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Risk allocation preferences in public-private partnerships in South Africa

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Risk allocation preferences in public-private partnerships in South Africa

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A research article submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

Johannesburg, 2019

DECLARATION

I, Mothusi Mohlakoana, declare that this research article is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at Wits Business School, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

_____

Mothusi Mohlakoana

Signed at ……

On the …… day of …… 2019

DEDICATION

I would like to express my gratitude to my courageous and loving wife Phumzile, who walked with me on this journey for your encouragement, support, coaching, and most importantly your prayers. Your faith has kept me steadfast on this journey.

To my daughter Onthatile Mataba, thank you for your hugs and smiles even though my time with you was limited at times. I love you with all my heart.

To my parents, Kabatoane and Leinane Mohlakoana, and sisters, Thato and Lesego. Thank you for all your support and prayers throughout my life.

Yo o go dibelang, Ga a ketla a otsela, le fa ele go robala.

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I would like to thank the “Members Only: MBA” collective for their moral support when navigating through the long nights, study sessions, and adventures. This journey would not have been the same without you.

I would like to thank the respondents who participated in this research for taking their precious time to contribute to the data.

Ke leboga, Morena Modimo for his favour during the challenging moments throughout my entire journey.

ABSTRACT

Background: Appropriate risk allocation has been identified as one of the critical success factors in Public-Private Partnerships (PPPs). Therefore, it is important to understand risk allocation preferences between the private and the public sector as the country's PPP market matures.

Objectives: This research study identifies risk allocation preferences in public-private partnerships in South Africa.

Method: An online questionnaire survey was designed to identify the allocation of different risk factors in PPPs.

Results: A total of 34 responses were obtained for empirical review. The Kruskal-Wallis H test and Mann-Whitney test were conducted to test whether significant differences in responses existed between respondents with practical PPP working experience and those with only theoretical knowledge. The results of the test indicated that the responses for all 43 risk factors were not significantly different. The empirical results indicated that all the risks which were allocated to the public sector were systemic risks which included political, legal, social and design risks. The private sector was allocated systemic risks which were project finance risks. The majority of natural, relationship, residual risks were preferred to be shared. The remaining risks which included mostly project-specific risks, such as construction, design, operational, and third-party risks, were deemed to be negotiable on a project by project basis.

Conclusion: This research study will enable international and domestic investors who want to enter into public-private partnerships to understand risk allocation preferences in South Africa. This study has also highlighted the need for the current risk allocation framework used by the South African National Treasury PPP unit to be reviewed in partnership with all the stakeholders represented.

Keywords: Risk allocation, Public-private partnerships, South Africa

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INTRODUCTION

SECTION 1. INTRODUCTION

1.1 PURPOSE OF THE STUDY

The purpose of this research report is to identify risk allocation preferences between the public sector and private sector partners in Public-Private Partnerships (PPPs) in South Africa. This study provides insights to the government and to potential investors on the risk allocation preferences amongst experts in this field.

This objective was achieved by conducting a literature review of the risk allocation preferences in several countries. Thereafter these risk allocation preferences were explored within the South African PPP context.

1.2 CONTEXT OF THE STUDY

The existence of adequate infrastructure is an essential enabler for economic development in all countries (Chuhan-Pole et al., 2014). Infrastructure refers to road networks, bridges, water supply networks, sewers, electrical grids, and telecommunications. These infrastructure assets have the potential to influence the economy of a region or a country for an extended period. Therefore, the continent has been aware of the need to invest in infrastructure in order to drive growth, and the challenge is the funding required to make it possible (Nkambule, 2016).

According to the African Development Bank, the continent's infrastructure needs amount to between $130 -$170 billion per annum, and the funding gap ranges between $68- $108 billion. The funding gap means that countries on the continent can only afford 45% of their annual infrastructure funding requirements (Bank, 2018).

In South Africa, the National Development Plan (NDP) identified infrastructure development as one of the pillars which could be used to drive economic growth. However, research has shown that spending fell by 18% (30% to 16%) from the 1980s to early 2000s (National Planning Commission, 2012). This statistic means that the government will have to reverse the trend in order to stimulate economic growth.

Figure 1, as adopted from the 2017 budget review, shows the national capital spending trends from 1998 to 2016 (Treasury, 2017).

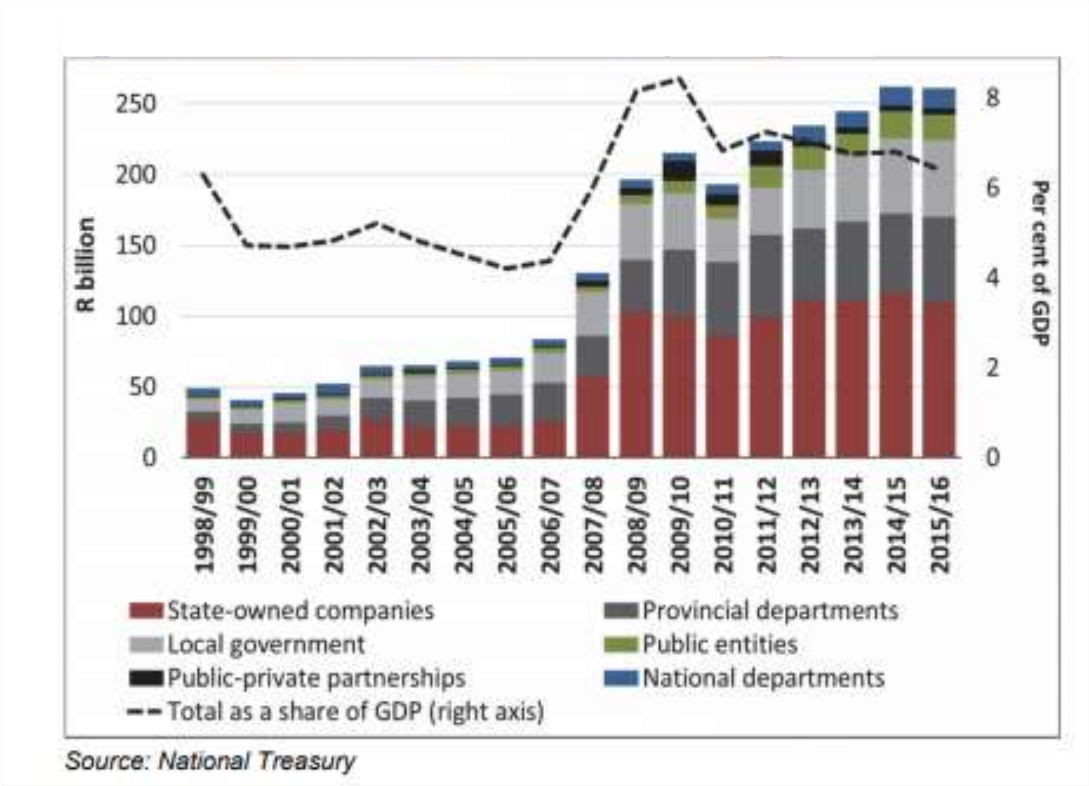


Figure 1: Public-Sector infrastructure spending

The NDP has identified that capital infrastructure investment will have to reach 30% of GDP by 2030 to enable sustainable growth for the economy (National Planning Commission, 2012). Private sector participation is therefore required to assist in alleviating the burden from the government.

The use of Public-private Partnership (PPPs), if procured and structured optimally, may enable governments to undertake infrastructure projects cost-effectively and efficiently, offering value for money for the government. This could, in some instances, deliver projects where the authorities might not have been able to deliver (Prüssing, 2015).

1.3 PROBLEM STATEMENT

1.3.1 MAIN PROBLEM

The purpose of the study is to identify preferred risk allocation in public-private partnerships in South Africa.

1.4 SIGNIFICANCE OF THE STUDY

According to a 2014 study by the World Bank group, the Sub-Saharan region is considered to have performed poorly in project preparation, procurement, unsolicited proposals, and contract management for public-private partnerships. These weaknesses have contributed to the minimal involvement by international financial institutions in African PPPs (Chuhan-Pole et al., 2014).

In the last few years, studies have been undertaken globally in order to compare preferred risk allocation in different countries; these studies have been undertaken in the United Kingdom, Greece, and Asia (China and Hong Kong).

These studies have been conducted in order to enable potential investors to have some insights into risks and preference in allocations between private and public sectors partners (Ke, Wang, & Chan, 2010).

National Treasury (South Africa) introduced a national PPP manual supported by the standardised PPP provisions as guidelines for parties willing to enter into such agreements with organs of the state. These documents have been in existence for more than a decade. There is currently no evidence that suggest that studies have been undertaken either by the government, academia, or private sector to obtain insights on the risk allocation preferences in South Africa. Studies undertaken by Ahwireng-Obeng and Mokgohlwa (2002) and Nkambule (2016) covered this topic to varying degrees but these did not cover the entire PPP project value chain.

Figure 2 illustrates potential PPP projects which were registered with South Africa's (SA) National Treasury as of 31 August 2018.

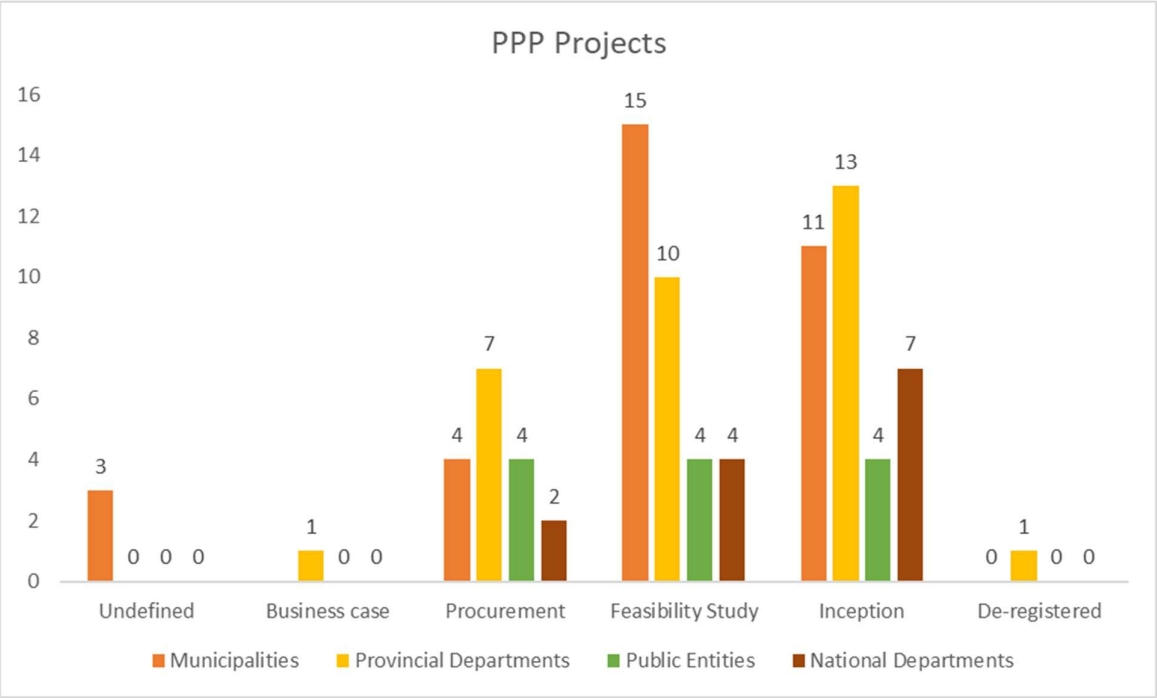


Figure 2: PPP Projects

The figure above indicates that on 31 August 2018, there were 90 PPP projects at various stages within the PPP project cycle, as defined by South Africa's National Treasury PPP manual. As per requirements, all of these projects are registered with the PPP Unit in Pretoria. The data showed that municipalities and provincial governments were the leading public sector advocates for PPP projects. The information supplied indicated that the majority of the proposed projects were either at the feasibility stage (37%) or inception stage (39%). This information shows that there are fertile opportunities to invest in PPPs in the country.

The aim of this study to provide potential investors with some insights into risk allocation preferences in South Africa.

1.5 DELIMITATIONS OF THE STUDY

- The scope of this study was limited to risk allocations preferences by participants from a predetermined list of conventional risk factors as identified from the literature review.
- The scope of the study did not cover the reasons by participants for allocating risk factors to either private sector, public sector or shared.
- The study was open to participants who either had practical working experience or theoretical knowledge of public-private partnerships in South Africa.
- The analysis in this study was based on data collected from an electronic survey questionnaire.

1.6 ASSUMPTIONS

The assumptions of the research study were:

- The participants understood the risk factors in the survey questionnaire.
- The participants would provide relevant data relevant to the research study.

1.7 OUTLINE OF THE REPORT

Section 1 provided the purpose, context, problem statement, the significance of the study, delimitations of the study and assumptions. Section 2 presents a literature review focusing on public-private partnership definitions, risks found in PPP's, risk management and risk allocations. Section 3 presents the methodology used in the research. Section 4 presents the findings from the research. The discussions of the findings are presented in Section 5. Recommendations, conclusions, and further research are presented in Section 6.

SECTION 2. LITERATURE REVIEW

2.1 PUBLIC-PRIVATE PARTNERSHIPS

The market has not been able to agree on a single universal definition of public-private partnership, but individuals, experts, and organisations have ventured definitions. Delmon (2009) defines PPP as any public sector service which is partially or wholly delivered by the private sector (Delmon, 2009). This is similar to a definition by the OECD (2008, p. 17) which states that a PPP is:

> an agreement between the government and one or more private partners (which may include the operators and the financers) according to which the private partners deliver the service in such a manner that the service delivery objectives of the government are aligned with the profit objectives of the private partners and where the effectiveness of the alignment depends on a sufficient transfer of risk to the private partners.

The reference guide to the World Bank (2014, p.17) introduces an all-inclusive definition of PPP that states “long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance”.

According to Treasury (2004, p.4) a PPP is defined as

> a commercial transaction between an organisation and a private party in terms of which the private party: (a) performs an organisational function on behalf of the organisation; and/or (b) acquires the use of state property for its own commercial purposes; and (c) assumes substantial financial, technical and operational function and/or use of state property; and (d) receives a benefit for performing the organisational function or from utilizing the state property, either by way of: (a) consideration to be paid by the organisation which derives from a revenue fund or, where the organisation is a national government business enterprise or a provincial government business enterprise, for the revenues of such organisation; or (ii) charges or fees to be collected by the private party from users or customers of a service provided to them; or (iii) a combination of such consideration and such charges or fees (Treasury, 2004).

Grimsey and Lewis (2002), as quoted by Prüssing (2015), have identified PPP as a long-term arrangement between the public sector and private sector; this arrangement could be for a construction or operation of public infrastructure asset, or the use of infrastructure to provide services to the community on behalf of the government (Grimsey & Lewis, 2002; Prüssing, 2015).

Public-private partnerships can take different forms of structure or delivery depending on the needs per project or country (Zimmermann & Eber, 2014). Table 1 lists the examples below.

Table 1. Project delivery types in PPPs

TYPE	DESCRIPTION
Build-own-operate (BOO), Design-construct-manage-finance (DCMF), Build-develop-operate (BDO).	The private sector designs, owns, builds, operates, develops, and manages an asset with no obligation to transfer ownership to the government.
Buy-build-operate (BBO), Wrap-around addition (WAA), Lease-develop-operate (LDO).	The private sector buys or leases an existing asset from the government, renovates, modernises, or expands it, then operates the asset, again with no obligation to transfer ownership back to the government.
Build-operate-transfer (BOT), Build-own-operate-transfer (BOOT), Build-rent-own-transfer (BROT), Build-lease-operate-transfer (BLOT), Build-transfer-operate (BTO).	The private sector designs and builds an asset, operates it, transfers it to the government when the operating contract ends, or at some other specified time. The private partner may subsequently rent or lease the asset from the government.

Adopted from Zimmermann and Eber (2014).

South African Context

The Public Finance Management Act 1989, supported by Treasury Regulation No. 16, provides guidance and instructions for PPPs (Sinanovic & Kumaranayake, 2006) . This regulation was enacted to support the Constitution in conforming to value for money, affordability and adequate risk transfer between the public sector and private sector (Treasury, 2004).

The PPP generic structure in South Africa includes Broad-Based Black Empowerment (B-BBEE). This policy was introduced by the South African government to create opportunities, transform the economy and to redress the apartheid legacy (Pooe, 2013). This policy stems from the Broad-Based Black Economic Empowerment (BBBEE) Act of 2003 (South Africa). The National Treasury considers PPPs amongst the tools which could be used by the government to promote BEE. BEE rating scores are taken into consideration when the PPP unit adjudicates bids. Figure 3 presents the unique generic PPP structure in South Africa (Treasury, 2004).

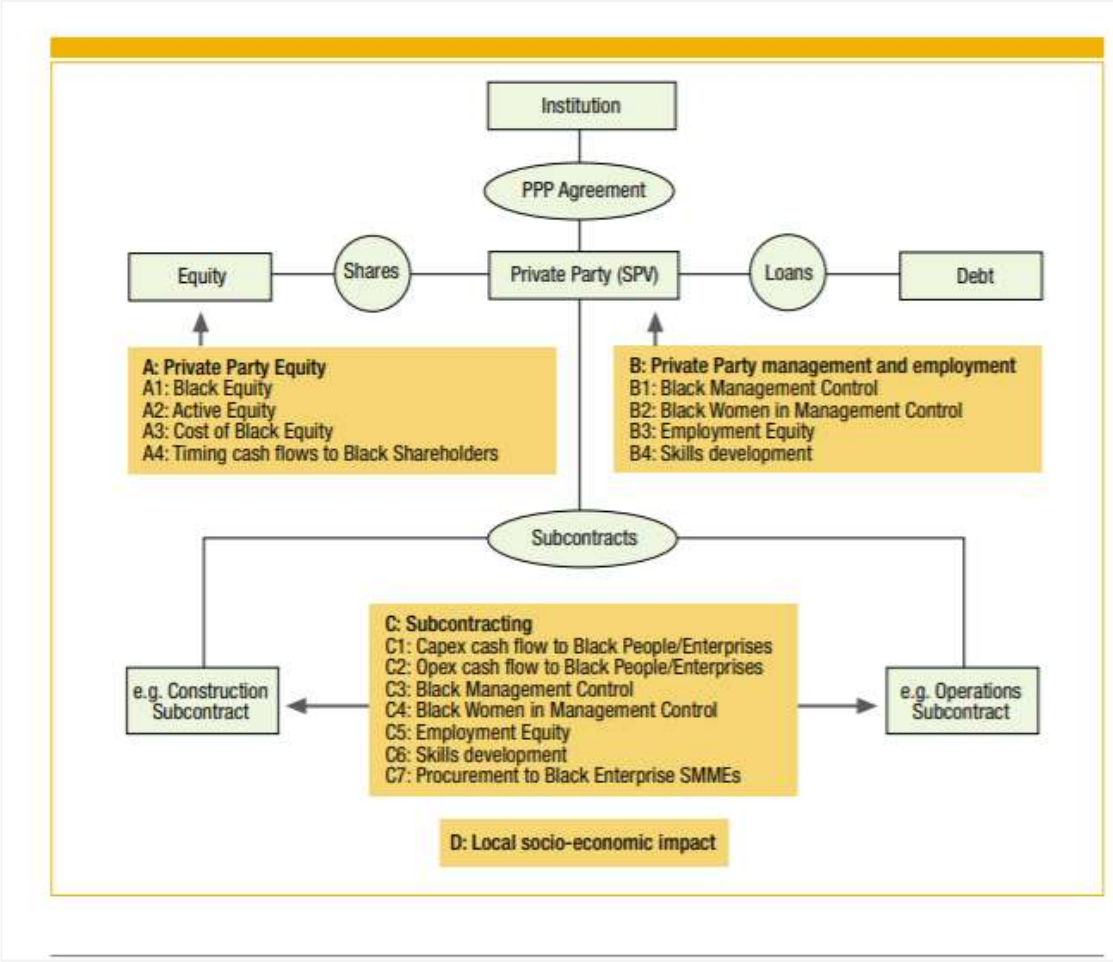


Figure 3. South African Generic IPP structure (Treasury, 2004)

In order to manage the construction and operations of PPPs, private partners create a special purpose vehicle (SPV) (Burger & Hawkesworth, 2011). The main objectives of an SPV are the generation of profits and minimising the risk of the project (Dixon, Pottinger, & Jordan, 2005). The special purpose vehicles are mostly financed using project finance. Project finance is described as the involvement in a company with a limited lifespan for a single purpose of investing in an asset. The value of the company will be tied to the underlying asset which is held as collateral by financiers (Esty, 2003). The shareholders will be protected as their assets outside the SPV will be excluded as part of the security required by lenders (Wahab, 2009). This financing method has been identified to have other benefits such as lower information costs, reduces incentive conflicts and increases tax benefits (Esty, 1999). This structure and definition emphasises the significant characteristics of PPP which are a long-term transfer of public services to the private sector; and also, the transfer of risks between private and public sectors partners.

The argument put forward for PPPs is the view that they enhance value for money for the public, i.e., the taxpayer (Burger & Hawkesworth, 2011).

According to Treasury (2004, p.7), value for money means:

> 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 (Treasury, 2004).

Zimmerman and Eder (2014) state that within the German public sector the choice of a PPP project is driven by whether this project represents the most profitable option available (Zimmermann & Eber, 2014). According to Hood and McGarvey (2002, p. 26), the Scottish government follows a similar view which states that for a PPP to be approved it must meet the two fundamental tenets which are “value for money must be demonstrated for any expenditure by the public sector, and the private sector must genuinely assume the risk”.

Burger and Hawkesworth (2011) have premised that both quantitative factors and qualitative factors are required, such as innovation in design, build quality, as the qualitative factors involve judgement for which no precise measure of value for money

exists (Burger & Hawkesworth, 2011). The public sector comparator is used to calculate the difference between traditional public sector procurement, and this is then compared to the PPP options (Cheung, Chan, & Kajewski, 2009). The PPP project will only be chosen if it delivers value for money; this will be the “savings” which has been calculated.

This view is contradicted by Engel et al. (2013) who argue that the widespread assumption of PPP, which states the PPPs free up funds from the national fiscus to be used for other priorities, may be flawed (Engel, Fischer, & Galetovic, 2013).

Engel et al. (2013) also argue that in a PPP, the government foregoes revenues, which might have been received by it and used to decrease distortionary taxes. They argue therefore that there is no gain for the public sector in a PPP arrangement.

2.2 RISK IN PPP

According to Collier and Berry (2002), risk as defined by the Concise Oxford Dictionary is a chance or possibility of injury, loss, danger, or other adverse consequences (Collier & Berry, 2002). This means that in a business environment, the risk could be described as unpredictable events which could influence the achievement of the organisation’s strategic, operational, and financial objectives (Wales, 1999).

Ahwireng-Obeng and Mokgohlwa (2002) have postulated that risk is the presence of uncertainty from which an actual outcome varies from the expected one in a given situation. It is the exposure to the possibility of financial or economic gain or loss, physical damage or injury, or delay as a consequence of the uncertainty when pursuing something/course of action (Ahwireng-Obeng & Mokgohlwa, 2002).

Although risk is an inherent factor in all infrastructure projects, the complexity of public-private partnership projects presents a different level of risks which might not be present in conventional infrastructure projects (Heravi & Hajihosseini, 2011). It is incumbent on the parties to accurately identify, classify and allocated risks to ensure the success of the projects.

2.3 RISK MANAGEMENT

According to Waring and Glendon (1998, p. 3),

> Risk management may be deemed as an activity seeking to eliminate, reduce and control pure risks (such as major hazards, security lapses, environmental hazards) and to enhance the benefits and avoid detriment from speculative risks (such as, financial investment, marketing, human resources, IT strategy, commercial and business risks).

Risk management should be seen as a continuous process within large infrastructure projects. This view holds for PPPs especially, since the types of risk change as the projects evolve from construction to operation (Pellegrino, Vajdic, & Carbonara, 2013). Risk management techniques include risk identification, analysis or measurement, and mitigation. Cheah and Garvin (2009), as quoted by Pellegrino et al. (2013) subdivided risk mitigation as avoidance, reduction, risk transfer or shifting, and retention (Pellegrino et al., 2013).

Risk management is assumed to be a project management tool (Valipour, Moharnrnadi, Yahaya, Sarvari, & Noor, 2014).

This viewpoint on the components of risk management supports the construction risk management system which consisted of four components: risk identification, risk evaluation and analysis, response management and system management (Al-Bahar & Crandall, 1990).

2.3.1 RISK IDENTIFICATION

The studies undertaken by researchers such as Ahwireng-Obeng and Mokgohlwa (2002), Grimsey and Lewis (2002), Bing et al. (2005), Ibrahim et al. (2006), Chan et al. (2010), Ke et al. (2010), Heravi and Hajihosseini (2011), Nkambule (2016) and Wang (2017) have assisted in identifying, classifying and creating a comprehensive list of public-private partnerships. The researchers attempted to categorise the risks by a variety of methods such as lifecycle phase and origin of the risk factor (Ibrahim, Price, & Dainty, 2006). Ibrahim et al. (2006) classified the risks as exogenous or endogenous; Bing et al. (2005) classified risks based on three levels which were macro, meso and micro level. Marques and Berg (2011) classified their risks as production, commercial and context (Marques & Berg, 2011). For this research study, risks have been classified as either systemic/country risks (these risks are beyond the

control of the private investors as outside forces drive them) or project-specific risks (these arise due to the nature of the project undertaken and decisions taken by the immediate parties in the project (Chan, Yeung, Yu, Wang, & Ke, 2010). These are detailed in Table 2.

Table 2: Systematic and Project-specific risks

SYSTEMIC RISK	PROJECT-SPECIFIC RISK
POLITICAL RISK • Unstable government • Strong Political opposition/hostility • Poor public decision-making process • Expropriation or nationalisation of assets **MACROECONOMIC RISKS** • Interest rate volatility • Poor financial market • Inflation rate volatility • Influential economic events **PROJECT FINANCE** • Financial attraction of project to investors • High finance cost • Availability of finance **LEGAL RISK** • Legislation Change • Tax Regulation change (Non-Discriminatory vs Discriminatory) • Industrial regulation change **NATURAL RISK** • Force Majeure • Weather • Geotechnical Conditions • Environment **PROJECT SELECTION RISKS** • Level of demand for project • Land Acquisition (Site Availability) **SOCIAL RISK** • Lack of tradition of private provision of public services • Level of public opposition to a project	**CONSTRUCTION RISK** • Labour/Material Availability • Construction Cost Overrun • Poor Quality Workmanship • Late Design Changes • Excessive contract variation • Construction Time delay **OPERATIONAL RISK** • Operation cost overrun • Operational revenue below expectation • Maintenance costs higher than expected • Maintenance required more frequent than expected **DESIGN RISK** • Unproven engineering techniques • Design Deficiency • Delay in project approval and permits **RESIDUAL RISK** • Residual Risk **THIRD-PARTY RISK** • Third-Party Liability • Staff Crises **RELATIONSHIP RISK** • Organisation and coordination risk • Inadequate experience in PPP/PFI • Differences in working method and know-how between partners • Inadequate distribution of responsibilities and risk • Inadequate distribution of authority in partnership • Lack of commitment from either party

2.3.2 RISK ANALYSIS

This step is to assist the parties concerned to make informed decisions by analysing their significance (Fischer, Leidel, Riemann, & Wilhelm Alfen, 2010). A qualitative evaluation of the probability of occurrence and the impact of risks need to be determined during the planning phases of a project (Sastoque, Arboleda, & Ponz, 2016). This will be followed by evaluating and then ranking such risks.

2.3.3 RISK ALLOCATION AND MITIGATION

Risk Allocation

Risk transfer is a crucial aspect of risk management. It is that part which concerns itself either with transferring the risk itself (i.e., passing full responsibility and control of an asset or activity to someone else), or retaining the responsibility of the asset or activity, but transferring them, with fiscal responsibility for something going wrong to someone else (e.g., insurance) (Hood & McGarvey, 2002).

This refers to the practice in which parties concerned endeavour to eliminate or decrease the impact of a specific risk. In such instances where the risk cannot be eliminated, the parties concerned will attempt to decrease it to an acceptable level or transfer it to another party (Fischer et al., 2010).

Risk Allocation is the process whereby each potential and significant risk in a project is identified and allocated to the participants in the transaction (Ahwireng-Obeng & Mokgohlwa, 2002). This alludes to a degree of risk allotment to participants in the projects, i.e., public sector and private sector while end-users are excluded (Bing, Akintoye, Edwards, & Hardcastle, 2005). According to Nisar (2007), risks should be allocated to a party who can best control them, as this would give an incentive to the party to minimise their costs. However, the dilemma is how to treat risks which neither party can control (Nisar, 2007). This supports Zimmerman's viewpoint on the matter.

According to Zimmermann and Eber (2014), risk should be assigned to the party that can best handle or influence the risk. The risk assigned should be ideally located within the proper field of competence of the partner. It should also be made from an economic point of view. Thus, the party to optimally handle a risk would be named the cheapest cost avoider (Zimmermann & Eber, 2014).

Engel et al. (2013) state that risk sharing has always been a cause of disagreement among practitioners and public sectors. The expectations are that risk should be allocated to the partner that can manage it.

Accordingly, Hashim (2010) has described how improper allocation of risk might have dire consequences on the timing, costing, and quality of PPP projects (Hashim, 2010). Researchers have stressed that negotiation is vital for risk allocation (Valipour et al., 2014).

Ahwireng-Obeng and Mokgohlwa (2002) state that in a PPP, risk allocation is implemented through tight, flexible and blend of two contracts. The authors have shown a preference to a hybrid risk allocation contract which anticipates certain risk events to shared or allocated to the relevant party. Remedies are predefined upfront.

The risk transfer to the private sector based on the type of public-private partnership has been summarised in Figure 4 (Page, Ankner, Jones, & Fetterman, 2008).

Public-Private Partnership (P3) Delivery Contracting Types and Risk Transfer

Type	Description	Risk Transfer
Design-Bid-Build (DBB)	Design and construction contracts awarded separately to private sector engineering and contracting firms	
Design-Build (DB)	Combines the design and construction phases into one fixed-fee contract	
Design-Build-Operate-Maintain (DBOM) **Build-Operate-Transfer (BOT)**	Selected contractor is responsible for the design, construction, operation, and maintenance of the facility for a specified time	
Design-Build-Finance-Operate (DBFO) **Design-Build-Finance-Operate-Maintain (DBFMO)**	Similar to DBOM, but contractor is also responsible for all or a major part of the project's financing	
Build-Own-Operate (BOO)	The private partner owns the facility and is assigned all operating revenue risk and any surplus revenues for the life of the facility.	

Figure 4: Risk Transfer in PPPs, adapted from Page et al. (2008)

Roumboutsos and Pantelieas (2015) and Loosemore et al. (2012) have advocated rules to be followed when discussing risk allocation between parties. The rules are as follows: "whereas a risk should be undertaken by a party when this party has:

- Full awareness of the risk to be undertaken;
- Greater capacity to manage the risk effectively and efficiently;
- The capacity and resources to cope with the risk eventuating;
- The preference to undertake the specific risk;
- The possibility to charge the respective risk premium" (Roumboutsos & Pantelieas, 2015, p. 186).

This viewpoint is supported by Bing et al. (2005), who supplemented it with a risk negotiation matrix to assist in the process. Figure 5 as adapted from Bing et al. (2005) shows the negotiation matrix.

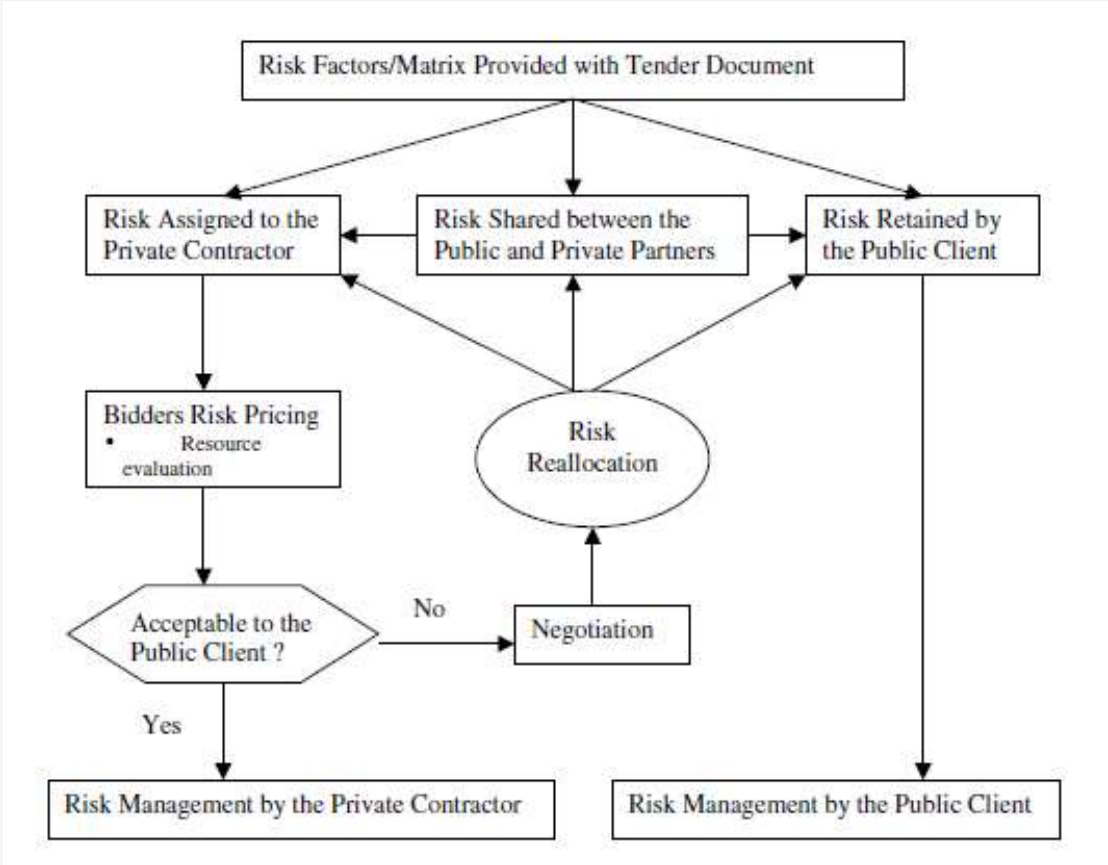


Figure 5. Negotiation matrix as adopted from Bing et al. (2005)

The negotiation matrix supports assumptions made by Valipour et al. (2014), who identified negotiations as a critical component of risk allocation. The result of the

negotiations will lead to the allocation of risks to the parties concerned. Studies were undertaken by Bing et al. (2005), Ibrahim et al. (2006), Roumboutsos and Anagnostopoulos (2008), and Ke et al. (2010) and have delivered insights on the preferred risk allocation preferences in countries such as China, Greece, Nigeria, and the United Kingdom. Table 3 presents risk allocation preferences on 42 common risks across four territories.

Table 3: Risk allocation preferences from the UK, China, Hong Kong, and Greece

#	RISK FACTOR	CHINA			HONG KONG			UK			GREECE		
		Pu	Pr	Sh	Pu	Pr	Sh	Pu	Pr	Sh	Pu	Pr	Sh
1	Unstable government	✔			✔			✔			✔		
2	Strong Political Opposition/Hostility	✔			✔			✔			✔		
3	Poor public decision-making process	✔			✔			✔			✔		
4	Poor Financial Market			✔		✔			✔				✔
5	Inflation rate volatility			✔			✔		✔				✔
6	Interest rate volatility		✔			✔			✔				✔
7	Influential economic events		✔				✔		✔				✔
8	Financial attraction of project to investors		✔			✔			✔			✔	
9	High finance cost		✔			✔			✔			✔	
10	Availability of finance		✔			✔			✔				✔
11	Legislation Change	✔			✔					✔	✔		
12	Tax Regulation change (Non-Discriminatory vs Discriminatory)	✔			✔				✔		✔		
13	Industrial regulation change		✔			✔			✔		✔		
14	Force Majeure			✔			✔			✔			✔
15	Weather		✔				✔		✔			✔	
16	Geotechnical Conditions		✔				✔		✔				✔
17	Environment		✔			✔			✔				✔
18	Level of demand for project			✔		✔			✔		✔		
19	Land Acquisition (Site Availability)	✔			✔			✔			✔		
20	Lack of tradition of private provision of public services	✔			✔				✔			✔	
21	Level of public opposition to a project	✔					✔	✔					✔
22	Labour/Material Availability -		✔			✔			✔			✔	
23	Construction Cost Overrun		✔			✔			✔			✔	
24	Poor Quality Workmanship		✔			✔			✔			✔	
25	Late Design Changes		✔			✔			✔			✔	
26	Excessive contract variation			✔			✔	✔				✔	
27	Unproven engineering techniques		✔			✔			✔			✔	
28	Design Deficiency		✔			✔			✔			✔	
29	Delay in project approval and permits	✔			✔			✔			✔		
30	Operation cost overrun		✔			✔			✔			✔	

#	RISK FACTOR	CHINA			HONG KONG			UK			GREECE		
		Pu	Pr	Sh	Pu	Pr	Sh	Pu	Pr	Sh	Pu	Pr	Sh
31	Operational revenue below expectation		✔			✔			✔			✔	
32	Maintenance costs higher than expected		✔			✔			✔			✔	
33	Maintenance more frequent than expected		✔			✔			✔			✔	
34	Residual Risk		✔				✔		✔				✔
35	Third-Party Liability			✔			✔		✔			✔	
36	Staff Crises		✔				✔		✔			✔	
37	Organisation and coordination risk			✔		✔			✔			✔	
38	Inadequate experience in PPP/PFI			✔			✔		✔			✔	
39	Inadequate distribution of responsibilities and risk			✔						✔		✔	
40	Inadequate distribution of authority in partnership			✔			✔			✔		✔	
41	Differences in working method and know-how between partners			✔			✔		✔			✔	
42	Lack of commitment from either party			✔			✔			✔		✔	

Risk Mitigation strategies

The following examples of risk mitigation strategies for public-private partnerships have been identified from literature by: Wang et al. (2000); Hoffman (2007); Padiyar et al. (2004); Marques and Berg (2011); Fabozzi and Nahlik (2012); Pellegrino et al. (2013); Carbonara et al. (2015).

The following strategies, amongst others, were brought forward by Wang et al. (2000), obtain surety from government and maintain good relations with government institutions; obtain insurance for political risks; enter into multi-currency contracts to guard against exchange and currency fluctuations; use hedging instruments; insure insurable force majeure risks; ensure that a tariff adjustment formula is agreed to with the government agencies concerned (Wang, Tiong, Ting, & Ashley, 2000).

Hoffman (2007) thinks that the programme used for designs should be tested for viability to mitigate design changes in the future, a maximum cost ceiling could be agreed to, in order to protect the private company from high financial costs and that governments should ensure that environmental laws are promulgated and enforced (Hoffman, 2007). This is further extended by Fabozzi and Nahlik (2012) who believe that the primary stakeholders should be informed if the environment is polluted. The

pair also require a more robust NPV calculation to counter residual risk (Fabozzi & de Nahlik, 2012).

Marques and Berg (2011) advocate that experienced staff should be appointed to counter design risks; sensitivity analysis undertaken for operational and demand risks; insurance contracts should be entered into to counter force majeure, construction risk, technological risks, and maintenance risks; long term financing and hedging to mitigate financial risks; fixed pricing against inflation and possible expropriation risks (Marques & Berg, 2011).

2.4 CONCLUSION

The literature review presented in this section indicates that although extensive research has been undertaken to identify risk allocations preferences in PPPs for countries which have adopted the model in the last 25 years, there has not been much research undertaken in South Africa. This current research is necessary to identify risk allocation preferences in South Africa.

2.4.1 RESEARCH QUESTIONS

1. What are the risk allocation preferences for systemic risks in PPPs?
2. What are the risk allocation preferences for project-specific risks in PPPs?

METHODS

SECTION 3. RESEARCH METHODOLOGY

3.1 INTRODUCTION

The following section presents the methodology that was utilised to determine risk allocation preferences in public-private partnerships in South Africa. It outlines the research design; population for the research; sampling; data collection methods; analysis and interpretation of results. The instrument used to gather data is also discussed.

3.2 RESEARCH DESIGN

An online electronic survey was chosen as a methodological approach for this research. This method has been identified to have advantages, such as: being convenient and more efficient when collecting large amounts of data (Lefever, Dal, & Matthiasdottir, 2007), results from surveys are easier to capture and with minimal misrepresentation of responses (Roberts & Allen, 2015).

According to Lefever et al. (2007) and Roberts and Allen (2015), the quality of surveys may be affected by the following factors: incorrect, old unused email addresses. Alternatively, the surveys might be marked as spam; decreased survey response rates; non-response bias i.e. (the views of respondents who did not respond to the surveys might be different from those who responded thereby causing variability in the answers); survey fatigue especially if the same respondents are requested to partake in surveys from multiple sources; respondents partaking and answering the survey multiple times; technical challenges, such as length, perceived lack of anonymity and connectivity (Lefever et al., 2007; Roberts & Allen, 2015).

To mitigate the pitfalls identified from the literature regarding the use of surveys, the researcher instituted the following measures: the survey was created to be only 11 minutes long, participants were not required to complete personal details, the survey tool was set up to reject multiple responses by logging the unique internet protocol number of the devices used.

3.3 POPULATION AND SAMPLE

3.3.1 POPULATION

The total population from which the survey sample was sourced are people who had experience or had interest in PPPs in South Africa. These people were sourced from the government, private sector, and academia.

3.3.2 SAMPLE

The identified population was sampled using non-probability sampling. The research was conducted by employing snowball sampling as the initial participants in the research were requested to forward the surveys to colleagues and other professional acquaintances, this could assist in increasing the response rate to the survey. However, this method of sampling negates the possibility of the researcher knowing who completed the survey and by the extension, the researcher will not be able to confirm whether the responses represent the population (Creswell, 2005). The total targeted sample size was 150 completed survey responses, with an expected sampling error of 95%.

3.4 THE RESEARCH INSTRUMENT

The research instrument used to gather primary data was an online electronic survey (refer to the appendix for survey used). The survey was designed to gather information on risk allocation preferences in South Africa. The risk scales to be tested were adopted from research studies which were undertaken in other countries. This was to ensure the reliability of the survey.

The survey consists of 43 risk factors adopted from studies by various authors (Bing et al., 2005; Ibrahim et al., 2006; Ke, Wang, Chan, & Lam, 2010; Roumboutsos & Anagnostopoulos, 2008). The risk factors were presented on a three-point Likert scale with three options: 1 (Public); 2 (Private) and 3 (Shared); the participants were requested to allocated risk factors according to their preference.

Additional information which included: practical working experience in public-private partnerships, years' experience with PPPs, experience in which type of PPP projects and in which field the participants belong (Bing et al., 2005; Ibrahim et al., 2006; Ke et al., 2010; Roumboutsos & Anagnostopoulos, 2008), was included in the questionnaire.

Table 4: Summary of the questionnaire.

SECTION	DESCRIPTION	SOURCE OF QUESTION	TYPE OF QUESTION
Section A: Introductory questions	Section A consists of questions 1 to 4 on (working experience, the field of speciality, length of experience in the field) The variable data of practical working experience was used as an independent variable during analysis	(Bing et al., 2005; Ibrahim et al., 2006; Y. Ke et al., 2010; Roumboutsos & Anagnostopoulos, 2008).	Multiple response multiple choice and dichotomous
Section B: Risk Allocation Preferences	Section B gathered information on risk allocation preferences (questions 5 to 12). The questions were grouped in the following risk categories: Political, macroeconomic, project finance, project selection, legal risks, natural risks, design risks, construction risk, operation risks, social risks, residual risk, third-party risk, and relationship risk.	(Bing et al., 2005; Ibrahim et al., 2006; Y. Ke et al., 2010; Roumboutsos & Anagnostopoulos, 2008).	3-point Likert scale

3.5 DATA COLLECTION AND CLEANSING

The data used for empirical analysis was collected through an electronic survey instrument. All the responses were collected between January and February 2019. The collection method applied ranged from distributions of the electronic survey via electronic mail, via Whatsapp communication app and the anonymous link was distributed on LinkedIn network. The final sample used for analysis was 34. This final sample represents a 23% response rate.

The study could have been undertaken using a larger sample, but successful studies have been undertaken using the same methodology and similar sample sizes. The study by Roumboutsos and Anagnostopoulos (2008), based on 27 respondents investigated risk ranking and preferred risk allocation in PPP project in Greece (Roumboutsos & Anagnostopoulos, 2008). The study of the allocation of risks in PPPs in Nigerian infrastructure projects was undertaken with a sample of 36 respondents (Ibrahim et al., 2006).

3.6 DATA ANALYSIS AND INTERPRETATION

The data was captured using Qualtrics survey software and then analysed using Statistical Package for Social Sciences (SPSS) version 25 (SPSS, 2017).

3.6.1 DESCRIPTIVE ANALYSIS

The analysis was based on descriptive statistical analysis. The data used in the analysis was tested using Cronbach's alpha coefficient, to assess the reliability and internal consistency of the scales. To calculate Cronbach's alpha, the following formula was used:

$$\alpha = (\frac{k}{k-1})(1 - \frac{\sum_{i=1}^{k} \sigma_{y^i}^2}{\sigma_x^2}$$

Where: k refers to the number of scale items

$\sigma_{y^i}^2$ refers to the variance associated with item i

σ_x^2 refers to the variance associated with the observed total scores

Descriptive statistics were used to measure centrality of the data, i.e. standard deviation and mean. The results from the analysis are presented in Section 4.

3.6.2 VALIDITY AND RELIABILITY

A validity test indicates whether an instrument measures what it is supposed to measure (Kothari, 2004). Four types of validity tests have been identified: internal, external, construct, and statistical criterion validity (Creswell, 2005). External and internal validity were measured for this research study.

3.6.3 INTERNAL VALIDITY

Internal validity tests whether there is a causal relationship between independent and dependent variables (Creswell, 2005). Internal validity is influenced by factors such as maturation, selection, regression, history, instrumentation, and mortality (Creswell, 2005).

3.6.4 EXTERNAL VALIDITY

External validity refers to the extent which findings can be extrapolated, generalised and applied to other circumstances (Creswell, 2005). According to Creswell (2015, p. 306), factors exist which are a deemed to be a threat to external validity, these are listed as: “Interaction of selection and treatment; Interaction of setting and treatment; and Interaction of history and treatment”.

3.6.5 RELIABILITY

According to Kothari (2004), an instrument is deemed to be reliable if it provides consistent results (Kothari, 2004). The reliability of the risk allocation preferences scales was tested using Cronbach’s Alpha coefficient (Creswell & Creswell, 2017). The reliability score is deemed acceptable if it is 0.7 and higher (Heale & Twycross, 2015). The scales were found to be reliable.

3.7 LIMITATIONS OF THE STUDY

Through the use of a quantitative survey questionnaire, the researcher anticipated some limitations, such as the possibility of low response rate (Roberts & Allen, 2015). In order to mitigate the risk, the researcher sent out a reminder note a week after the initial distribution of the survey. The limitation of a survey is that the researcher is unable to obtain reasons behind the responses from the participants in the study (Segal, Borgia, & Schoenfeld, 2005), this can be addressed via a complementary qualitative study to understand the thinking behind the selections.

The findings and conclusion of this research article were based on the responses of the participants.

3.8 ETHICAL CONSIDERATION

In order to address ethical considerations, the following controls were exercised. Participants were assured that participation in the research study was voluntary and all the responses were confidential. The study did not request biographical information which could be used to identify the individuals concerned, such as name or identity numbers. The research will be stored for five years for further analysis, and after that, it will be destroyed.

3.9 CONCLUSION

This section presents the methods that were applied during the study. A survey was used as a data gathering instrument for the risk allocation preferences in South African PPP projects. The data analysis and interpretation were performed using descriptive analysis. The data was captured using Qualtrics survey software and then analysed using Statistical Package for Social Sciences (SPSS) version 25 (SPSS, 2017). Section 4 presents the results of the data on risk allocation preferences.

RESULTS

SECTION 4. RESULTS OF THE STUDY

4.1 INTRODUCTION

This section presents the empirical findings collected from the online survey. Primary data collected, was cleaned using Microsoft Excel, and analysed using SPSS Statistics®. The data were analysed using the methods discussed in section 3. The analysis has been divided into two parts, namely descriptive analysis of the sample, and reliability testing of the results.

4.2 PROFILE OF SAMPLE

The data used for the analysis was based on responses from a Qualtrics online survey questionnaire. The total number of returned electronic questionnaires was 34 participants. The sample used for analysis thus represents a 23% response rate. This response rate is higher than that achieved by Bing et al. (2005) who achieved a response rate of 11% from a target sample population of 500, but it is lower than Roumboutsos and Anagnostopoulos (2008) who achieved a 52% response rate but with an absolute value of 27 respondents and Ke et al. (2010) who achieved a 23% response rate with 47 returned questionnaires. These response rates are deemed sufficient for management research (Bing et al., 2005). The data collected was deemed sufficient for descriptive analysis.

4.3 RELIABILITY ANALYSIS

Reliability is defined as a measure of an instrument's ability to produce stable and consistent results (Creswell & Creswell, 2017). Cronbach's Alpha test was used to test the reliability of the results. The reliability score is deemed acceptable if it is 0.7 or higher (Heale & Twycross, 2015). Both systemic risks and project-specific risks results were deemed to be reliable as the coefficients were found to be above the acceptability threshold of 0.7. The findings are listed in Table 5.

Table 5: Reliability test results

Factor	Cronbach's Alpha	Result
Systemic Risk	0.817	Accepted
Project-specific Risk	0.887	Accepted

4.4 GENERAL INFORMATION

4.4.1 WORKING EXPERIENCE

The data obtained from 34 participants were used for the following empirical analysis. Twenty-one participants had less than five years' experience; nine participants had between 6-10 years' experience, three participants had between 11-15 years' experience and one participant had between 16-20 years' experience. None of the participants had more than 20 years' experience in South African PPPs. Figure 6 represents the participants' experience.

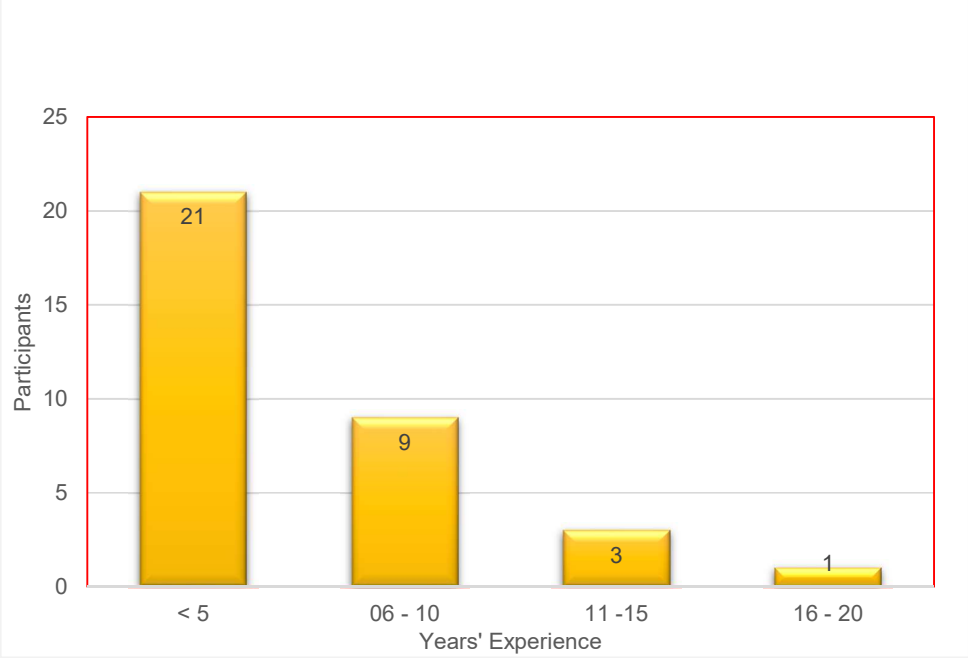


Figure 6: Breakdown of the working experience of participants

4.4.2 PPP SECTORS EXPERIENCE

Of the 34 participants, it is evident that there is a balanced representation within the different sectors of the economy. The majority of participants have been involved in power and energy (26%), other unspecified sectors (23%) and finally transportation (22%).

Figure 7 represents the participants' PPP sector involvement.

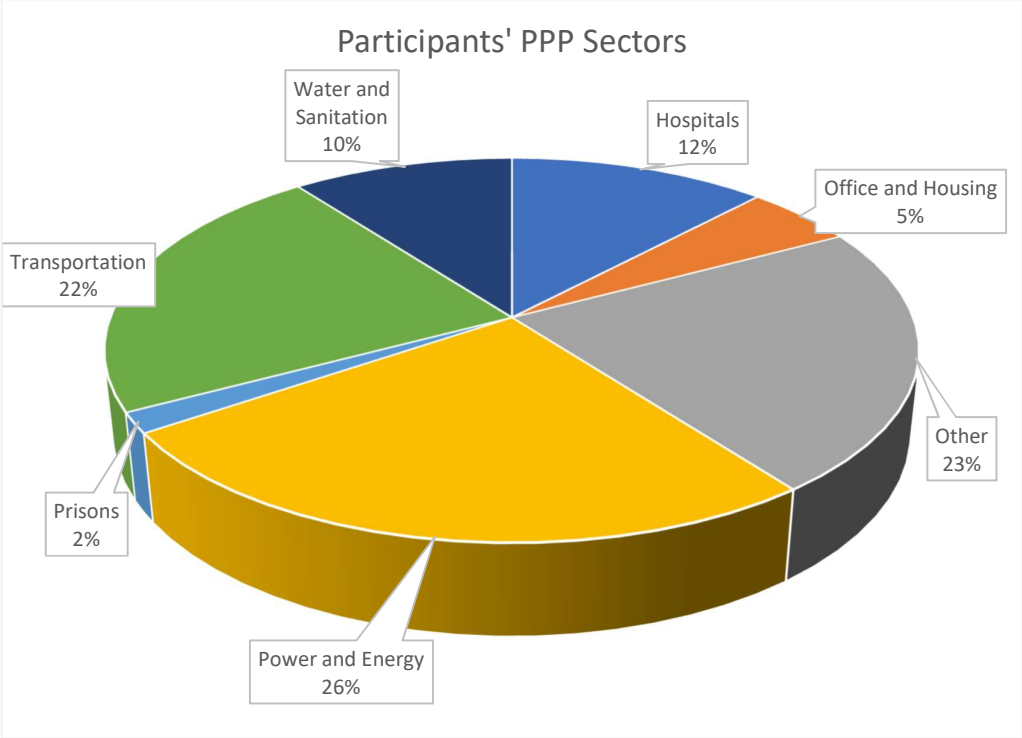


Figure 7: Participants' Sector Experience

4.4.3 PPP PRACTICAL WORKING EXPERIENCE

The participants in the study were divided into two stakeholder groups, i.e., those with PPP practical working experience and those without PPP practical working experience. Of the 34 participants who returned the survey, 62% had practical public-private partnership working experience while 32% of the participants were either in academia or were interested in PPPs but did not have practical working experience. Figure 8 represents the stakeholder groups breakdown.

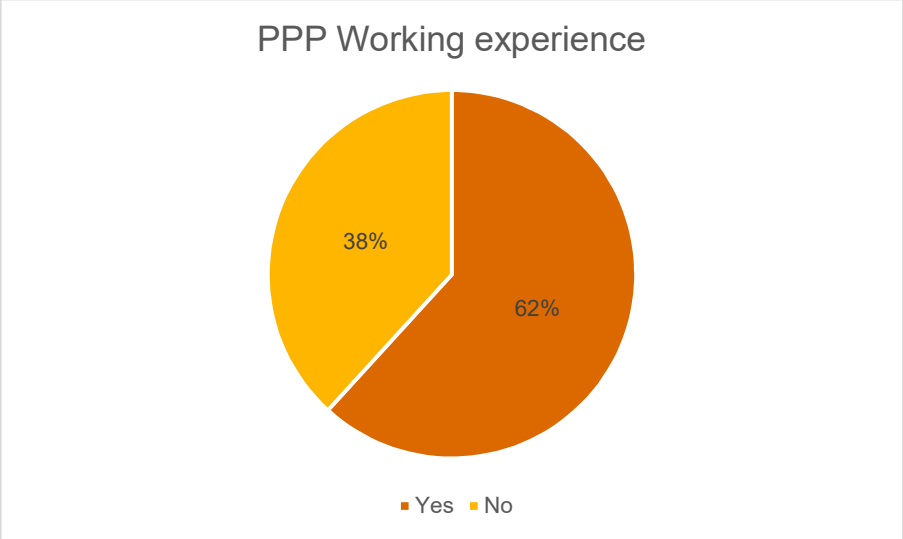


Figure 8: Stakeholder groups breakdown

4.5 DESCRIPTIVE ANALYSIS

The descriptive analysis results for the risk allocation preferences in South African PPP's are presented below.

4.5.1 PREFERRED RISK ALLOCATION OF THE RISK FACTORS

Table 6 presents the participants' risk allocation preferences; the responses have been divided according to the stakeholder groups' practical PPP working experience, i.e., those with PPP practical working experience are defined as "PPP Exp", those with no PPP working experience are defined as "Non-Exp" and total sample results "Combined".

The findings are discussed according to the differentiators:

PPP Experience

The results for systemic risks, i.e., political risk, macroeconomic risks, project finance, legal risk, natural risk, project risks, and social risk indicated that 64% of the risk factors could be primarily allocated to either the private sector, public sector or shared as results exceeded the 50% threshold to be allocated. 36% of the risk factors did not exceed the 50% threshold. Therefore, those risks were regarded as having no allocation preference and would have to be negotiated on a project by project basis.

The results for project-specific risks, i.e., construction risk, operational risk, design risk, residual risk, third-party risk, and relationship risk indicated that 52% risk factors could be primarily allocated to either the private sector, public sector or shared as results exceeded the 50% threshold to be allocated. 48% of the risk factors did not exceed the 50% threshold. Therefore, those risks were regarded as having no allocation preference and would have to be negotiated on a project by project basis.

Non-Exp Results

The results for systemic risks indicated that 41% of the risk factors could be primarily allocated to either the private sector, public sector or shared as results exceeded the 50% threshold to be allocated. 59% of the risk factors did not exceed the 50% threshold. Therefore, those risks were regarded as having no allocation preference and would have to be negotiated on a project by project basis

The results for project-specific risks indicated that 41% of the risk factors could be primarily allocated to either the private sector, public sector or shared as results exceeded the 50% threshold to be allocated. 59% of the risk factors did not exceed the 50% threshold. Therefore, those risks were regarded as having no allocation preference and would have to be negotiated on a project by project basis.

Combined Results

The results for systemic risks indicated that 59% of the risk factors could be primarily allocated to either the private sector, public sector or shared as results exceeded the 50% threshold to be allocated. 41% of the risk factors did not exceed the 50% threshold. Therefore, those risks were regarded as having no allocation preference and would have to be negotiated on a project by project basis

The results for project-specific risks indicated that 33% of risk factors could be primarily allocated to either the private sector, public sector or shared as results exceeded the 50% threshold to be allocated. 67% of the risk factors did not exceed the 50% threshold. Therefore, those risks were regarded as having no allocation preference and would have to be negotiated on a project by project basis.

Table 6: Preferred risk allocation by stakeholder groups

#	RISK FACTOR	PPP Exp			NON-EXP			COMBINED		
		Allocation %			Allocation %			Allocation %		
		Pu	Pr	Sh	Pu	Pr	Sh	Pu	Pr	Sh
	Systemic risks									
1	Unstable government	52	10	38	38	15	46	47	12	41
2	Strong Political Opposition/Hostility	62	5	33	69	8	23	65	6	29
3	Poor public decision-making process	62	14	24	69	8	23	65	12	24
4	Expropriation or nationalisation of assets	62	10	29	54	15	31	59	12	29
5	Poor Financial Market	29	33	38	31	23	46	29	29	41
6	Inflation rate volatility	24	29	48	38	23	38	29	26	44
7	Interest rate volatility	14	43	43	31	31	38	21	38	41
8	Influential economic events	14	19	67	15	15	69	15	18	68
9	Financial attraction of project to investors	33	29	38	23	31	46	29	29	41
10	High finance cost	10	62	29	31	31	38	18	50	32
11	Availability of finance	14	62	24	8	38	54	12	53	35
12	Legislation Change	62	19	19	38	15	46	53	18	29
13	Tax Regulation change (Non-Discriminatory vs Discriminatory)	38	29	33	38	15	46	38	24	38
14	Industrial regulation change	19	48	33	38	31	31	26	41	32
15	Force Majeure	14	5	81	15	8	77	15	6	79
16	Weather	10	38	52	8	15	77	9	29	62
17	Geotechnical Conditions	24	29	48	15	15	69	21	24	56
18	Environment	24	19	57	15	8	77	21	15	65
19	Level of demand for project	14	29	57	15	38	46	15	32	53
20	Land Acquisition (Site Availability)	38	14	48	38	23	38	38	18	44
21	Lack of tradition of private provision of public services	48	5	48	31	31	38	41	15	44
22	Level of public opposition to a project	67	10	24	46	15	38	59	12	29
23	Labour/Material Availability -	14	52	33	8	23	69	12	41	47
24	Construction Cost Overrun	19	52	29	15	38	46	18	47	35
25	Poor Quality Workmanship	24	52	24	38	23	38	29	41	29
26	Late Design Changes	33	38	29	31	23	46	32	32	35
27	Excessive contract variation	33	29	38	31	31	38	32	29	38
28	Construction Time delay	29	33	38	38	23	38	32	29	38
29	Unproven engineering techniques	24	48	29	15	23	62	21	38	41
30	Design Deficiency	24	52	24	23	31	46	24	44	32
31	Delay in project approval and permits	48	14	38	62	8	31	53	12	35
32	Operation cost overrun	33	43	24	23	23	54	29	35	35
33	Operational revenue below expectation	10	48	43	38	23	38	21	38	41
34	Maintenance costs higher than expected/more frequent than expected	14	43	43	31	46	23	21	44	35
35	Residual Risk	29	19	52	23	15	62	26	18	56
36	Third-Party Liability	29	33	38	8	31	62	21	32	47

#	RISK FACTOR	PPP Exp			NON-EXP			COMBINED		
		Allocation %			Allocation %			Allocation %		
		Pu	Pr	Sh	Pu	Pr	Sh	Pu	Pr	Sh
	Systemic risks									
37	Staff Crises	24	38	38	31	38	31	26	38	35
38	Organisation and coordination risk	14	29	57	8	31	62	12	29	59
39	Inadequate experience in PPP/PFI	14	19	67	23	15	62	18	18	65
40	Inadequate distribution of responsibilities and risk	19	10	71	15	23	62	18	15	68
41	Inadequate distribution of authority in partnership	24	10	67	31	23	46	26	15	59
42	Differences in working method and know-how between partners	0	19	81	0	31	69	0	24	76
43	Lack of commitment from either party	14	5	81	8	8	85	12	6	82

4.5.2 RESULTS FROM NON-PARAMETRIC TESTS

The following non-parametric tests were performed on the results of the survey to test whether the stakeholder group's PPP experience influenced the results. Firstly, a Kruskal-Wallis H test was performed to test the null hypothesis "No Significant Differences Exist between the two groups." The results did not reject the null hypothesis thus no statistically significant differences were identified between "participants with practical working experience in PPPs (YES)" and "Participants with no practical PPP working experience (NO)". The results showed an average p-value = 0.512, and an average mean ranking of 21.78 for "Yes" and 22.70 for "No" participants.

A Mann-Whitney test was performed as a supplement to the Kruskal-Wallis H test with a similar null hypothesis, the results did not reject the null hypothesis, therefore the conclusions were that there were no statistically significant differences between "participants with practical working experience in PPP's (YES)" and "Participants with no practical PPP working experience (NO)". The results showed an average U =117.837, and an average p-value = 0. 512. The results are represented in Table 7.

Table 7: Results from Kruskal-Wallis H Test and Mann-Whitney Test

	Test Statistics							
	Kruskal-Wallis H Test			Mann-Whitney U				
	Kruskal-Wallis H	df	Amp. Sig.	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
Unstable government	0.440	1	0.507	119.500	350.500	-0.663	0.507	.552[b]
Strong Political Opposition/Hostility	0.257	1	0.612	124.500	215.500	-0.507	0.612	.675[b]
Poor public decision-making process	0.112	1	0.737	128.500	219.500	-0.335	0.737	.780[b]
Expropriation or nationalisation of assets	0.132	1	0.716	127.500	358.500	-0.363	0.716	.753[b]
Poor Financial Market	0.051	1	0.821	130.500	361.500	-0.227	0.821	.834[b]
Inflation rate volatility	0.577	1	0.448	116.500	207.500	-0.759	0.448	.484[b]
Interest rate volatility	0.470	1	0.493	118.500	209.500	-0.685	0.493	.529[b]
Influential economic events	0.012	1	0.915	134.000	365.000	-0.107	0.915	.944[b]
Financial attraction of project to investors	0.365	1	0.546	120.500	351.500	-0.604	0.546	.576[b]
High finance cost	0.108	1	0.742	128.000	219.000	-0.329	0.742	.780[b]
Availability of finance	2.746	1	0.097	94.500	325.500	-1.657	0.097	.138[b]
Labour/Material Availability -	3.507	1	0.061	88.500	319.500	-1.873	0.061	.089[b]
Construction Cost Overrun	0.784	1	0.376	113.500	344.500	-0.886	0.376	.420[b]
Poor Quality Workmanship	0.000	1	1.000	136.500	227.500	0.000	1.000	1.000[b]
Late Design Changes	0.483	1	0.487	118.000	349.000	-0.695	0.487	.529[b]
Excessive contract variation	0.009	1	0.925	134.000	365.000	-0.094	0.925	.944[b]
Construction Time delay	0.091	1	0.763	128.500	219.500	-0.301	0.763	.780[b]
Unproven engineering techniques	2.619	1	0.106	94.000	325.000	-1.618	0.106	.138[b]
Design Deficiency	0.833	1	0.361	112.500	343.500	-0.913	0.361	.400[b]
Delay in project approval and permits	0.450	1	0.502	119.500	210.500	-0.671	0.502	.552[b]
Operation cost overrun	2.044	1	0.153	98.500	329.500	-1.430	0.153	.181[b]
Operational revenue below expectation	1.137	1	0.286	108.500	199.500	-1.066	0.286	.326[b]
Maintenance costs higher than expected/more frequent than expected	1.888	1	0.169	100.500	191.500	-1.374	0.169	.205[b]
Force Majeure	0.063	1	0.801	131.500	222.500	-0.252	0.801	.861[b]
Weather	1.687	1	0.194	105.000	336.000	-1.299	0.194	.276[b]
Geotechnical Conditions	1.268	1	0.260	108.000	339.000	-1.126	0.260	.326[b]
Environment	1.138	1	0.286	111.000	342.000	-1.067	0.286	.381[b]
Legislation Change	2.446	1	0.118	96.500	327.500	-1.564	0.118	.158[b]

Test Statistics								
	Kruskal-Wallis H Test			Mann-Whitney U				
	Kruskal-Wallis H	df	Amp. Sig.	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
Tax Regulation change (Non-Discriminatory vs Discriminatory)	0.158	1	0.691	126.000	357.000	-0.398	0.691	.727[b]
Industrial regulation change	0.601	1	0.438	116.000	207.000	-0.775	0.438	.484[b]
Level of demand for project	0.281	1	0.596	123.000	214.000	-0.530	0.596	.649[b]
Land Acquisition (Site Availability)	0.094	1	0.759	128.500	219.500	-0.307	0.759	.780[b]
Lack of tradition of private provision of public services	0.045	1	0.832	131.000	362.000	-0.212	0.832	.861[b]
Level of public opposition to a project	1.279	1	0.258	108.500	339.500	-1.131	0.258	.326[b]
Residual Risk	0.245	1	0.621	124.000	355.000	-0.495	0.621	.675[b]
Third-Party Liability	2.412	1	0.120	96.000	327.000	-1.553	0.120	.158[b]
Staff Crises	0.259	1	0.611	123.000	214.000	-0.509	0.611	.649[b]
Organisation and coordination risk	0.132	1	0.716	127.500	358.500	-0.363	0.716	.753[b]
Inadequate experience in PPP/PFI	0.175	1	0.676	126.500	217.500	-0.418	0.676	.727[b]
Inadequate distribution of responsibilities and risk	0.166	1	0.684	127.000	218.000	-0.408	0.684	.753[b]
Inadequate distribution of authority in partnership	0.972	1	0.324	112.000	203.000	-0.986	0.324	.400[b]
Differences in working method and know-how between partners	0.595	1	0.440	120.500	211.500	-0.771	0.440	.576[b]
Lack of commitment from either party	0.103	1	0.749	130.500	361.500	-0.321	0.749	.834[b]

a. Kruskal Wallis Test
b. Grouping Variable: Do you have any practical working experience in South African Public-Private Partnerships?
b. Not corrected for ties.

Based on the results from the tests performed above, the null hypothesis was found to be valid between PPP experienced participants and non-experienced participants. Therefore, the results are grouped and presented as combined.

4.5.2 SYSTEMIC RISKS

Table 8 presents statistics on mean, standard deviation, skewness, and kurtosis of systemic risks:

Mean: The results indicate that risk factors have a mean value of 2.25, except for risk factor 1,2,3,4,12 and 22, with an average score of 1.73.

Standard Deviation: The standard deviation for all the results is an average of 0.82. This means that most of the results are close to the mean.

Skewness: The distribution of risk factors 1,5,6,7,9,10,11,12,13,14,20 and 21 are deemed to be symmetric as they lie within the defined parameters for symmetric distributions. Risk factors 2,3,4, and 22 are negatively skewed while 8,15,16,17,18 and 19 are positively skewed.

Kurtosis: Risk factors 8,15, and 16 are deemed to be leptokurtic as they indicate a positive kurtosis, while the rest of the risk factors are deemed platykurtic as they indicate a negative kurtosis.

Table 8: Descriptive statistics of systemic risk factors

STATISTICS					
#	RISK FACTOR	MEAN	STD. DEVIATION	SKEWNESS	KURTOSIS
1	Unstable government	1.94	0.952	0.123	-1.957
2	Strong Political Opposition/Hostility	1.65	0.917	0.788	-1.373
3	Poor public decision-making process	1.59	0.857	0.937	-0.966
4	Expropriation or nationalisation of assets	1.71	0.906	0.639	-1.507
5	Poor Financial Market	2.12	0.844	-0.233	-1.571
6	Inflation rate volatility	2.15	0.857	-0.297	-1.595
7	Interest rate volatility	2.21	0.770	-0.379	-1.183
8	Influential economic events	2.53	0.748	-1.259	0.067
9	Financial attraction of project to investors	2.12	0.844	-0.233	-1.571
10	High finance cost	2.15	0.702	-0.213	-0.867
11	Availability of finance	2.24	0.654	-0.277	-0.617
12	Legislation Change	1.76	0.890	0.497	-1.584
13	Tax Regulation change (Non-Discriminatory vs Discriminatory)	2.00	0.888	0.000	-1.771
14	Industrial regulation change	2.06	0.776	-0.104	-1.296

STATISTICS					
#	RISK FACTOR	MEAN	STD. DEVIATION	SKEWNESS	KURTOSIS
15	Force Majeure	2.65	0.734	-1.769	1.419
16	Weather	2.53	0.662	-1.112	0.153
17	Geotechnical Conditions	2.35	0.812	-0.754	-1.045
18	Environment	2.44	0.824	-1.011	-0.723
19	Level of demand for project	2.38	0.739	-0.764	-0.722
20	Land Acquisition (Site Availability)	2.06	0.919	-0.121	-1.862
21	Lack of tradition of private provision of public services	2.03	0.937	-0.061	-1.924
22	Level of public opposition to a project	1.71	0.906	0.639	-1.507

4.5.3 PROJECT-SPECIFIC RISKS

Table 9 presents statistics on mean, standard deviation, skewness, and kurtosis of project-specific risks:

Mean: The results indicate that risk factors have a mean value of 2.24 except for risk factor 9, with an average score of 1.82.

Standard Deviation: The standard deviation for all the results is an average of 0.77, this means that most of the results are close to the mean.

Skewness: The distribution of risk factors 2,3,4,5,6,7,8,9,10,11,12 and15 are deemed to be symmetric as they lie within the defined parameters for symmetric distributions. Risk factors 1,13,14,16,17,18,19,20 and 21 are negatively skewed.

Kurtosis: Risk factor 21 is deemed to be leptokurtic as it indicates a positive kurtosis, while the rest of the risk factors are deemed platykurtic as they indicate a negative kurtosis.

Table 9: Descriptive statistics of project-specific risk factors

STATISTICS					
#	RISK FACTOR	MEAN	STD DEVIATION	SKEWNESS	KURTOSIS
1	Labour/Material Availability -	2.35	0.691	-0.603	-0.677
2	Construction Cost Overrun	2.18	0.716	-0.276	-0.945
3	Poor Quality Workmanship	2.00	0.778	0.000	-1.314
4	Late Design Changes	2.03	0.834	-0.057	-1.568
5	Excessive contract variation	2.06	0.851	-0.116	-1.626
6	Construction Time delay	2.06	0.851	-0.116	-1.626
7	Unproven engineering techniques	2.21	0.770	-0.379	-1.183
8	Design Deficiency	2.09	0.753	-0.149	-1.171
9	Delay in project approval and permits	1.82	0.936	0.373	-1.815
10	Operation cost overrun	2.06	0.814	-0.111	-1.476
11	Operational revenue below expectation	2.21	0.770	-0.379	-1.183
12	Maintenance costs higher than expected/more frequent than expected	2.15	0.744	-0.248	-1.101
13	Residual Risk	2.29	0.871	-0.631	-1.402
14	Third-Party Liability	2.26	0.790	-0.522	-1.185
15	Staff Crises	2.09	0.793	-0.162	-1.368
16	Organisation and coordination risk	2.47	0.706	-0.986	-0.263
17	Inadequate experience in PPP/PFI	2.47	0.788	-1.084	-0.451
18	Inadequate distribution of responsibilities and risk	2.50	0.788	-1.184	-0.267
19	Inadequate distribution of authority in partnership	2.32	0.878	-0.706	-1.345
20	Differences in working method and know-how between partners	2.76	0.431	-1.306	-0.315
21	Lack of commitment from either party	2.71	0.676	-2.073	2.743

4.6 SECTION SUMMARY

Section 4 presented the analysis and results of the data. A combination of descriptive statistics which included frequency tables, bar charts, and pie charts were presented. The reliability of both the results for systemic risks and project-specific risks were analysed using Cronbach's Coefficient Alpha test, the Alpha scores above the 0.7 thresholds indicate that the scales used in the study were reliable. A Kruskal-Wallis H test and a Mann-Whitney test was undertaken, both the tests supported the null

hypothesis “No Significant Differences Exists between the two groups.” None of the significance scores fell below the significance level of 0.05. Therefore, the results of both groups were combined for data analysis and discussions. The results are discussed and explained in Section 5.

CONCLUSION

SECTION 5: DISCUSSION OF THE RESULTS

5.1 INTRODUCTION

In this section, the research results presented in Chapter 4 are discussed and explained. The discussion focusses on descriptive statistics of the sample tested. The results in this research are compared to findings from the literature.

5.2 RISK ALLOCATION PREFERENCES.

The preferred risk allocations are presented as a percentage of the participants' responses to the survey. This presentation method is adapted from similar studies undertaken by Bing et al. (2005); Ibrahim et al. (2006); Roumboutsos and Anagnostopoulos (2008) and Ke et al. (2010). The categorical buckets into which the responses were allocated are identified as "Allocate to Public Sector", "Allocate to Private Sector "and "Risk to be shared". If none of the categories obtains a clear majority, the outcome is deemed "Negotiable on a project basis". The basis for allocation of risks is based on majority opinions (i.e., greater than 50%). If more than 50% of the participants have elected to allocate a particular risk factor to the private sector then the factor is categorised as "Allocate to Private Sector".This principle is applied uniformly to "Allocate to Public Sector" and "Risk to be shared". The allocations are discussed in Table 10.

Table 10: PPP risk allocation preferences in South Africa.

SYSTEMIC RISKS	Allocation (%)			Preferred Allocation
	Public	Private	Shared	
Strong Political Opposition/Hostility	65	6	29	Allocate to Public Sector
Poor public decision-making process	65	12	24	
Expropriation or nationalisation of assets	59	12	29	
Legislation Change	53	18	29	
Level of public opposition to a project	59	12	29	
High finance cost	18	50	32	Allocate to Private Sector
Availability of finance	12	53	35	
Influential economic events	15	18	68	Risk to be shared
Force Majeure	15	6	79	
Weather	9	29	62	
Geotechnical Conditions	21	24	56	
Environment	21	15	65	
Level of demand for project	15	32	53	
Unstable government	47	12	41	Negotiable
Poor Financial Market	29	29	41	
Inflation rate volatility	29	26	44	
Interest rate volatility	21	38	41	
Financial attraction of project to investors	29	29	41	
Tax Regulation change	38	24	38	
Industrial regulation change	26	41	32	
Land Acquisition (Site Availability)	38	18	44	
Lack of tradition of private provision of public services	41	15	44	
Project-specific Risks				
Delay in project approval and permits	53	12	35	Allocate to Public Sector
Residual Risk	26	18	56	Risk to be shared
Organisation and coordination risk	12	29	59	
Inadequate experience in PPP/PFI	18	18	65	
Inadequate distribution of responsibilities and risk	18	15	68	
Inadequate distribution of authority in partnership	26	15	59	
Differences in working method and know-how between partners	0	24	76	
Lack of commitment from either party	12	6	82	
Labour/Material Availability	12	41	47	Negotiable
Construction Cost Overrun	18	47	35	
Poor Quality Workmanship	29	41	29	
Late Design Changes	32	32	35	
Excessive contract variation	32	29	38	
Construction Time delay	32	29	38	
Unproven engineering techniques	21	38	41	
Design Deficiency	24	44	32	
Operation cost overrun	29	35	35	
Operational revenue below expectation	21	38	41	
Maintenance costs higher /more frequent than expected	21	44	35	
Third-Party Liability	21	32	47	
Staff Crises	26	38	35	

5.2.1 RISK TO BE ALLOCATED TO THE PUBLIC SECTOR

The research survey responses indicate that six risks should be allocated to the public sector (Table 10 score rating >50 %): *Strong political opposition/hostility, poor political decision-making process, expropriation or nationalisation of assets, legislative change, delay in project approval and permits and level of public opposition to a project.* Five of these risk factors are deemed to be systemic risks. *Delay in project approval and permits* is a project-specific risk. These results corroborate with the previous findings by Ke et al. (2010) and Ibrahim et al. (2006).

5.2.2 RISK TO BE ALLOCATED TO THE PRIVATE SECTOR

Table 10 indicates that participants have indicated that only two risks must be allocated to the private sector: *high finance cost and availability of finance.* All the risks are categorised as systemic risks. The participants allocated two (6%) of the 43 risk factors to the private sector. These results differ substantially with surveys undertaken by Bing et al. (2005) and Ibrahim et al. (2006). The survey called *"The allocation of risk in PPP/PFI construction projects in the UK"* showed that 32 (representing 69%) out of 46 risk factors should preferably be allocated to the private sector (Bing et al., 2005), and the survey named "*The analysis and allocation of risks in public-private partnerships in infrastructure projects in Nigeria*" indicated that participants allocated 34 (56%) out of 61 risk factors to the private sector (Ibrahim et al., 2006). The results of studies by Ke et al. (2010) and Roumboutsos and Pantelias (2015) also show substantially different results from the current study.

5.2.4 RISK TO BE SHARED

Table 10 also indicates that participants prefer that 13 risk factors be shared between private and public sector partners. Six of the risk factors are systemic risks, and four of the risks belong to the sub-group "Natural Risks", These risks are *force majeure, weather, geotechnical conditions,* the other risks are *influential economic events (macroeconomic) and level of demand for the project (project selection risk).* Seven projects specific risk factors: *Residual risk (residual risk), organisation and coordination risk, inadequate experience in PPP/PFI, inadequate distribution of responsibilities and risk, inadequate distribution of authority in partnership, differences in working method and know-how between partners and lack of commitment from either party (relationship risk). Relationship risks are dependent on both parties*

working together, neither of the parties will be able to manage them if there is no contribution or commitment from the counterparty (Bing et al., 2005).

5.2.5 RISK WHOSE ALLOCATION DEPENDS ON PROJECT CIRCUMSTANCES

The central principle of public-private partnerships is the allocation of risks to the party which is best placed to manage the risk. The challenge occurs where neither of the parties is capable of managing a particular risk (Bing et al., 2005). These survey results indicate that participants had difficulties allocating risks to either the private or public sector or sharing. Table 10 shows risks with frequency percentages of less than 50%. 22 (51%) risk factors are a mixture of systemic and project-specific risks, depending on the nature of each project. These risk factors include : *unstable government, poor financial market, inflation rate volatility, interest rate volatility, financial attraction of project to investors, tax regulation change (non-discriminatory vs discriminatory), industrial regulation change, land acquisition (site availability), lack of private provision of public services, labour/material availability, construction cost overrun, poor quality workmanship, late design changes, excessive contract variation, construction time delay, unproven engineering techniques, design deficiency, operation cost overrun, operational revenue below expectation, maintenance costs higher than expected/ more frequent than expected, third-party liability and staff crises.* The parties to PPP must consider the risks allocated above carefully when allocating them.

5.3 CONCLUSION

This chapter discussed and presented the empirical results from the research. The empirical results can be summarised as follows: Six risk factors should preferably be allocated to the public sector, and two risk factors should preferably be allocated to the private sector, 13 risk factors to be shared between private and public sector partner and the allocation of 22 (51%) risk factors should be allocated based on a project by project basis.

SECTION 6. CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This section presents a summary of the main findings and conclusions drawn from the study on risk allocation preferences in public-private partnerships in South Africa. The summary results highlight how the participants have indicated which risks must be allocated to the private sector, public sector or shared amongst the parties involved in the proposed project. After the conclusion of the researcher, recommendations, and suggestions for further research follow.

6.2 CONCLUSION OF THE RESEARCH

The primary objective of the research was to identify risk allocation preferences in public-private partnerships in South Africa. The results of this study can contribute to providing potential investors with crucial insights into the country's PPP market.

The study was based on a positivist research paradigm, and a quantitative research methodology was adopted. An electronic survey questionnaire was used to collect primary data from which 34 responses were used for empirical analysis. The reliability of the scales for systemic and project-specific risks was tested using Cronbach's alpha coefficient and was found to be acceptable. Non-parametric tests, i.e., Kruskal-Wallis H test and Mann-Whitney test were performed, and the results showed that there were no significant differences between the means of the category "participants with practical PPP working experience and those with practical working experience", thus the null hypothesis was accepted.

6.2.1 SYSTEMIC RISKS

Of the 21 risk factors defined as systemic risks, the participants preferred to allocate these risks as five risks (representing 23 %) allocated to the public sector, two risks (9 %) to the private sector, six risks (27%) to be shared and nine risks (41%) were deemed as negotiable on a project by project basis.

6.2.2 PROJECT-SPECIFIC RISKS

Of the 22 risk factors defined as project-specific risks, the participants preferred to allocate these risks as one risk (representing 5%) allocated to the public sector, seven risks (33%) are to be shared, and 13 risks (62%) were deemed as negotiable on a project by project basis.

This research study will enable international and domestic investors who want to enter into public-private partnerships to understand risk allocation preferences in South Africa. This study has also highlighted the need for the current risk allocation framework used by the South African National Treasury PPP unit to be reviewed in partnership with all the stakeholders represented.

6.3 RECOMMENDATIONS

This research report has contributed to providing the empirical findings on the risk allocation preferences in public-private partnerships in South Africa. Appropriate risk allocation has been identified as one of the critical success factors of PPPs, although South Africa currently uses the national PPP Manual and the National Treasury standardised PPP provisions, these have not been updated to reflect the changes within the South African PPP landscape.

The results from this study have indicated that a need exists for a collaborative effort between stakeholders such as academia, the private sector and government, especially the PPP Unit at National Treasury to review the current PPP manual.

6.4 SUGGESTIONS FOR FURTHER RESEARCH

The current research has identified substantial differences in risk allocation preferences in South Africa, compared to other countries.

Further research can be undertaken in the following areas:

As the current study was limited to a risk allocation preference of the participants using a primarily quantitative method, a future study could be extended to in-depth qualitative research into the perceptions of the group.

Potential future studies could be undertaken to expand this study by focusing on a larger sample size and using predictive models to better understand which risk factors are better suited to the types of PPP models.

A case study research could be undertaken to measure the economic impact of the Gautrain public-private partnership on the Gauteng province.

A future study could be undertaken on the extent of post-occupancy evaluation in South African PPP projects, especially for performance-based contracts.

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APPENDIX A – EMAIL

Good day.

My name is Mothusi Mohlakoana, and I am an MBA Candidate at Wits Business School, My research will focus on Risk Allocation Preferences in Public-Private Partnerships "PPP" in South Africa.

I invite you to assist me by completing my survey which can be found by following the link below:

Survey link: https://wits.eu.qualtrics.com/jfe/form/SV_8GEFh3AtqZIaRBH

Completion should take you between 8 to 12 minutes. Please feel free to send the link to as many as of your contacts as you please.

Your participation in the survey is entirely voluntary, and your answers will be kept anonymous. No personally identifiable information will be associated with your responses in reports of this data. If at any point you wish to stop participating in the survey, you may close the link.

Should you have questions or queries, feel free to email me at mothusimohlakoanam@gmail.com

Thank you in advance

Mothusi Mohlakoana

APPENDIX B – ELECTRONIC SURVEY

Risk Allocation Preferences in Public-Private Partnerships in South Africa

The study aims to identify Risk allocation preferences in Public-Private Partnerships "PPP" in South Africa.

Instructions

The completion of this survey should take you between 8 to 12 minutes. Your participation in the survey is entirely voluntary, and your answers will be kept anonymous.

1. Do you have any practical working experience in South African Public-Private Partnerships?

- ○ Yes
- ○ No

2. Please specify your experience in Public-private Partnerships (Years)

- ○ ≤ 5
- ○ 6 - 10
- ○ 11 - 15
- ○ 16 - 20
- ○ > 20

3. Are you in?

- ○ Academia
- ○ Private Sector
- ○ Public Sector

4. In which sectors do you have experience with PPPs?

- ☐ Hospitals
- ☐ Power and Energy
- ☐ Water and Sanitation
- ☐ Prisons
- ☐ Office and Housing
- ☐ Transportation
- ☐ Other

5. Please allocate the following Political risk factors

	Public	Private	Shared
Unstable government	○	○	○
Strong Political Opposition/Hostility	○	○	○
Poor public decision-making process	○	○	○
Expropriation or nationalisation of assets	○	○	○

6. Please allocate the following Macroeconomic and Project Finance risk factors

	Public	Private	Shared
Poor Financial Market	○	○	○
Inflation rate volatility	○	○	○
Interest rate volatility	○	○	○
Influential economic events	○	○	○
Financial attraction of project to investors	○	○	○
High finance cost	○	○	○
Availability of finance	○	○	○

7. Please allocate the following Construction Risk Factors

	Public	Private	Shared
Labour/Material Availability	○	○	○
Construction Cost Overrun	○	○	○
Poor Quality Workmanship	○	○	○
Late Design Changes	○	○	○
Excessive contract variation	○	○	○
Construction Time delay	○	○	○

8. Please allocate the following Design and Operation risk factors

	Public	Private	Shared
Unproven engineering techniques	○	○	○
Design Deficiency	○	○	○
Delay in project approval and permits	○	○	○
Operation cost overrun	○	○	○
Operational revenue below expectation	○	○	○
Maintenance costs higher than expected/more frequent than expected	○	○	○

9. Please allocate the following Natural risk factors

	Public	Private	Shared
Force Majeure	○	○	○
Weather	○	○	○
Geotechnical Conditions	○	○	○
Environment	○	○	○

10. Please allocate the following Legal and Project Selection risk factors

	Public	Private	Shared
Legislation Change	○	○	○
Tax Regulation change (Non-Discriminatory vs Discriminatory)	○	○	○
Industrial regulation change	○	○	○
Level of demand for project	○	○	○
Land Acquisition (Site Availability)	○	○	○

11. Please allocate the following Risk factors

	Public	Private	Shared
Lack of tradition of private provision of public services	○	○	○
Level of public opposition to a project	○	○	○
Residual Risk	○	○	○
Third-Party Liability	○	○	○
Staff Crises	○	○	○

12. Please allocate the following Relationship risk factors

	Public	Private	Shared
Organisation and coordination risk	○	○	○
Inadequate experience in PPP/PFI	○	○	○
Inadequate distribution of responsibilities and risk	○	○	○
Inadequate distribution of authority in partnership	○	○	○
Differences in working method and know-how between partners	○	○	○
Lack of commitment from either party	○	○	○