopo Department of Health and Social Development	DBOT	Dec-2006	10 years	Equity: 100%	88	Unitary payment
Port Alfred and Settlers Hospital	Eastern Cape Department of Health	DFBOT	May-2007	17 years	Debt: 90% Equity: 10%	169	Unitary payment

Figure 7: Health Sector PPP projects concluded in South Africa
Note: Reprinted from National Treasury (2018, p. 155)

Annexure B:

Figure 8: PPP Project Cycle
Note: Reprinted from National Treasury PPP Manual (2004, p. II)

Annexure C:

Table 18: Project Risk Categories

Risk Category	Description	Mitigation Measures
Market; Demand; Volume	• Demand side- poor demand, falling prices • Supply side- increased input costs, scarcity of supply	• PPP Agreement- authority to increase unitary payments, extension of project term • Specialist advisors • Business Interruption Insurance
Construction	• Subcontractor • Time and cost over-runs • Design risk • Site risk	• Subcontractor JV agreement with joint and several liability • PPP Agreement- institution responsibility for expropriation, performance bond, liquidated damages • Construction subcontract- fixed price • Insurance
Operating Risk	• Cost overruns • Industrial action • Failure to obtain necessary rights/consents • Failure to meet output specifications • Technology	• Operations subcontractor JV with joint and several liability • Operations subcontract- no residual operations risk with private party, fixed price, interface with construction subcontract • Insurance
Political Risk	• Nationalisation • Sovereign debt defaults • Expropriation • Privatisation	• PPP Agreement- relief for "Unforeseeable Discriminatory Government Conduct", Breech Clause, Termination Clause, Lenders "Step-in" rights under direct agreement
Environmental Risk	• Legal liability- The Constitution, Natural Environmental Management Act 1998, Environment Conservation Act 1989 • Regulatory bodies	• Insurance • Due Diligence- Environmental impact assessment, Environmental management plan • Construction and operations subcontracts- Environmental management, Indemnification
Financial Risk	• Inflation risk • Interest rate risk • Foreign exchange risk	• Hedging- exchange rates, interest rates, commodity prices • Fixed-rate loans • PPP Agreement- revenue adjustment formula; escalation/indexation
Regulatory Risk	• Capacity to contract • Well-developed body of commercial law • Consistent application and interpretation • Independent judiciary • Security of tenure and title • Enforceability of project documents	• Attorneys- local counsel, legal due diligence and legal opinion • Choice of law • Jurisdiction • Alternative dispute resolution mechanisms

Note: Adapted from Aiello (2014)

Annexure D:

	Private party	Contractor	Operator	Lenders	Institution	Insurers	Sponsors
1) Market risk	●			●			
2) Design risk		●					●
3) Construction risk		●				●	●
4) Operating risk			●			●	●
5) Political risk					●		
6) Environmental risk		●	●	●		●	●
7) Inflation risk		●	●	●			●
8) Interest rate				●			
9) Exchange rate risk				●			
10) Regulatory risk	●	●	●	●	●		●

Figure 9: PPP Risk Matrix
Note: Reprinted from Aiello (2014)

Annexure E- Permission Letter

Request for permission to conduct research in organisation

Gordon Institute of Business Science
University of Pretoria

Dear Mr Lindokuhle Hlatshwayo,

As discussed previously, I am a final year MBA student at the Gordon Institute of Business Science and currently in the process of completing the compulsory research component of the degree. My research project is titled: A paradigm-shift in mitigating health public-private partnership risk: A systems thinking approach. The purpose of the study is to explore whether using systems thinking can improve on current risk mitigation practices.

As the dedicated PPP unit of National Treasury and given the advisory role your organisation plays on PPP projects, I believe that your project managers have the requisite skill and experience to give insights on current risk mitigation practices, and challenges experienced in implementing PPP projects, particularly in the health sector.

This letter, therefore, serves to request permission to conduct my academic research in your organisation. I propose to invite identified potential respondents to participate in the study via e-mail. Data will be collected by way of semi-structured interviews which will last approximately an hour per respondent. Respondents will be assured of confidentiality, and any quotes which appear in the research report will be anonymized.

Please could you confirm permission by signing below.

Name L. HLATSHWAYO Signature 

Kind regards,

Ndileka Shuenyane

17399603@mygibs.co.za

Annexure F- Interview Guide

Date: _____

Time: _____

Venue: _____

Organisation: _____

Industry: _____

Qualifications: _____

_____

Role in Business: _____

Introduction

- ☐ Introduce myself and my role to the participant
- ☐ Introduce study with background and purpose of the study
- ☐ Explain the method of data capture and analysis
- ☐ Confirm consent for participation
- ☐ Confirm interview duration with the participant
- ☐ Ensure participant of confidentiality
- ☐ Provide potential benefits of study to the participant and their organisation

Health Sector PPP projects

1. What is your educational background?
2. Have you been involved in previous health sector PPP projects?
3. What capacity were you involved in?

Applying Systems Thinking to PPP risk mitigation

This segment of the interview relates to the application of Systems Thinking to project risk mitigation. Systems Thinking will be defined to the participant as a holistic approach to analysis that focuses on the way that a system's constituent parts interrelate, and how systems work over time and within the context of larger systems. The systems approach contrasts with traditional analysis which studies systems by breaking them down into their separate elements.

The following questions will be asked:

1. **What is your current approach to PPP risk mitigation?**

-Is there a framework used?

-Which are the biggest project risks?

-Are the project risks defined the same by all the stakeholders?

-Should there be flexibility in the contract to allow for uncertainty?

-Are the current risk mitigation strategies adequate?

-Do PPPs deliver value for money for government?

2. **Why is the current risk mitigation approach used?**

-Why is the current risk mitigation approach used?

-Does your risk mitigation approach use Systems Thinking?

3. **Why isn't Systems Thinking used in practice?**

-Why isn't Systems Thinking used in practice?

-Would it be easy to adopt a Systems Thinking Approach?

4. **Do you think the questions answered the scope of the study? Do you have any further inputs which you feel would benefit the study?**

Annexure G- Informed Consent

Gordon Institute of Business Science
University of Pretoria

Dear XXXX,

Title of Study: A paradigm-shift in mitigating health public-private partnership risk: A Systems Thinking Approach.

Researcher: Ndileka Shuenyane
E-mail: 17399603@mygibs.co.za
lulama.makhubela@vodamail.co.za
Tel: 083 212 6338

Supervisor: Prof Lulama Makhubela
E-mail:
Tel: 082 728 2951

Name of Participant: _____

Organisation: _____

1. I confirm that I understand the research topic and have had the opportunity to ask questions.
2. I agree to participate in the study and consent to one face-to-face interview lasting for an hour duration and audio recording of the interview.
3. I have been informed that there are no known benefits to me that would result from participation in this research. This study may help PPP practitioners to improve how they analyse and mitigate PPP project risk.
4. I have been informed that the records of this study will be kept strictly confidential however disguised extracts from this interview may be quoted in the investigator's research report.
5. I have been informed that participation in this research study is voluntary. I may choose not to participate and may withdraw consent to participate at any time without penalty.
6. I have been informed that should I have any concerns, I can contact the researcher or her supervisor using the details stated above.

Participant's signature: _____ Date: _____

Researcher's signature: _____ Date: _____

Annexure H- GIBS Ethical Clearance

Gordon Institute of Business Science
University of Pretoria

12 July 2018

Shuenyane Ndileka

Dear Ndileka

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

Please note that approval is granted based on the methodology and research instruments provided in the application. If there is any deviation change or addition to the research method or tools, a supplementary application for approval must be obtained

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

Gordon Institute of Business Science
Reg. No. 99/19816/08

26 Melville Road, Illovo, Johannesburg
PO Box 787602, Sandton, 2146, South Africa

telephone (+27) 11 771 4000
fax (+27) 11 771 4177

website gibs.co.za
University of Pretoria

Annexure I: UP Health Ethical Clearance

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.
- FWA 00002567, Approved dd 22 May 2002 and Expires 03/20/2022.
- IRB 0000 2235 IORG0001762 Approved dd 22/04/2014 and Expires 03/14/2020.

30/08/2018

Endorsement Notice

Ethics Reference No: Temp2018-01309

Title: A paradigm-shift in mitigating health public-private partnership risk: A systems thinking approach.

Dear Dr Ndileka Shuenyane

The **Amendment** as described in your documents specified in your cover letter dated 28/08/2018 received on 28/08/2018 was approved by the Faculty of Health Sciences Research Ethics Committee on its quorate meeting of 29/08/2018.

Please note the following about your ethics approval:
- Please remember to use your protocol number **Temp2018-01309** on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, or monitor the conduct of your research.

Ethics approval is subject to the following:
- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

We wish you the best with your research.

Yours sincerely

Dr R Sommers; MBChB; MMed (Int); MPharMed,PhD
Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria

The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes, Second Edition 2015 (Department of Health).

Research Ethics Committee
Room 4-60, Level 4, Tswelopele Building
University of Pretoria, Private Bag X323
Arcadia 0007, South Africa
Tel +27 (0)12 356 3084
Email deepeka.behari@up.ac.za
www.up.ac.za

Fakulteit Gesondheidswetenskappe
Lefapha la Disaense tša Maphelo

Gordon Institute of Business Science
University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

19.1 COPYRIGHT DECLARATION FORM

Student details			
Surname:	Shuenyane	Initials:	NN
Student number:	17399603		
Email:	drnmbete@samedical.co.za		
Phone :	083 212 6338		
Qualification details			
Degree:	MBA	Year completed:	2018
Title of research:	GIBS A paradigm shift in mitigating health public-private partnership risk: A systems thinking approach		
Supervisor:	Prof Lulama Makhubela		
Supervisor email:	lulama.makhubela@gmail.com		

Access

A.	My research is not confidential and may be made available in the GIBS Information Centre and on UPSpace.

I give permission to display my email address on the UPSpace website

Yes	X	No	

B.

	My research is confidential and may NOT be made available in the GIBS Information Centre nor on UPSpace.

Please indicate embargo period requested

Two years		Please attach a letter of motivation to substantiate your request. Without a letter embargo will not be granted.
Permanent		Permission from the Vice-Principal: Research and Postgraduate Studies at UP is required for permanent embargo. Please attach a copy permission letter. Without a letter permanent embargo will not be granted.

Copyright declaration

I hereby declare that I have not used unethical research practices nor gained material dishonesty in this electronic version of my research submitted. Where appropriate, written permission statement(s) were obtained from the owner(s) of third-party copyrighted matter included in my research, allowing distribution as specified below.

I hereby assign, transfer and make over to the University of Pretoria my rights of copyright in the submitted work to the extent that it has not already been affected in terms of the contract I entered into at registration. I understand that all rights with regard to the intellectual property of my research, vest in the University who has the right to reproduce, distribute and/or publish the work in any manner it may deem fit.

Signature:	**Date:** 03 November 2018
Supervisor signature:	**Date:** 03/11/18

17. APPENDIX 5 CERTIFICATION OF ADDITIONAL SUPPORT

(Additional support retained or not - to be **completed by all students)**

Please note that failure to comply and report on this honestly will result in disciplinary action

I hereby certify that (please indicate which statement applies):

- ***I DID NOT RECEIVE*** *any additional/outside assistance (i.e. statistical, transcriptional, thematic, coding, and/or editorial services) on my research report:* .....

- ***I RECEIVED*** *additional/outside assistance (i.e. statistical, transcriptional, thematic, coding, and/or editorial services) on my research report*

  .....

If any additional services were retained– ***please indicate below which:***

☐ ***Statistician***

☐ ***Coding (quantitative and qualitative)***

☒ ***Transcriber***

☐ ***Editor***

Please provide the name(s) and contact details of all retained:

NAME: .....Thando Khumalo.....

EMAIL ADDRESS: thando.m.khumalo@gmail.com.....

CONTACT NUMBER: 079 178 2038.....

TYPE OF SERVICE: ...Transcription.....

NAME: .....

EMAIL ADDRESS: .....

CONTACT NUMBER: .....

TYPE OF SERVICE: .....

NAME: .....

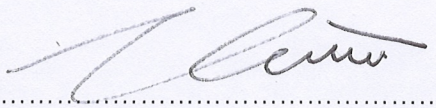
EMAIL ADDRESS: .....

CONTACT NUMBER: .....

TYPE OF SERVICE: .....

I hereby declare that all *interpretations (statistical and/or thematic) arising from the analysis; and write-up of the results for* **my study was completed by myself without outside assistance**

NAME OF STUDENT:
Ndileka Shuenyane

SIGNATURE: 

STUDENT NUMBER:
17399603

STUDENT EMAIL ADDRESS:
drnmbete@samedical.co.za