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ABSTRACT

Despite wide international acceptance of infrastructure public-private partnerships (PPPs), they are fertile ground for disputes because of their unique features such as numerous stakeholders with differing organisational values and lifecycle arrangement for project delivery, among others. At the same time, dispute resolution (DR) in infrastructure PPPs is inadequately addressed and inefficient DR systems are prevalent. This study therefore developed a framework for constructive DR in infrastructure PPPs by embedding behaviour of PPP project parties through the lens of the Dual Concern Theory (DCT).

The research employed a mixed methods approach and found that some of the sources of disputes in infrastructure PPPs include unbalanced allocation and under-pricing of risks, political interference, breakdown of commercial relationships, among others. In addition, some of the issues affecting DR in infrastructure PPPs were highlighted as inadequate information sharing, poor communication and collaboration, inadequate monitoring and evaluation systems, among others. Some critical success factors for DR in infrastructure PPPs were determined such as neutrality of the mediator, flexibility of PPP project parties, confidence in the DR system, fairness by all parties, and speed of DR. As a step towards improving DR in infrastructure PPPs, collaborative means of DR were suggested. These can be achieved through exploring solutions that are acceptable to all parties, transparency and open communication, among others. A framework for constructive DR in infrastructure PPPs was also developed.

Among other theoretical contributions, this research clarified the occurrence of disputes and their resolution in infrastructure PPPs through the lens of DCT. From a practical perspective, an empirical framework that can serve as a customisable reference point when issues arise on infrastructure PPP projects, was developed.

Keywords: Dispute resolution, infrastructure public-private partnerships, conflict management, dual concern theory

RESEARCH PUBLICATIONS

As part of this research, and from this thesis, two journal articles were published in a journal that is ranked as A* on the Australian Business Deans Council (ABDC) Journal Quality List. Both journal articles are directly relevant to the topic of this thesis.

In compliance with the journal guidelines to authors, only the abstracts of the journals have been included in this thesis (Appendix 9). Full papers can be downloaded via the Digital Object Identifier (DOI) links provided below.

Musenero L., Baroudi B., & Gunawan I. 2021. Application of Dual Concern Theory in Elucidating Conflict Behaviour in Infrastructure Public-Private Partnership Projects. *Journal of Construction Engineering and Management*, 147(7), p. 04021061. DOI: https://ascelibrary.org/doi/10.1061/%28ASCE%29CO.1943-7862.0002099#infotabcontent

Musenero L., Baroudi B., & Gunawan I. 2023. Critical issues affecting dispute resolution practice in infrastructure public-private partnerships. *Journal of Construction Engineering and Management*, 149(3), p. 04023001. DOI: https://doi.org/10.1061/JCEMD4.COENG-12902

The publication of these papers in a highly ranked peer-reviewed journal demonstrates the relevance of the research findings to the infrastructure PPP community worldwide. The feedback received during the peer review process on the published works shaped the development of several sections of this thesis.

A third paper is under preparation for submission to an FT-50 journal. The title of this paper is presented below, and an abstract has been added to Appendix 9.

Musenero L., Baroudi B., & Gunawan I. Sustainable delivery of infrastructure projects through better dispute resolution arrangements for public-private partnerships.

ACRONYMS

ABDC	Australian Business Deans Council
ACA	Australian Constructors Association
ACT	Australian Capital Territory (Australia)
ADR	Alternative dispute resolution
AIPM	Australian Institute of Project Management
BOO	Build-own-operate
BOOT	Build-own-operate-transfer
BOT	Build-operate-transfer
CFA	Confirmatory factor analysis
COVID	Coronavirus disease
D&C	Design and construction
DAB	Dispute avoidance board
DBFM	Design-build-finance-maintain
DBFMO	Design-build-finance-maintain-operate
DBOT	Design-build-operate-transfer
DCMF	Design-construct-manage-finance
DCT	Dual Concern Theory
DOI	Digital Object Identifier
DR	Dispute resolution
DRB	Dispute resolution board
DRBF	Dispute resolution board foundation
EFA	Exploratory factor analysis
EPEC	European PPP Expertise Centre
ESA	Event sequence analysis
EU	European Union
FIDIC	Fédération Internationale des Ingénieurs-Conseils
HREC	Human Research Ethics Committee
ICT	Information and communications technology
IFC	International Finance Corporation
IMF	International Monetary Fund
KMO	Kaiser-Meyer-Olkin
LU	London Underground (United Kingdom)
NEC	New Engineering Contract

NSW	New South Wales (Australia)
NT	Northern Territory (Australia)
O&M	Operation and maintenance
OECD	Organisation for Economic Co-operation and Development
PFI	Private finance initiative
PMI	Project Management Institute
PPP	Public-private partnership
PSC	Public Sector Comparator
QLD	Queensland (Australia)
SA	South Australia (Australia)
SPV	Special purpose vehicle
TAS	Tasmania (Australia)
UK	United Kingdom
USA	United States of America
VfM	Value for money
VIC	Victoria [state] – in Australia
WA	Western Australia (Australia)
WB	World Bank

CHAPTER 1 INTRODUCTION

This first chapter of the thesis presents background information on this research project. The chapter also clarifies the research problem, rationale for the research, research questions, objectives of the research project, and its scope. Finally, the thesis structure is outlined.

1.1 Background

Public-private partnerships (PPPs) are an internationally recognised form of delivering capital-intensive infrastructure projects especially where demand for infrastructure development exceeds government resources. Tang, Shen and Cheng (2010, p. 685) describe PPPs as "arrangements where both the public and private sectors bring their complementary skills to a project, with varying levels of involvement and responsibility, for the purpose of providing public services or projects."

For most infrastructure PPP arrangements, a contractual arrangement is established between government or their representative and a special purpose vehicle (SPV). In this arrangement, the government is usually the custodian and procurer of the project and they represent the interests of the wider beneficiary communities. In order to fulfil their delivery obligations, the SPV may engage equity investors, debt financiers, an operation and maintenance (O&M) contractor, a design and construction (D&C) contractor, and sub-contractors and advisors as required. This consolidated effort relieves the government of the financial burden of delivering a massive project. Moreover, repayment of the SPV's investment in the PPP project is made over an extended period of time, which allows utilisation of government funds for other priority projects (Currie and Teague 2015).

Despite their wide application and benefits, infrastructure PPPs present fertile ground for conflicts and disputes between project parties and stakeholders (Johnston 2010). This is usually attributed to their unique features such as multiplicity of stakeholders with different organisational culture, long-term engagements of project parties on projects, and large

investment costs with an extended repayment period, among others. Additionally, the varying ways in which the private sector and public sector operate may fuel disputes. While the focus of the public sector is towards realising social goals, minimising risks, maintaining political popularity and maximising influence; the private sector is usually interested in maximising investment returns, realising their commercial objectives and taking corporate risks. This may lead to competing interests and goals in the parties' attempt to successfully deliver a project (Ng, Wong and Wong 2012). It is also common for project parties of infrastructure PPPs to deviate from project goals and prioritise their own interests (Shrestha et al. 2017). Moreover, in the PPP arrangement, the government is not only a partner in the PPP but is also concerned with its regulation and planning, making decisions, accountability of public funds, and economic development of the country, among others (Hodge 2005). This may result in conflict of interest (Johnston 2010; McCann, Aranda-Mena and Edwards 2016).

It is therefore not surprising that disputes have been cited as a critical issue in PPPs (Chan et al. 2010; Ke et al. 2010; Lee 2010; Song, Yibo and Zhuo 2018), and the importance of dispute resolution (DR) in PPPs has been stressed by some scholars (Gray 2004; Liu et al. 2015). Despite this, DR remains inadequately addressed (McCann, Aranda-Mena and Edwards 2016; Shrestha et al. 2017) and inefficient DR systems are prevalent (Johnston and Kouzmin 2010; Siddiquee 2011; De Schepper, Dooms and Haezendonck 2014). It has also been argued that behaviour and attitudes of individuals drive de-escalation and escalation of disputes (Lovelace, Shapiro and Weingart 2001; Chen, Liu and Tjosvold 2005). In spite of this, current DR practices for PPPs do not seem to deliberately incorporate attitudes and behaviour of infrastructure PPP project parties in the approaches to DR.

This study therefore developed a framework for constructive resolution of disputes in infrastructure PPPs. Zhang et al. (2015) reasoned that a viable approach to developing such frameworks is by grounding studies in time-honoured theories that are fundamental to the phenomenon under investigation. Accordingly, this study was grounded in an existing theory

as discussed in subsequent chapters of this thesis. Given that Australia is one of the leading countries in infrastructure PPP project delivery (Barrett 2003), the empirical data collection stages of this research were limited to Australia.

1.2 Research Problem and Problem Statement

Infrastructure PPP projects are arguably breeding grounds for disputes because of several reasons. Given the presence of multiple project parties with variable commitment to prioritising DR and differing principles on trust and cooperation (Currie and Teague 2015), infrastructure PPPs experience an array of responses to dispute. This necessitates the need for an integrated framework that is tailored for DR in such inter-organisational arrangements.

Most DR-related research that has been done on infrastructure PPP projects has largely focussed on the manifestation of disputes in general (Chan et al. 2010; McCann, Aranda-Mena and Edwards 2016; Song, Yibo and Zhuo 2018), causes of disputes (Osei-Kyei et al. 2019), and use of selected DR methods (Lee 2016). A few attempts at integrating the behaviour of project parties in the dispute resolution processes for infrastructure PPP projects include studies by Forward (2006) and Worthington et al. (2017) that proposed adoption of relationship or alliance contracting. But implementing alliances may be challenging in infrastructure PPPs because some of the project parties like the D&C contractor are not part of the project for the entire multi-decade project duration. Rather than disbanding the SPV to realise a feasible alliance, the appealing characteristics of alliances (for example cultivation of a culture that is not insistent on apportioning blame and sharing of performance obligations and risks) can be incorporated in the processes for DR in infrastructure PPP projects to encourage win-win DR approaches. One way of achieving this is by incorporating attitudes and behaviour of infrastructure PPP project parties as significant elements of effective DR systems (Currie and Teague 2015).

From the forgoing, the research problem statement is summarised as below:

In the complex set-up of infrastructure PPP projects, a behavioural-centric framework that can be applied for resolution of disputes among all public and private infrastructure PPP project parties is necessary for constructive resolution of disputes in infrastructure PPPs.

1.3 Rationale of the Research

This research study bridges a knowledge gap in effective DR for infrastructure PPP projects. Although PPP schemes have been used to deliver infrastructure projects for several decades in many countries globally, it is not uncommon for the success of infrastructure PPPs in both emerging and established PPP markets to be hindered by dispute at some stage of delivery. Unsurprisingly, several infrastructure PPP projects have been distressed due to poorly resolved disputes. Some of these projects include but are not limited to: Australia – the Cross-City Tunnel in Sydney, Spencer Street (Southern Cross) Station Re-development in Melbourne (McCann, Aranda-Mena and Edwards 2016), Lane Cove Tunnel Sydney, Melbourne CityLink (Forward 2006; Worthington et al. 2017); Ghana National Housing Project (Ghana), West Cultural Kowloon District (Hong Kong), and Bangkok Elevated Transport System (Thailand) – (Osei-Kyei et al. 2019). This necessitates an assessment of current DR practices in infrastructure PPPs in order to develop more constructive ways of resolving disputes on these projects. This research hypothesises that dispute on such projects can be better resolved through a framework that incorporates behaviour and attitudes of project parties of infrastructure PPPs during DR.

1.4 Objectives of the Research

The aim of this study is to develop a framework for constructive DR in infrastructure PPPs that incorporates attitudes and behaviour of PPP parties.

The specific objectives of the research are stated below:

To investigate sources of disputes and critical issues in DR in infrastructure PPPs. This objective highlights the sources of disputes based on data collected from review of literature as

well as empirical studies. Additionally, it investigates the critical issues underlying current DR practice for infrastructure PPPs.

To assess current DR practices and understand behavioural orientations of parties in infrastructure PPPs. Under this objective, the current DR practices in infrastructure PPPs are scrutinised to understand their effectiveness. Additionally, an understanding of the behavioural orientations of PPP project parties during dispute is established through a theoretical lens.

To establish a relationship between critical issues in DR and DR practice. Having gathered information on DR practices and critical issues associated with them, the research establishes a link between the two aspects.

Also, the critical success factors for successful DR in infrastructure PPP projects are determined.

To investigate and propose recommended practices for constructive DR in infrastructure PPPs. This objective involves recommending DR practice for infrastructure PPPs based on data obtained in the preceding objectives and direct responses from practitioners who participated in the empirical stages of this research.

To develop a framework for constructive DR in infrastructure PPPs. Here, the information collected in the research is aggregated to develop a DR framework for constructively resolving disputes in infrastructure PPP projects.

1.5 Research Questions

The main research question of this study is:

‘How can constructive dispute resolution in infrastructure PPPs be enhanced with consideration of project parties’ attitudes and behaviour?’

The sub-questions are outlined below:

- What are the sources of disputes and what critical issues are encountered during their resolution in infrastructure PPPs?
- What are the current DR practices in infrastructure PPP projects and what are the behavioural orientations of PPP project parties during disputes?
- What relationship exists between critical issues in DR and DR practices and what are the critical success factors to constructive DR in infrastructure PPPs?
- What practices can be recommended for constructive DR in infrastructure PPPs?
- What framework can be recommended for DR in infrastructure PPPs?

1.6 Research Scope

Although the literature review component of this research addressed infrastructure PPPs from a global perspective, the empirical component was limited to infrastructure PPP practice in Australia.

The empirical results presented in this study were based on data obtained from questionnaire surveys and discussions with infrastructure PPP practitioners through focus groups and semi-structured interviews. While these results are considered sound and representative of the dispute situations encountered by the respective infrastructure PPP practitioners, they may not necessarily apply to all possible disputes in the infrastructure PPP project environment.

1.7 Thesis Structure

This thesis consists of six chapters.

Chapter 1 introduces the research – covering the background, research problem, rationale of the research, research questions and objectives, research scope, and a summary of the thesis structure.

Chapter 2 reviews existing literature on PPPs and DR in infrastructure PPP projects. Among other topics, the literature review covers general concepts of PPPs, the use of PPPs for

infrastructure delivery, DR in infrastructure PPPs, and knowledge gaps. A conceptual framework for DR in infrastructure PPPs is also presented.

Chapter 3 describes the research design, methodology and data analysis techniques that were adopted for this research. This encompassed both qualitative and quantitative approaches. The qualitative component involved the use of focus group discussions and semi-structured interviews for data collection, whereas self-administered questionnaire surveys were used for the quantitative component.

Chapter 4 discusses the results from this research study from all three empirical data collection stages. First, the findings from the focus group discussions are presented, followed by those from the questionnaire surveys and finally the semi-structured interviews. The Chapter concludes with a summary of the aggregated empirical findings.

Chapter 5 presents the proposed framework for constructive DR in infrastructure PPPs. The framework was developed as an extension to the conceptual framework presented in Chapter 2 and based on the results in Chapter 4.

Chapter 6 concludes the research by presenting the general conclusions from this study as well as a demonstration of how the objectives of this research were achieved. It further highlights the theoretical and practical contributions, wider application and limitations of the research, and recommendations for future research in the area of DR for infrastructure PPP projects.

1.8 Summary

In this chapter, an introduction to the research and thesis was provided. Also provided in this chapter were the research problem and rationale of the study, research questions and research objectives. Whilst the literature in this thesis was reviewed from a global perspective, the empirical data collection component of this research was limited to Australia with possible universal application.

CHAPTER 2 LITERATURE REVIEW

2.1. Introduction

This chapter presents a comprehensive review of literature on PPPs in general, the use of PPPs for infrastructure delivery, an introduction to DR, DR in infrastructure PPPs, among other topics. Subsequently, knowledge gaps in literature and a conceptual framework for DR in infrastructure PPPs are provided.

2.2. Concept of Public-Private Partnerships (PPPs)

Typical PPP project arrangements are birthed from a need by the general public to access a good or service (Babatunde et al. 2015). Because the government does not have infinite resources to fulfil all public needs, a PPP agreement is formed between the government and a private party (Akampurira, Root and Shakantu 2009; Tang, Shen and Cheng 2010). The government or their representative retains oversight of the PPP project and is actively involved throughout its lifecycle (Grimsey and Lewis 2005). In most PPP arrangements, the private party usually takes the form of a dedicated business entity – a special purpose vehicle (SPV), that is specifically set up for delivering a given project (Levitt and Eriksson 2016). The entities within the SPV may vary depending on the delivery requirements of the project. On most infrastructure PPP projects, the SPV engages a D&C contractor and an O&M contractor for the implementation aspects of the project in addition to raising finance through equity or debt (Hodge and Greve 2021). A schematic of the parties that are usually involved in typical infarstructure PPP projects is shown in Figure 2.1. The public sector may also contribute towards the PPP project with direct funds or in-kind (Jefferies and McGeorge 2009).

Delmon (2005) describes two main phases of project financing of PPP projects. In the first phase, the PPP project is financed progressively during its design, construction and commissioning. For the period of the second phase – the operation phase, the cost of investment by the financiers is reimbursed. The amount that is reimbursed varies depending on the contract

agreement. Reimbursement can be in form of equal monthly payments, a rate per unit of output (in case of utilities PPP projects), a percentage of the revenue obtained during the operation phase of the project, among others. According to Chege and Rwelamila (2001), financing of projects through PPPs differs from conventional approaches in such a way that in PPPs, the expected cash flow of a given project is the major basis for establishing its economic viability, without additional sponsor guarantees.

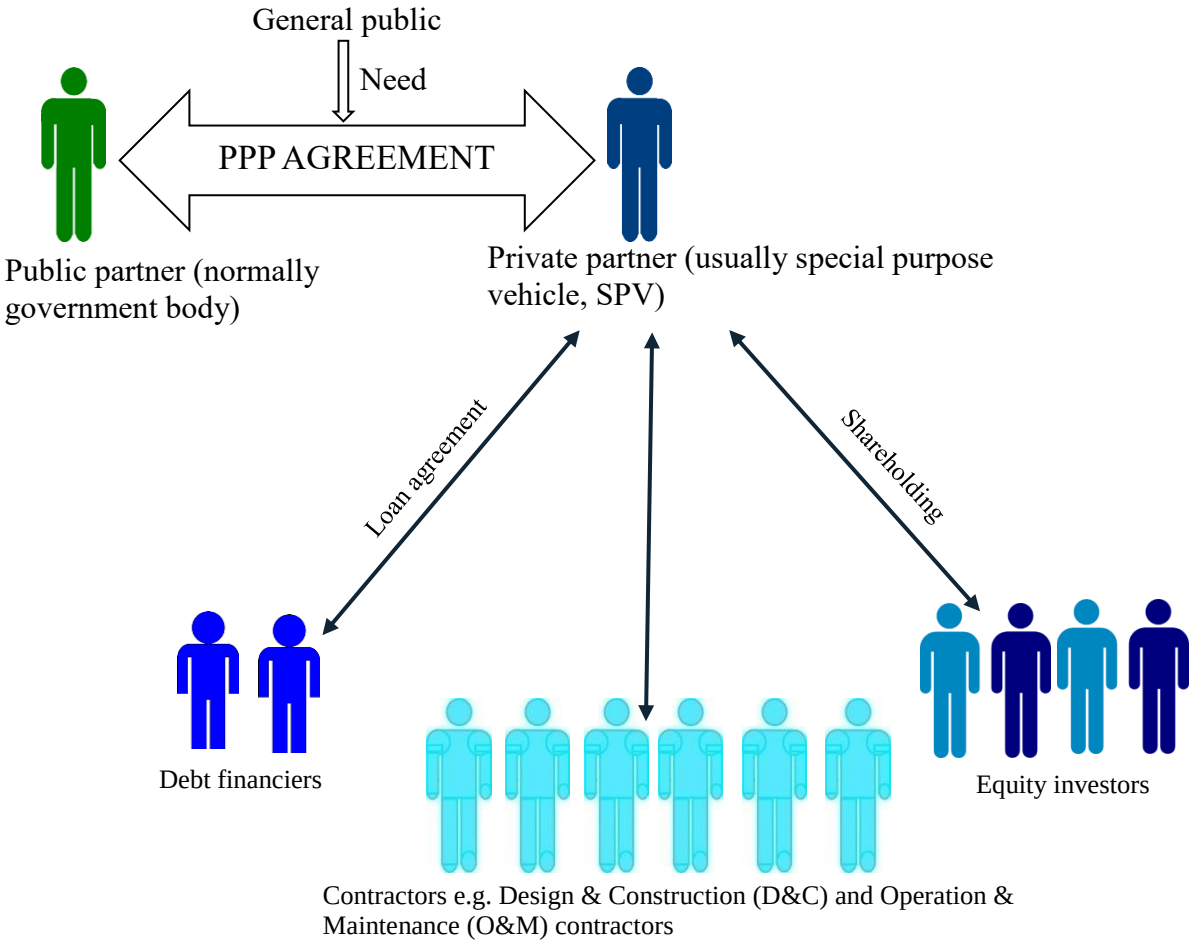

Figure 2.1: Schematic of typical PPP project parties

Additionally, PPPs are critical on risk allocation and transfer – with the argument that risks are typically allocated to the parties best-suited to manage them (Clifton and Duffield 2006; Ke et al. 2010; Karim 2011). Common practice is that when the SPV takes on the responsibility of design, construction, operation, and financing of the project, they also assume the associated risks (Karim 2011). Such risks may include construction delays, increase in labour costs,

increased operational costs, actual traffic volumes being less than projected at design stage, fluctuation of interest rates, among others (Clifton and Duffield 2006; Li, Wang and Wang 2016).

2.2.1. Definition of PPPs

The definitions of PPPs have caused some debates (Ball 2011) leading to the argument that formulating a single definition is not of much benefit (Hall, de la Motte and Davies 2003). In addition to Tang, Shen and Cheng (2010)'s definition that has been introduced in Scetion 1.1 of this thesis, other definitions of PPPs that have been brought forward include:

"*A contracting arrangement in which a private party, normally a consortium structured around a Special Purpose Vehicle (SPV), takes responsibility for financing and long-term maintenance or operation of a facility to provide long-term service outcomes.*" Duffield (2008, p. 7)

"*Arrangements where both the public and private sectors bring their complementary skills to a project, with varying levels of involvement and responsibility, for the purpose of providing public services or projects.*"

"*A combination of resources of the public and the private sectors in the quest for more efficient service provision.*" Akintoye et al. (2003, p. 461)

"*A 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.*" (The World Bank Group 2020)

All the above definitions converge to PPPs being long-term contracts between a public sector entity (generally government or their representative) and a private sector partner (usually in form of an SPV) where the private partner may implement, finance, maintain and operate a public service or asset and the public sector entity regulates the PPP in addition to other in-kind

contributions. PPPs typically encompass elements of capital sourcing and service delivery that are paid for by either user charges, the government, or a combination of the two.

PPPs may take various forms in different regions of the world. For instance, PPPs are popularly known as private finance initiatives (PFIs) in the United Kingdom (UK); in France, partnership contracts and concession agreements; and in Asia and Pacific Regions, build-operate-transfer (BOT) projects (Zhang et al. 2015). Other common variants include build-own-operate (BOO), design-build-finance-maintain (DBFM), build-own-operate-transfer (BOOT), design-build-finance-maintain-operate (DBFMO), design-build-operate-transfer (DBOT), design-construct-manage-finance (DCMF), among others (English and Guthrie 2003).

2.2.2. Emergence of PPPs

The origin of PPPs is not precise. From literature, it appears that present day PPPs have been in existence for centuries as a project delivery method. According to McDermott (1999), the history of PPPs stems from over a century ago when they were established to utilise private sector funding for constructing railroads and canals. Smith (1999) argues that the earliest concession models are best-described by the phrase build-own-operate-transfer. This phrase is often credited to the late Turkish Prime Minister, Halil Turgut Özal who is said to have invented it during the initial stages of building power plants in Turkey in the 1980s (Smith 1999).

One of the earliest recorded public-private engagements for development of infrastructure projects is said to have been done in the United States of America (USA) in 1640. Under this engagement, the state of Massachusetts empowered Harvard College to run a ferry on the Charles River (between Charlestown and Boston) and collect profits from it for over 100 years (Lorman 2018).

Smith (1999) highlighted that following commencement of the Industrial Revolution in 1709, the need to build supporting infrastructure arose. However, financing of infrastructure was left to individuals. Smith (1999) added that under this arrangement, railroads and canals were built

in several countries such as China, Japan and the USA. By the late 1700s, governments had started generating enough tax from the Industrial Revolution to fund infrastructure projects, but large undertakings were pursued under concession arrangements. One such project was a water distribution project in Paris that was granted to Perrier Brothers in 1782 (Prasad 2007). A concession arrangement was also used to deliver the Suez Canal in Egypt between 1859 and 1869. Under this concession, the Suez Canal Company was awarded the build and operation functions of the canal while financing was provided by European capital and the Egyptian government (Walker and Smith 1995).

However, between the mid-1800s and the early 1900s, a number of projects in many countries underwent a form of nationalisation. Whilst the motives for each country differed, they were generally driven by the poor quality and apparent greed that was exhibited by the private sector at the time (Walker and Smith 1995). Moreover, with the increasing inflation in the 1900s, many private firms could not keep afloat and therefore had to be nationalised by governments, such as the electricity sector of Brazil (Klein 2015). Klein (2015) adds that in some instances, governments opted for regulation of quality and prices of the private sector, rather than nationalisation. In much of the developed world, the nationalisation of infrastructure lasted until the 1970s after which most economies started experiencing a slowdown in their productivity (Gomez-Ibanez and Meyers 1993). This resulted in financial stress. To minimise the impact of the crisis, countries like Britain turned to the International Monetary Fund (IMF) for support, while Latin America was in debt in the 1980s. Also in the 1980s, the UK pioneered the exploration of a form of ‘privatisation’ to fulfil their infrastructure needs (Foreman-Peck and Millward 1994; Mustafa 1999).

Before 1989, using private sector capital to finance public projects in the UK was governed by a set of formal rules (Birnie 1999). Birnie (1999) added that by 1992, these rules had been withdrawn and the scope of private financing had been increased to include leasing agreements and joint ventures with the private sector. Additionally, the transfer of risk was clearly set out.

These new arrangements were termed as private finance initiatives (PFIs). In 1997, the process for implementing PFIs was reviewed to improve its effectiveness leading to the formation of Partnerships UK, among other reforms (Nettleton 2000). By 2012, more than 550 PFIs had been initiated across England in various sectors such as health, education, transport infrastructure, among others (EPEC 2012). In the rest of Europe, PPPs were embraced by Portugal and Spain; and they were commonly used at municipal level in France (EU 2018).

Other parts of the world caught the wave of interest in PPPs at varying paces. In Latin America, Argentina established their first legal framework for governing PPPs in the year 2000 (Corrá and Wagmaister 2022). In Asia, private sector participation in infrastructure delivery – both exclusively and through PPPs, started in the 1980s and 1990s as a response to inefficiencies in public project delivery (Henckel and McKibbin 2017). By 2012, the People's Republic of China and India recorded the majority of infrastructure PPPs in the region (Lee et al. 2019). To date, PPPs account for less than 1% of the gross domestic product (GDP) of the five main Southeast Asian countries where their use is mostly promoted – Viet Nam, Thailand, Philippines, Indonesia and Malaysia (Zen 2018). In India, project finance and PPPs did not pick up until around the year 2010 (Harisankar and Sreeparvathy 2013). In sub-Saharan Africa, PPPs did not enjoy much popularity in the 1990s, and have only recently boomed specifically in the electricity and telecommunications sectors (Moseley 2020). The Middle East and North Africa have only had a handful of PPP projects.

In Australia, delivery of infrastructure projects through leveraging of private sector finance and expertise is said to have been pioneered by Lieutenant Colonel Lachlan Macquarie shortly after taking office as Governor of New South Wales (NSW) in 1810 (Forward 2006). Similar to the system in England at the time, private turnpikes were established for financing major bridges, ferries and roads. Whereas the government had the exclusive right to determining the location of toll gates or ferries, the rights for collecting toll fees were sold by public auction. Forward (2006) further adds that by 1865, 34 toll gates and 5 toll ferries had already been established in

NSW. Some Australian analysts such as Jones (2003); Duffield (2005); Malone (2005) suggest that PPPs in Australia started in the late 1980s as a development from BOO projects (like the Gateway Motorway and Bridge in Brisbane that was completed in 1986) and BOOT projects (like the Sydney Harbour Tunnel that was completed in 1992). By 2002, the term PPP had become widely accepted in general vocabulary even though the project delivery arrangements were still emerging in practice (Malone 2005).

In summary, PPPs do not have a straight-forward geographical history or pattern. While some countries have taken them up enthusiastically, others are still assessing whether they are a feasible form of service delivery.

2.2.3. Application of PPPs

PPPs are applied in a range of sectors including but not limited to information and communications technology (ICT), health, waste management, water and sanitation, power plants, education, housing, and transport.

According to the European PPP Expertise Centre (EPEC), a total of 1749 PPP projects valued at 336 billion Euros were implemented in the European Union (EU) between the years 1990 and 2016 (EU 2018). EU (2018) added that in the year 2016, one-third of the PPP projects were in the transport sector, followed by the health and education sectors. The PPP market in the EU is mostly dominated by the United Kingdom, Spain, France, Germany and Portugal. Evidently, 90% of the European PPP projects over the period between 1990 and 2016 were implemented in these countries. As of the year 2018, the World Bank estimated that PPPs constituted a total of 335 projects in Sub-Saharan Africa – with 48% of these projects concentrated in Kenya, Nigeria, South Africa, and Uganda. Between the years 2013 and 2018, infrastructure PPP projects in the region were mostly in the energy sector – accounting for 78%; followed by the transport sector – 22%; and finally, the water and sanitation sector – 0.5% (Rana and Izuwah

2018). In Australia, a total of 179 PPP projects were implemented in the 20-year period between 1988 and 2008 (Jefferies 2014).

2.2.4. Benefits of PPPs

In the most popular arrangement for PPPs, the capital that is used for funding the project is sourced by the private sector (Kwak, Chih and Ibbs 2009). This not only allows the government to utilise their resources for other critical public needs but may also provide higher budgetary certainty for the project throughout its lifecycle (Canning and Pedroni 2008). Moreover, the infrastructure developed results into long-term economic growth (Kodongo and Ojah 2016).

Also, because the SPV usually obtains a loan or equity to execute the project, they are incentivised to complete the project within budget and on time given the motivation to repay the loan without accumulating additional interest charges (Iossa and Martimort 2015). In addition, the investors and financiers of the project usually apply proactive means to ensure that the project is feasible and on track (Chasey, Maddex and Bansal 2012). It is also worth noting that in most cases, the SPV is not reimbursed until commencement of delivery of the service(s) that were procured under the PPP arrangement and payment is usually associated with the quality of service(s) (Leigland 2018).

By virtue of association of payment with the quality of services, the PPP arrangement obliges the private partner to maintain a high standard of service delivery for the full length of their contract (Zhang 2005a). In some cases, unsatisfactory service delivery may expose the private partner to penalties; this further encourages quality and time efficiency (Raisbeck, Duffield and Xu 2010). The result is that development of quality infrastructure is not only facilitated but higher economic value for projects is achieved (Li, Wang and Wang 2016).

PPPs also enhance service delivery by empowering both the public and private sector to focus on the components of project delivery that they execute best (Ricaurte, Arboleda and Peña-Mora 2008). Government is allowed room to undertake its core business of serving the public

and setting policy whereas the private sector takes on the functions of financing, maintaining, constructing, designing, and operating the PPP project (Ng, Wong and Wong 2012). The higher flexibility of the private sector as well as their access to resources are also utilised to improve service delivery (Leigland 2018).

In bringing the private sector aboard the project, various skills of the private partner are made available to the project (Iossa and Martimort 2015). These skills may include project management, design and construction, contract management, among others (Worthington et al. 2017). For PPPs necessitating specialist skills, the skills of the private sector complement those of their government counterparts to deliver a quality project (De Bettignies and Ross 2004). Transfer of skills from the private partner to the public partner may also happen.

During procurement of most PPP projects, the government largely focuses on specifying outputs and performance requirements (Davies and Eustice 2005). This allows bidders more flexibility to apply innovative solutions during delivery of the project/service (Johnston 2010). This may not only reduce the cost of undertaking the PPP project but also brings forward new ways of executing project tasks.

In PPPs, risks are usually assigned to the parties best suited to manage them (Zhang 2005b). Inspired by the goal to minimise the collective cost of risk management over the PPP lifecycle, the private partner is allocated only risks which they can manage at a cost lower than the government would (Ibrahim, Price and Dainty 2006). Table 2.1 demonstrates how some common risks are usually allocated on infrastructure PPP projects.

Table 2.1: Typical risk allocation expectation for PPPs

General Description of Typical Risk	**Public Partner**	**Private Partner (SPV)**		
	Government	**Debt Financiers and Equity Investors**	**D&C Contractor**	**O&M Contractor**
Access to the proposed PPP project site	×			
Operation and maintenance-related risks				×
Design and construction-related risks			×	
Insolvency of the SPV	×			

General Description of Typical Risk	Public Partner	Private Partner (SPV)		
	Government	Debt Financiers and Equity Investors	D&C Contractor	O&M Contractor
Demand risk (for user-charge PPPs)		×		
Demand risk (for service-payment PPPs)	×			
Insolvency of the main contractor(s)		×		
Site risks			×	

Sourced from Karim (2011), Ke et al. (2010), Clifton and Duffield (2006), Ibrahim, Price and Dainty (2006) and Zhang (2005b).

In general, the risk of insolvency of any of the contractors or related scenarios rests on the SPV (Karim 2011). This is partly because debt financiers and equity investors tend to invest more resources in mitigating issues that could result in or from any of the contractors failing to fulfil their obligations or becoming insolvent (Ke et al. 2010). If the resources channelled by the investors/financiers are insufficient to shield the government from this risk, the risk returns to the government (Clifton and Duffield 2006). Furthermore, claims by contactors for additional money and/or time are initially made to the SPV, who only forward them to the government if the need arises (Klein 2015).

Financial incentives can be embedded in PPP projects to motivate timely completion of the project. Although traditionally procured projects have provision for liquidated damages as a motivation for timely project delivery, the PPP model can be structured to include additional financial benefits to the private sector (Iossa and Martimort 2015). Considering a fixed contract period for the PPP, early completion of construction results into a longer period for earning revenue from the PPP and vice versa (Henckel and McKibbin 2017). The SPV may agree to share with the D&C contractor the revenue earned during the period between the early date of opening and the official opening date in the contract (Tang, Shen and Cheng 2010).

PPPs secure investment opportunities for the private sector over a multiple-decade duration of the PPP contract (Li, Wang and Wang 2016). The private partner in the PPP contract may also make profit by realising adeptness using their capabilities and innovation (Davies and Eustice 2005). Also, experience of the private partner in a particular sector of PPPs unlocks for them

future business opportunities because they can market their successful delivery to future clients (Worthington et al. 2017).

Finally, the long-term contracts of PPPs encourage lifecycle project planning and budgeting because the cost of maintaining the asset is included in the budget at the beginning of the project (Rufin and Rivera-Santos 2012). This implies that maintenance of the asset is not reliant on government or other budget pressures, and the value and condition of the asset is sustained throughout its lifecycle.

2.2.5. Challenges with PPPs

Despite the benefits presented above, the PPP project delivery model is said to have several challenges. The subsequent paragraphs discuss the challenges associated with PPPs based on this literature review.

Some PPP critics argue that risk transfer in PPPs is delusive in two parts. Firstly, governments have been accused of shoving the risk burden onto the private sector making the partnership unequal (Forward 2006). Secondly, risks allocated to and accepted by the private sector have in some instances not been well-managed by them (Mwakabole, Gurmu and Tivendale 2019). Consequently, the government is compelled to either share in the risk or completely take over its management (Clifton and Duffield 2006). This was experienced in the year 2000 when the Metropolitan Women's Correctional Centre and Latrobe Public Hospital project were bought back by the Victorian Government (Australia) because of poor service levels that emanated from underestimating the demand risk (Worthington et al. 2017). Besides, mispricing of risks tends to have costlier outcomes in PPPs and yet is more likely to happen in PPPs than in traditional contracts owing to their long-term nature (Bashar et al. 2021). This was seen on the Adelaide-Darwin Railway project in Australia. On this project, the SPV overestimated the demand for rail freight services resulting into their insolvency during the O&M phase of the project (Worthington et al. 2017). Another risk-related challenge with PPPs is that in striving

to allocate risks to the parties best suited to manage them, risks may be unfairly allocated due to one of the parties having weaker negotiation skills.

PPPs which are primarily financed by the private sector tend to cost much more than they would have if they had been financed by the government (Jomo et al. 2016). This is because the cost of borrowing for government is generally lower than that for the private sector owing to the higher interest rates charged to the private sector (Blanc-Brude, Goldsmith and Välilä 2006).

In some instances, the long-term duration that is typical of PPP contracts has been reported as unsuitable for fields such as ICT especially in environments where technology rapidly changes (Warsen et al. 2020). This is because rapid technological changes would often require regular equipment upgrade (EU 2018). Therefore, a need may arise for capital investment to be set aside for venturing in the technology evolutions. This challenge has been experienced on PPP projects in the French ICT sector (EU 2018).

2.3. PPPs in Infrastructure Delivery

The use of PPPs for delivery of infrastructure projects has gained popularity in different regions of the world over the past two decades. Correspondingly, research in infrastructure PPPs has surged over the last twenty years (Cui et al. 2018).

Ke et al. (2009), Chen, Daito and Gifford (2016), Neto et al. (2016) and Cui et al. (2018) conducted review studies examining infrastructure PPP research spanning several years. All four authors agreed that research focus over the years has been around the areas of regulatory environment, governance and institutional arrangements, contract design and management, value for money, and risk management. Despite the agreement, Ke et al. (2009) did not seem to observe performance management as a research area that has been focussed on in infrastructure PPPs. Instead, they noted integration research as a research interest – an observation the other three sets of authors did not make. In their synthesis, Neto et al. (2016) introduced qualitative benefits and costs as a key research area. This varied from other authors'

observations who tended to bundle both quantitative and qualitative aspects of value for money with financial package. While the above studies demonstrated that research in infrastructure PPPs over the past few decades has covered a variety of topics which are relevant to the successful implementation of infrastructure PPPs, the area of dispute resolution (DR) in infrastructure PPPs hardly featured.

2.3.1. Types of infrastructure PPPs

Infrastructure PPPs can be used to deliver greenfield projects – involving new assets, or brownfield projects where the private sector upgrades or manages existing assets (The World Bank Group 2020). Infrastructure PPPs can be further categorised by payment mechanism of the private sector investment in the project. The private sector may be paid by the government, through collection of fees from users of the service or infrastructure asset, or by a combination of the two (Villalba-Romero and Liyanage 2016).

For *government-pays* infrastructure PPPs, the SPV primarily gets their revenue from availability or service payments by the government during the operation phase of the project. Thus, the demand risk for the infrastructure PPP project is often borne by the government. This payment mechanism is commonly applied to social infrastructure PPPs such as hospitals, prisons, schools, social housing projects, among others (Yescombe 2007).

On the other hand, for *user-pays* infrastructure PPPs, the SPV generates their revenue through charges to users for a service or asset. These charges may be in the form of tariffs or tolls. The SPV therefore usually bears the demand risk for the project. This payment mechanism is normally used to deliver economic infrastructure PPPs such as tunnels, roads, ports, railways, bridges, airports, mass transit systems, solid waste management systems, telecommunications services, wastewater treatment plants, water supply, and power generation and distribution facilities (IFC 2013; Eberhard et al. 2016).

The tolls or tariffs collected in *user-pays* infrastructure PPPs can be boosted by payments from the government – in a hybrid payment mechanism that combines the features of *government-pays* and *user-pays* infrastructure PPPs (The World Bank Group 2020). This may take the form of general subsidies to all users of the service / infrastructure or complementary payments specifically for low-income earners.

2.3.2. The Australian infrastructure PPP model

Regan, Smith and Love (2011) listed some key features of PPP projects in Australia as: the bid process starts with formal expressions of interest all the way to requests for tender; during the delivery and operational phases, value for money (VfM) and innovation are emphasised; and most PPP consortia are led by financial institutions, and not contractors.

The onset of a PPP project is usually triggered by a need for a service by the general public (Ball 2011). Subsequently, the specific project through which the need will be met is defined as well as an analysis of the anticipated rewards for investing in the project (Idris, Kura and Bashir 2013). Additionally, an assessment of the most suitable method for procuring the project is made (Department of Infrastructure and Regional Development 2008). If the PPP avenue is being explored for the project, a Public Sector Comparator (PSC) is developed to evaluate whether procuring the project through the PPP model would offer better value for money than traditional methods of procurement would (Hodge and Duffield 2010). The PSC is an estimate of the hypothetical lifecycle cost of a project assuming that it was delivered by the government (English 2006). It provides a quantitative measure of the expected VfM that would accrue from permitting the private sector to deliver the project (Qi, Yi and Li 2014). In some PPP policies of Australia, it is recommended that a PPP is approved only if the winning bid has been priced below the PSC (Zwalf, Hodge and Alam 2017). It should be noted that unlike earlier PPPs where governments appeared to favour the PPP delivery model because it shifted the project from the government's balance sheet, current PPP practice by most Australian governments requires that the full capital costs of projects are allocated on the budgetary cycle prior to

committing to projects (Worthington et al. 2017). Worthington et al. (2017) add that if the PPP project delivery model is selected, the allocated capital is presented as a liability aimed at covering future service payments, for the case of social infrastructure PPPs.

Upon selection of the PPP delivery model, the government announces their intention to the deliver the PPP project and a draft contract is prepared in which output specifications and preferred risk allocation for the PPP project are detailed (Javed, Lam and Zou 2013). It would normally require long-term (typically 10 – 30 years) delivery of the infrastructure over its lifecycle, including but not limited to design, construction, operation, maintenance and finance (Brewer et al. 2013). A call for tenders to undertake the PPP project is made to the private sector.

Because of the range of services required to deliver the infrastructure PPP project, it is not unusual that the skills needed are beyond the capabilities of one individual firm. Thus, firms usually team up to form a consortium, which submits a bid for the infrastructure PPP project (Regan, Smith and Love 2011). The specific composition of the consortium may vary depending on the project requirements. Typically, a consortium comprises debt financiers, equity investors, contractors and sub-contractors (Hodge and Duffield 2010). The consortium that is awarded the PPP contract constitutes an SPV, the private partner in the PPP agreement; and the government or their representative becomes the public partner (English 2006).

To pay the D&C contractor, the SPV makes use of loan and equity money sourced from the financiers and the investors (Liu and Wilkinson 2022). Upon completion of construction, the O&M contractor starts providing the required services. This enables the SPV to either earn a service payment from the government in the case of social infrastructure PPPs or receive user charges for economic infrastructure PPPs (Engel, Fischer and Galetovic 2014). Subsequently, the SPV pays the debt financiers and the O&M contractor in accordance with their respective agreements and contracts (Worthington et al. 2017). If the SPV's revenues are more than their

expenditures, the surplus of the income is distributed amongst the equity investors as a return on their investment (Levitt and Eriksson 2016). Following the end of the concession period, ownership of the infrastructure PPP reverts to the government as per the PPP agreement (Zou, Wang and Fang 2008).

Using this model (or slight variations of it), several infrastructure PPP projects have been implemented in Australia. According to Infrastructure Partnerships Australia (2022), infrastructure PPPs in Australia were mostly used in the transport sector in the majority of the states between the years 2000 and 2021. Infrastructure Partnerships Australia (2022) further added that the highest number of infrastructure PPP transactions during that period was recorded in New South Wales, followed by Victoria, Queensland, Western Australia, Northern Territory, and finally Australian Capital Territory and South Australia which recorded approximately the same number of infrastructure PPP transactions. Tasmania had the lowest number of infrastructure PPP projects.

2.3.3. Practical issues related to infrastructure PPPs

Some practical issues related to the use of infrastructure PPPs have been presented in this section.

Antagonists of infrastructure PPP projects have highlighted that transparency during execution of the projects is inadequate in respect to anticipated future liability to the taxpayers as well as the actual profits made by equity investors (Wibowo and Alfen 2014). For instance, in the UK, the expectation for disclosure of the private sector's commercially sensitive information such as their actual returns and revenue forecasts was reported as a deterrent for private sector participation in PPPs (Hood, Fraser and McGarvey 2006).

Also, most government institutions – representing the public partner in the PPP, usually lack the necessary skillset that is required to successfully deliver the project (Umar, Zawawi and

Abdul-Aziz 2019). This can be overcome by undertaking training for the government institutions (Sharma 2007).

The cost of participation in PPP projects is usually prohibitive for small contractors (Parker and Hartley 2003). Moreover, the PPP set-up usually necessitates a contractor to form a consortium with partners whose core area of expertise is not construction. This may be a barrier to smaller contractors who are less likely to succeed in forming collaborations in all the sectors required to successfully deliver a PPP project (Reeves 2008). Additionally, these smaller firms may not have the capacity to assume all the risks that are normally assigned to the private sector (Dewatripont and Legros 2005). This inhibits their participation in the PPP market.

Furthermore, the large portion of risk that is transferred to the private sector in infrastructure PPPs may suppress innovation on the project (Leiringer 2006). This could happen when the private sector chooses to implement tried and tested traditional approaches (Worthington et al. 2017). For PPP projects where innovation is key to project success, the government could explore project delivery models that emphasise sharing of most – if not all, of the risks (Roumboutsos and Saussier 2014).

The involvement of multiple stakeholders in infrastructure PPPs limits flexibility on the project (Demirel et al. 2017). This is because prior to consenting to any changes proposed by the parties in the PPP set-up, every party assesses how they will be affected by the changes, and it is usually challenging to negotiate a position that benefits all the parties involved (Ross and Yan 2015). For example, equity investors may consent only after confirming that the additional risks imposed by the proposed changes yield proportionate rewards for them. To improve flexibility in infrastructure PPPs, broad power to order variations similar to those embedded in most construction contacts may be included in the PPP contract (Martins, Marques and Cruz 2014). This would allow the government to approve any desired changes provided the SPV is compensated for any revenue loss and/or additional costs.

Over-optimistic forecasts of revenue have led to failure of some economic infrastructure PPPs especially where the financing structure of the SPV was not robust enough to absorb the revenue shortfalls (Roumboutsos and Pantelias 2015).

The public sector comparator (PSC) that is often used in many PPP markets to evaluate a PPP project's VfM prior to its approval has been criticised as prone to manipulation depending on one's desired outcome (Iossa and Martimort 2013).

Finally, conflict and dispute are a recurrent issue in infrastructure PPPs (Sinha and Jha 2020). Most conflicts and disputes on infrastructure PPPs arise from claims that are initiated by one of the SPV's contractors (Levitt and Eriksson 2016). In some instances, the government has been hesitant to engage with contractors or sub-contractors because they do not have a direct contractual relationship with them (Warsen, Klijn and Koppenjan 2019).

2.4. Conflict Management and Dispute Resolution

The word 'conflict' is often used interchangeably with 'dispute' in the construction sector (Acharya, Lee and Im 2006). However, the two terms differ as explained in this section. Conflict management and dispute resolution have also been described and key conflict theories have been discussed.

2.4.1. Defining conflict and dispute

The term 'dispute' usually describes a form of conflict which requires resolution (Cheung and Suen 2002) while 'conflict' more broadly includes situational stresses and relationship strains that may not have developed into disputes yet (Lynch 2001). Costantino and Merchant (1996) further defined conflict as a kind of misunderstanding between parties which could potentially result into a dispute. From this, it can be drawn that disputes are not usually independent of conflicts. Therefore, conflicts manifest before disputes. Theoretical research usually has two perspectives of conflicts – the interactionist perspective and the fundamentalist perspective (Ellis and Baiden 2008). The interactionist perspective argues that conflict is inevitable and that

it is neither bad nor good whereas the fundamentalist perspective believes that conflict should be avoided because it is destructive (Rollinson and Broadfield 2002). Fenn, Lowe and Speck (1997) also presented two academic viewpoints on conflicts – one that sees it as a chronic state and recommends that its causes should be identified and treated; and another that 'takes it for granted' and seeks to understand it better. The latter was proposed as more plausible.

2.4.2. Concept of conflict management and dispute resolution

Dispute resolution can be defined as involving elimination, termination, and reduction of conflict while conflict management can involve containment, avoidance and resolution of issues (Ury 1999). Hence, some researchers reason that conflict management encompasses both conflict and dispute resolution (Lynch 2001). For this research, however, the term 'dispute resolution' was mostly used in order to align the research terminology with what is commonly used in the construction industry. Conflict management has also been used in some instances.

2.4.3. Key conflict theories

There are a number of conflict theories such as the Realist Theory of Conflict (McKenzie and Gabriel 2017), Constructive Controversy theory (Vollmer and Seyr 2013), Mary Parker Follett Model (Giritli, Balci and Sertyesilisik 2014), Hall's Win-Lose Approach (Vu and Carmichael 2009), and the Dual Concern Theory (Pruitt and Rubin 1986; Rahim 2002).

The Realist Theory of Conflict suggests that intrinsic characteristics of human beings such as selfish interests, aggressiveness and violence are the primary causes of conflict and insecurity (Cozette 2008; Glaser 2010). The theory is divided into three parts – explanatory realism, descriptive realism and prescriptive realism. Explanatory realism asserts the presence of genetic defects in human beings that drive them towards negative behaviour; this makes conflict inevitable (Williams 2007). Williams (2007) adds that descriptive realism views the world as a ring of conflicts while prescriptive realism builds on the viewpoints of explanatory and descriptive realism to suggest that decision makers are morally justified to protect and preserve

their interests using any possible means. The Realist Theory of Conflict has been faulted for elevating inter-party competition and power while neglecting the role of multi-layered interaction between individuals during conflicts (McKenzie and Gabriel 2017).

Hall's Win-Lose Approach proposes that conflicts can be resolved through concern for personal goals and concern for relationships (Vu and Carmichael 2009). It further suggests that DR is based on losing and winning (Atteya 2012) – a style that is said to promote competition. Competitive styles are not effective for resolving conflicts (Tjosvold, Wong and Chen 2014). Also, Hall's Win-Lose Approach is said to advocate for a common approach to conflict management, and not a behavioural one, despite the latter being considered more suitable for resolving disputes (Vu and Carmichael 2009; Giritli, Balci and Sertyesilisik 2014).

The Mary Parker Follett Model suggests that existence of conflicts is fuelled by differing opinions of the involved parties and that conflict management approaches should utilise these differences (Giritli, Balci and Sertyesilisik 2014). Consequently, they introduce five DR styles (suppression, domination, evasion, integration, and compromise). One of the main shortfalls of the Mary Parker Follett Model is that it does not recognise obliging as a DR approach despite it being known as a standard flexible style for managing conflicts (Al-Sedairy 1994).

Constructive Controversy proposes that effective DR is achieved through open-minded discussions (Mitchell, Parker and Giles 2012). Earlier studies (Isen and Levin 1972; Deutsch 1973; Clark and Mills 1979; Rahim and Bonoma 1979; Pruitt and Rubin 1986; De Dreu, Weingart and Kwon 2000) that sought to understand the nature of relationships that are conducive for open-minded discussions during conflicts pointed to mutual benefit relationships. Consequently, Tjosvold, Wong and Chen (2014) concluded that Constructive Controversy is founded on the Dual Concern Theory (DCT) given that DCT is premised on mutual benefit relationships.

The concepts and application of DCT are presented in the subsequent section.

2.4.4. DCT and its application

The Dual Concern Theory (DCT) illustrates how the behaviour of people guides the way they manage conflicts (Rahim 2002). It is said to have been founded on the managerial grid developed by Mouton and Blake in 1964 (DeChurch, Hamilton and Haas 2007). It is also said to be an expansion of the Theory of Cooperation and Competition that was invented by Deutsch (1973). Blake and Mouton (1964) suggested that managerial behaviour is influenced by concern for people and concern for production. On this basis, they proposed five interaction styles – withdrawing, forcing, compromising, problem-solving, and smoothing. The managerial grid by Blake and Mouton (1964) has been adopted by many conflict management researchers. The grid was interpreted by Thomas (1976) in their Conflict Mode Instrument to propose that conflict can be managed through assertiveness and cooperativeness. Subsequently, five conflict management styles were introduced i.e. competing, avoiding, collaborating, compromising and accommodating. Pruitt and Rubin (1986) are said to have evolved the concepts of Thomas (1976) to introduce a version of DCT with four DR strategies i.e. problem-solving, contending, inaction and yielding – motivated by concern for their own outcomes and concern for other people's outcomes. Compromising was not recognised as a distinct conflict management style arguing that it was a 'lazy form of problem solving'. To date, DCT has had several variations some of which acknowledge compromising as a conflict management style (De Dreu et al. 2001). Of these variations, the most used one for conflict research in the construction sector is by Rahim (2002) – (Lee 2008; Akiner 2014; Gunarathna, Yang and Fernando 2018). This could in part be attributed to the evidence that supports it empirically (Rahim and Magner 1995) and the wide research on which its conceptualisation was based (Rahim and Bonoma 1979; Rahim 1983, 1997, 2001).

Rahim (2002) presented the DCT with five DR styles grounded on two motives: concern for others and concern for self. The DR styles included obliging, integrating, avoiding, dominating, and compromising (Figure 2.2).

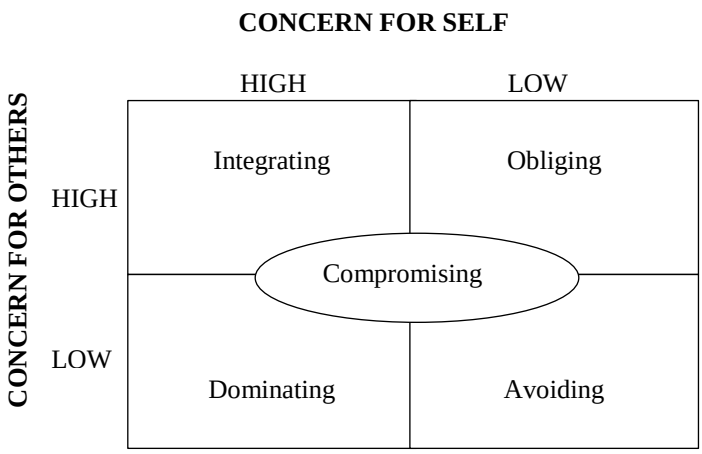

Figure 2.2: DR styles according to the Dual Concern Theory (Rahim 2002, p.217)

The "integrating" style involves high concern for others and high concern for self. It is concerned with problem-solving and collaboration through openness and information exchange, examining differences and exploring acceptable solutions to all parties involved in a conflict (Tsai and Chi 2009).

The "obliging" style (also sometimes known as "yielding" or "accommodating") is characterised by high concern for others and low concern for self (Gunarathna, Yang and Fernando 2018). Obliging parties often exhibit selflessness and obedience to other parties. Consequently, differences are downplayed and the concerns of more powerful parties or parties to whom the issue at hand is more important are often prioritised (Rahim 2002).

The "dominating" style typically involves low concern for others and high concern for self. It is linked to a controlling win-lose approach that ignores the viewpoints and needs of other parties (Oetzel and Ting-Toomey 2003).

The "avoiding" style (sometimes referred to as "withdrawing" or "ignoring") applies to situations where parties have low concern for both their own and others' concerns. Parties normally withdraw from a conflict without addressing the concerns of any of the parties involved (De Dreu et al. 2001). Parties could also show disinterest – sometimes presenting inadequate information to other parties involved in the conflict or dispute (Musenero, Baroudi and Gunawan 2021).

Finally, the "compromising" style is an intersection between concern for other parties and concern for self with the hope of achieving mutually suitable outcomes for all parties (Holt and DeVore 2005). It could involve parties letting go of a need in order to reach an agreement; it mostly manifests when the demands of the parties in conflict or dispute are mutually exclusive (Cai and Fink 2002).

Rahim (2002) further classified the above DR approaches into distributive and integrative DR dimensions (Figure 2.3).

The integrative DR dimension typifies a problem-solving style which represents one's concern for others' and own outcomes while the distributive DR dimension embodies a bargaining approach which is representative of one's concern for others' or their own outcome (Rahim 2002). The intersection point of the two dimensions is at "compromising" where parties tend to have intermediate concern for others' and/or own outcomes.

The distributive dimension (DD) and integrative dimension (ID) can be determined using Equations 2.1 and 2.2 (Tsai and Chi 2009).

Integrative Dimension (ID) = Integrating style – Avoiding style (2.1)

Distributive Dimension (DD) = Dominating style – Obliging style (2.2)

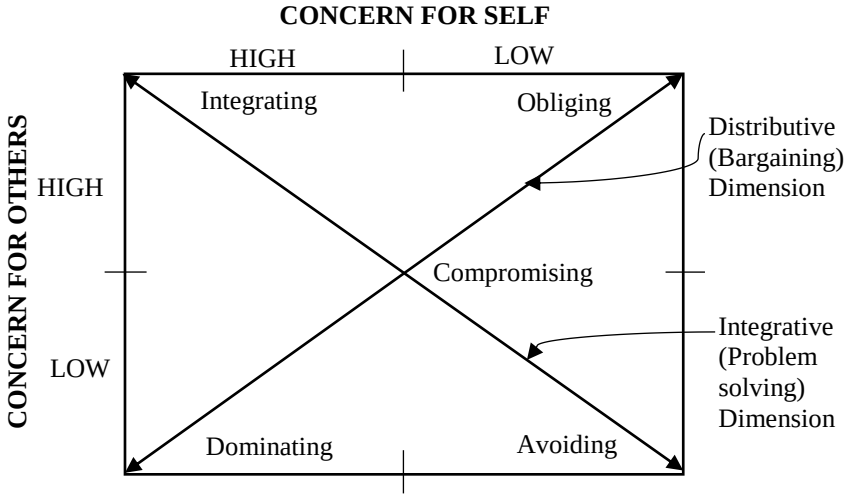

Figure 2.3: Integrative and distributive dimensions of DR styles in DCT (Rahim 2002, p.221)

A high ID implies that the tendency for the "integrating" DR style is high while a low ID shows that the tendency for the "avoiding" style is high. In the same way, a high DD signifies a high tendency for "dominating" while a low DD shows a high tendency for "obliging" (Tsai and Chi 2009).

DCT researchers reason that choice of any given DR style is influenced by either directness or cooperation. While directness focusses on the desire of parties to either evade or discuss conflicts and disputes, cooperation looks at individuals' concern for outcomes that are either personal or mutual (Putnam 2006; Guerrero, Anderson and Afifi 2007). Additionally, DCT assumes that the two main behavioural orientations it proposes (concern for others and concern for self) are not dependent on each other. This is backed by practical evidence that did not present any correlation between them (Butler 1994; Van Lange 1999).

Despite the strengths and versatility of DCT, critics of DCT argue that it does not account for situations where the parties affected by a conflict or dispute seek to deliberately destroy or harm themselves and/or others (Kim and Koo 2020).

DCT has been applied in some conflict studies in several fields including religion (Dunaetz and Greenham 2018), social and organisational psychology (De Dreu et al. 2001; Özkalp, Sungur and Özdemir 2009; Zhang, Chen and Sun 2015), mining (Lee 2008), manufacturing (Lee 2008; Özkalp, Sungur and Özdemir 2009), banking and aviation (Özkalp, Sungur and Özdemir 2009) as well as construction of non-PPP projects (Yiu and Cheung 2006; Lee 2008; Tsai and Chi 2009; Akiner 2014; Tabassi et al. 2017; Gunarathna, Yang and Fernando 2018). However, it appears that DCT has not been used in DR research for infrastructure PPP projects. Through assessment of the infrastructure PPP dispute and conflict environment, a relationship between DR in infrastructure PPPs and DCT is presented in Section 2.5 of this thesis.

2.5. Behavioural Antecedents of Infrastructure PPPs through the Lens of DCT

Through an understanding of the conflict and dispute environment of infrastructure PPP projects, the behavioural backdrops of infrastructure PPP project parties were clarified using DCT as a theoretical lens.

2.5.1. Overview of DCT and infrastructure PPPs

The point of view of DCT is that DR is influenced by difference in the concern that individuals have for their own outcomes and/or those of other parties' outcomes. This is also experienced in infrastructure PPPs where project parties often have varying inclination towards the goals of the projects (Ng, Wong and Wong 2012). It is also common for project parties of infrastructure PPPs to prioritise their own interests resulting in divergence from project objectives (Shrestha et al. 2017). Thus, when selecting DR approaches for infrastructure PPPs, the tactic changes from simply identifying the cheapest methods to ensuring that the project's best interests are met as opposed to selfish interests of each project party. This may require an understanding of the behavioural backdrops of the project parties, as implied by DCT.

It was found that three main behavioural predispositions characterise the DR environment for infrastructure PPPs, as explained by DCT.

2.5.2. Typical behavioural predispositions during dispute in infrastructure PPP projects

The first predisposition involves an adversarial win-lose approach which is driven by the need to follow laws and standards that are stipulated in contract documents. This often leads to accusations against other parties. It could also promote rights-based DR approaches such as arbitration and litigation, which correspond with DCT's distributive dimension. While this may sometimes foster deliberations on issues, relationships are not usually preserved. Although many infrastructure projects are moving away from litigation (Tsai and Chi 2009), it is common on infrastructure PPP projects for independent experts or arbiters to be appointed. Among other roles, the independent arbiter regularly assesses the private partners' output and performance

against their expectations. This was experienced on the London Underground PPP in the UK where an independent arbiter was retained to identify any contractual deviations that the private partners made. Additionally, the arbiter assessed the private partner's claims against a theoretical model based on a fictional company, which the arbiter considered to be best practice (Currie and Teague 2015). Also, the various roles held by governments in infrastructure PPPs (regulators, partners, planners, etc.) could create imbalances in the partnership. This was experienced on the redevelopment of Spencer Street Railway Station in Melbourne (Australia) where one of the private sector companies that delivered the infrastructure PPP project (Leighton Contractors) noted that their relationship with the government was far from a partnership – instead likening it to that of a master and a slave (Hannan 2004), where they obliged to the government's demands. Inspired by the imbalance in the partnership, the private partner sued the government for contamination issues which had been initially overlooked (McCann, Aranda-Mena and Edwards 2016). In a similar case on the London Underground PPP (UK), the government is said to have been hesitant to participate in joint initiatives with their private sector counterparts on several occasions (Currie and Teague 2015). Under such circumstances, the party in a stronger bargaining position is often inclined to the DCT style of "dominating", whereas the party in a weaker bargaining position adopts the "obliging" style (Rahim 2002).

The second behavioural predisposition is a collaborative win-win style that focusses on achieving mutual satisfaction of all parties involved in the dispute, without resorting to legal proceedings. In such cases, relationships are not destroyed, and parties usually work together to achieve the desired project goals. Thus, this preposition usually prioritises the use of DR approaches that pursue the interests of both parties, such as mediation and negotiation. This predisposition aligns with the integrative dimension of DCT. It was experienced on the Sydney Metro Northwest Operations, Trains and Systems project in Australia where a non-conventional form of dispute boards was applied (Forward 2006). Unlike commonly used dispute boards

where both the dispute resolution and dispute avoidance functions rest on the same team, the dispute resolution role on the Sydney Metro Northwest Operations, Trains and Systems PPP project was contracted to an independent expert. As is usually done during mediation and proactive negotiation, the dispute board on this PPP project discussed emerging issues with all involved parties and facilitated the resolution of issues in a manner that was acceptable to all parties (Worthington et al. 2017). As a result, integrative methods of resolving disputes prevailed.

Finally, the third behavioural predisposition involves compromising. This predisposition is an intersection of DCT's distributive and integrative DR dimensions. It usually manifests when two equally powerful parties cannot reach a consensus to complex problems (Rahim 2001) even after attempting the DR styles of "dominating" (distributive DR) or "integrating" (integrative DR). Oftentimes, one party may trade an interest for a favour from the other party. This was experienced on the upgrade of Spencer Street Railway Station in Melbourne (Australia) when the government notified the SPV consortium of their intention to claim for liquidated damages due to project delays (Das 2005). Around the same time, the SPV notified the government of their intention to sue them over earlier project delays they had encountered because of contamination and access issues. To reach a compromise, the government agreed to forgo the liquidated damages on condition that the SPV withdrew the court case (McCann, Aranda-Mena and Edwards 2016). On some infrastructure PPP projects, for example the Kaesong Industrial Complex (on the border of South Korea and North Korea), conciliators are appointed to facilitate consensual compromises when disputes arise (Lee 2016).

Based on the discussion presented in this section, it can be said that sufficient connectivity exists between DR in infrastructure PPP projects and DCT. This evidently supports the application of DCT in infrastructure PPP research.

2.5.3. The behavioural predispositions in practice

In accordance with the DR behavioural predispositions described in Section 2.5.2 of this thesis, the DR styles of DCT can be said to collectively account for DR in infrastructure PPP projects, as infrastructure PPP practitioners know it today. It is, however, important to note that no single behavioural predisposition monopolises the approach to DR for any given infrastructure PPP project. Instead, DR styles vary between the extremes of adversarial and cooperative techniques (Section 2.6.3 of this thesis) depending on the situation as well as behaviour and attitude of the infrastructure PPP project parties involved in the dispute (Currie and Teague 2015). This is similar to DCT where difference in the behaviour and attitudes of individuals results in varying degrees of concern for others or self, yielding diverse DR styles. Also, the project environment for infrastructure PPPs is generally relatively stable during the project duration that typically lasts 20-30 years or more in some instances. Thus, the DR approaches of the different organisations involved in any given infrastructure PPP project tends to stabilise over the years during execution of the project (De Dreu et al. 2001). Consistent with the principles of DCT, predictable behaviour towards disputes may result. Even when project team members may change over the project duration, the organisations' values and culture on dispute – into which the individuals are usually oriented upon deployment, foster stability of the teams' DR approaches and predictability of their behavioural response to disputes.

In situations where divergence of the project parties' behavioural inclinations results in different DR styles, DCT researchers suggest that the behavioural inclination of one party can inspire change in behavioural inclination of another party (Deutsch 1973; De Dreu et al. 2001). They further observe that DR styles where individuals have high concern for other parties' outcomes are more likely to encourage cooperation from other parties. Similarly, DR styles that seek to protect parties' selfish interests may inspire competitive responses from other parties. Consequently, parties that could have originally been inclined towards different DR styles may eventually be drawn towards DR styles that are similar. Further investigation on the occurrence

of these behavioural dynamics in the context of infrastructure PPP projects needs to be done, with empirical evidence.

2.6. Conflict, Dispute and their Resolution in Infrastructure PPPs

Disputes and conflicts in infrastructure PPP projects can occur at any stage of the project lifecycle. A few examples of the circumstances that can lead to disputes and conflicts are presented here: during the inception of an infrastructure PPP project, conflicts and disputes may arise due to social, environmental or land-related issues; at procurement stage, disputes and conflicts can arise when a bidder contests the award of contract; at contract management stage, conflicts and disputes can result from performance issues, the project parties' interpretation of their contractual obligations, among others (Harisankar and Sreeparvathy 2013; Osei-Kyei et al. 2019).

One of the first reported disputes involving an infrastructure PPP project is said to have happened in the 1800s where the owners of the Warren Bridge were sued by the owners of Charles River Bridge in Massachusetts, United States of America (Lorman 2018). In their suit, the Charles River Bridge proprietors argued that the legislation of Massachusetts that approved the construction of the Warren Bridge next to the Charles River Bridge violated their contract agreement with the government – since the Warren Bridge could have deprived the Charles River Bridge of traffic and tolls, among other reasons (Mangas 1977). In the end, the owners of Charles River Bridge lost the lawsuit despite making several appeals. This case illustrates a dispute scenario on a typical infrastructure PPP project, which is not different from what is experienced on infrastructure PPP projects today.

2.6.1. Uniqueness of infrastructure PPPs in the dispute resolution context

The DR environment of infrastructure PPPs tends to be more complex and dynamic compared with that of traditional construction projects (Kwak, Chih and Ibbs 2009). As expressed in the definitions of PPPs that have been presented in Section 2.2.1 of this thesis, PPP projects usually

involve pooling of skills and resources from multiple stakeholders in the public and private sector in addition to sharing risks and responsibilities over a long period of time – the entire PPP project cycle (typically 20 – 30 years or more). This arrangement in itself is likely to result in a number of issues (De Schepper, Dooms and Haezendonck 2014; Osei-Kyei and Chan 2015).

Considering the multiple stakeholders involved in infrastructure PPP projects, a question may arise on which of the many parties is responsible for initiating DR on the projects (Chou 2012). Also, infrastructure PPPs pool organisations with different interests, cultures, and in some cases opposing values on trust and cooperation (Ejohwomu, Oshodi and Onifade 2016). These differences may influence their response to disputes and conflicts. Moreover, it may be challenging to reconcile some differences especially the ones between the private and the public sector (Zou et al. 2014). While the government is focussed on delivering public services to beneficiary communities (among other functions), the private sector is interested in remaining competitive on the market, and maximising their profits, among others (Ng, Wong and Wong 2012). On some occasions, exclusion of the beneficiary communities from key decisions on infrastructure PPP projects has resulted in the communities opposing the project. This has led to disputes on some occasions (Henjewele, Fewings and Rwelamila 2013).

The DR process in infrastructure PPPs is typically an extended process that requires open communication and trust (Henjewele, Fewings and Rwelamila 2013). As highlighted in earlier sections of this thesis, the government or their representative is a counterparty to the PPP project contract, together with the private project company – typically in the form of an SPV. To facilitate successful project delivery, the SPV engages with equity investors, debt financiers, as well as D&C, and O&M companies (Regan, Smith and Love 2011). Furthermore, the government typically transfers most of the risks to the private sector with due consideration of their ability to manage them (Hodge and Duffield 2010). For instance, in Australia, unquantifiable social risks affecting the general public are typically allocated to the public

partner whereas commercial risks are mainly transferred to the private sector (Chung, Hensher and Rose 2010).

With the many parties / organisations that are typically involved in infrastructure PPP projects, multiple contracts between different project players are inevitable. These contracts often have differing DR provisions (Hayford and Mueller 2021). A typical infrastructure PPP project has an upstream PPP agreement between the government and SPV in addition to contractual arrangements between the SPV and contractors such as the head D&C and O&M contractors. The contractors may also have separate contracts with a number of subcontractors. Under any of these contracts, disputes can arise at any point. For instance, a dispute between the SPV and an O&M contractor may trigger or be triggered by a dispute between the government and SPV. This is commonly referred to as a "pass-through" or "linked" dispute. Hayford and Mueller (2021) illustrate that such a linked dispute would typically result in parallel DR processes between the SPV and the government agency, and between the O&M contractor and the SPV – unless the two separate contracts between the respective parties allow for consolidated DR processes, a scenario which had not been encountered by the authors on any PPP project in Australia. With the parallel DR processes, the possibility of different outcomes from the processes increases. For example, the outcome of the DR process between the government and SPV may differ from that between the O&M contractor and the SPV. This could potentially result in liability gap for the SPV especially if the claim by the contractor exceeds the settlement from the government. Hayford and Mueller (2021) highlight that to address this, Australian PPP project contacts usually include linked claim clauses and corresponding project relief provisions. Generally, a "linked claim clause" would require the SPV to pursue any corresponding claim with the government (in the upstream contract) that is inked to a claim received from a contractor or subcontractor (from downstream contract) following the DR provisions in the upstream contract. This is accompanied by a "suspension clause" that calls for suspension of the downstream DR procedures to allow progression of the upstream DR

processes. There also exists a "project relief clause" where the downstream parties are expected to be bound by the DR outcome of the upstream processes and emphasises that the downstream entitlements do not exceed the award to the SPV from the upstream DR process. However, if the SPV does not satisfactorily pursue the linked claim with the government, the validity of the suspension clause ceases, and the downstream parties are at liberty to progress the claim to the downstream DR process.

2.6.2. Sources of conflicts and disputes in infrastructure PPPs

The sources of conflicts and disputes in infrastructure PPP projects have generally not been widely studied – with most studies focusing on traditional infrastructure projects (Mahato and Ogunlana 2011; Mitkus and Mitkus 2014; Ejohwomu, Oshodi and Onifade 2016). While investigating the major causes of disputes on dam construction projects in Nepal, Mahato & Ogunlana (2011) concluded that ineffective environmental assessment as well as inadequate public involvement and consultation from early stages of the project were the major causes of disputes. Mitkus & Mitkus (2014) stated that the major cause of disputes in infrastructure projects is poor communication between the contractor and the client. Ejohwomu, Oshodi & Onifade (2016) listed 64 causes of disputes in infrastructure projects – highlighting the three biggest ones as poor financial forecasts by the client, insufficient project funds, and bad relationship between the project implementation team and the general public.

Osei-Kyei et al. (2019) reviewed literature on the root causes of conflicts and disputes in infrastructure PPPs as summarised in Table 2.2.

Table 2.2: Summary of sources of conflict in infrastructure PPPs

Cause of conflict	(Chan et al. 2011)	(Cheung and Chan 2011)	(Ng, Wong and Wong 2012)	(Tang et al. 2013)	(Babatunde et al. 2015)	(Osei-Kyei and Chan 2017b)
Unfair risk allocation	x					
Lack of a clear understanding of the parties' roles and responsibilities				x		
Unexpected tariff changes					x	
Excessive contract variations		x				

Political interference						x
Ambiguous goals and objectives			x			
Inadequate compensation to displaced persons						x
Unreliable service delivery						x
Delay in rectifying defects during service delivery						x

Adopted from Osei-Kyei et al. (2018), p.3

Based on empirical data collected in China and Ghana, Osei-Kyei et al. (2019) concluded that the highest-ranking causes of conflicts and disputes in infrastructure PPPs were unfair risk allocation, delayed decision-making by parties, inadequate understanding of parties' roles and responsibilities, political interference and absence of proper communication channels.

In a case study analysis of the London Underground PPP project, Currie and Teague (2015) determined that the major sources of disputes in infrastructure PPP projects include: varying interpretation of contractual terms by each party, amendments to contractual requirements, misinterpretation of specific standards, and fault attribution when a performance defect arises.

Although some researchers (Raisbeck, Duffield and Xu 2010; Chasey, Maddex and Bansal 2012) have commended the PPP delivery model for its superior cost and time efficiency, McCann, Aranda-Mena and Edwards (2016) pointed out that delays in project implementation, cost overruns and related penalties such as liquidated damages, lead to disputes on infrastructure PPP projects. Siddiquee (2011) also stated that some infrastructure PPPs become unpopular to the general public in Australia due to inaccurate traffic forecasts and the subsequent high toll prices charged to road users. Some examples of such projects include the Sydney Cross City Tunnel and the Sydney Airport Railway Link (Zou, Wang and Fang 2008).

It would seem that due to the limited literature available on sources of conflicts and disputes in infrastructure PPPs, there is need for more empirical research to build the knowledge base.

2.6.3. Current DR practices for infrastructure PPPs

There are several dispute resolution techniques that are commonly used on infrastructure PPPs. Generally, the DR styles that are recommended for any given infrastructure PPP project are specified in the contract documents and emphasis on their application is stressed unless it is

absolutely necessary to deviate from the contract stipulations (Harisankar and Sreeparvathy 2013). Depending on the circumstances, the DR methods of conciliation, litigation, negotiation, mediation or arbitration are applied on infrastructure PPP projects (Osei-Kyei et al. 2019). These methods are sometimes applied through other processes such as independent expert determination, dispute boards, or adjudication (UNESCAP 2011; Uygun 2015). Similar to the arrangements in other construction projects, it is usually emphasised that disputes are resolved amicably, before adversarial techniques are employed. Amicable DR techniques may include mediation, negotiation, and conciliation. On the other hand, arbitration and litigation are generally regarded as adversarial techniques.

During negotiation, parties engage in consultation and direct dialogue to deliberate on issues in a peaceful manner. Negotiation is usually one of the first DR steps in infrastructure PPPs because it facilitates amicable resolution of disputes and preserves working relationships (Osei-Kyei et al. 2019). However, the outcome of negotiation proceedings is not usually legally binding as it is not enforceable in courts of law (Chan and Suen 2005). Thus, if parties are dissatisfied with a negotiation outcome, they can escalate the matter to another DR approach, as witnessed in South Korea on the Yongin Light Rail Project (Jang et al. 2018) where arbitration was sought.

Mediation is like negotiation; but, during the mediation process, a mediator who is considered as impartial helps the parties involved in a dispute to realise mutually acceptable outcomes. Similar to negotiation, the mediation outcome is usually not enforceable in courts of law (Harisankar and Sreeparvathy 2013). Likewise, during conciliation, a neutral party is appointed to facilitate the DR process. During both conciliation and mediation, the neutral parties may have joint meetings with the parties involved in dispute or privately meet each of them to discuss the issues (Hinchey 2012). Some authors argue that there is hardly a difference between conciliation and mediation further highlighting that the two terms are interchangeably used to refer to assisted negotiation (du Preez, Berry and Oosthuizen 2010). In some countries such as

South Africa – whose legal system springs from that of Holland and England, a non-binding ruling is usually expected from mediation especially when the mediator has not managed to lead the parties towards a mutually agreeable solution at the discretion of the parties in dispute. However, in situations where there is no expectation for the mediator to make a recommendation, the process is regarded as conciliation (du Preez, Berry and Oosthuizen 2010).

During arbitration, an arbitrator – who is considered as a neutral third party reviews the cases fronted by the different parties involved in a given dispute and makes a ruling. The parties involved in dispute are not necessarily required to work towards a mutually agreeable settlement. Instead, they argue their cases and an arbitrator makes a decision (Osei-Kyei et al. 2019). It is worth noting that the regulations governing arbitration may vary in different countries. As such, many infrastructure PPPs where project parties originate from different countries usually utilise international arbitration (Gaillard 2015). The ruling from arbitration may or may not be binding depending on the contract stipulations. In situations where it is binding, the process of enforcing the ruling is specified in the project contract documents. Unlike litigation, arbitration offers the advantage of allowing disputes to be resolved outside courts of law (Marques 2018). However, arbitration has been cited to cause significant delays and accompanying cost overruns on some projects such as the Nathpa Jhakri Hydro-electric Project in India. On this project, it was stated that arbitration procedures delayed the project by approximately three years (Government of India 2008).

Litigation involves a judicial system where decisions made by the court are legally binding for all parties involved. Normally, it is considered as the last DR option in infrastructure PPP projects (Marques 2018). Litigation typically happens in courts of law and is led by a judge or group of judges who decide in accordance with the law and the rules of justice (Harisankar and Sreeparvathy 2013). Because of this, the litigation panel has on some occasions been accused of approaching disputes from a perspective of general lawlessness and procedure impropriety

such as when parties abuse their powers, act against general principles of natural justice, or do not fulfil their contractual obligations, among others. In instances where disputes require specialist technical knowledge that is not covered by the combined competence of the jury, the court's jurisdiction may be restricted unless the illegalities of the case leading to the dispute are apparent (Zheng et al. 2021). This was seen in a court case in India involving Uttar Pradesh Power Corporation, and NTPC Ltd and others. On this case, the Supreme Court noted that cases associated with determining tariffs were outside the competencies of the jury because they required knowledge of the law, engineering, project and contract management, finance, commerce, and economics (Harisankar and Sreeparvathy 2013).

Dispute boards have become popular on construction projects – including infrastructure PPPs, in the recent past (Dorgan 2005). In infrastructure PPPs, a variation of dispute boards has been applied. For instance, a dispute board with both conflict avoidance and dispute resolution functions was constituted on the Sydney CBD and Southeast Light Rail PPP project (Australia). However, on the Sydney Metro PPP (Australia), the dispute board was constituted primarily for the conflict avoidance function (Worthington et al. 2017). Of recent, dispute boards with both avoidance and resolution function are encouraged on infrastructure PPPs. Dispute boards characteristically comprise three members that are appointed in the early stages of the project. Typically, members of dispute boards have considerable experience in implementing similar projects, as well as aspects of DR. They are usually well-respected individuals with combined expertise in the law, finance, contract and project management, as well as engineering. The ruling of dispute boards can be interim-binding, non-binding, or final and binding – depending on the terms set by the project parties when the dispute boards are set up. As such, it is not rare for project parties to challenge a dispute board's ruling and escalate matters to litigation or arbitration (Chapman 2009).

Adjudication can either be statutory or contractual. In statutory adjudication, a statutory authority which is mandated to adjudicate between parties in dispute. The enforceability of a

ruling from adjudication depends on the individual contract. In some cases, the outcome from adjudication is final and legally binding whereas in other cases, an adjudication ruling can be contested. When the latter happens, another DR approach such as litigation or arbitration can be pursued to override the ruling from adjudication (Sheridan 2009).

The DR techniques described above are mostly applied on disputes involving parties with contractual agreements in the infrastructure PPP project set-up, but not other key project stakeholders like trade unions, civil society groups or beneficiary communities of the project. For disputes that involve the latter groups, open dialogue through consultation and engagement with their leaders is usually recommended.

On most infrastructure PPP projects, the project contract documents specify the order in which DR procedures should be pursued when disputes arise, and subsequent procedures are applied when the preceding ones fail. Typically, the order of application of DR techniques is as follows: (1) negotiations between the parties' senior executives or their nominated representatives; (2) mediation by an agreed unbiased party; (3) independent expert or panel review (or dispute board); (4) arbitration; and (5) litigation (Moseley 2020). However, this order may vary from project to project even for projects implemented in the same country as demonstrated by Sinha and Jha (2020). Referring to infrastructure PPP projects executed in India, Sinha and Jha (2020) noted that the DR-related contract provisions for the Durgapur Express Project, National Highway (NH) (km 581 to km 646) specified the first step of DR would be conciliation involving the chairperson of the National Highways Authority of India (NHAI) and the concessionaire chief executive officer (CEO). In the event that the dispute was not resolved within 15 days of starting the conciliation process, legally binding arbitration would commence. In the same way, the contract documents of the Bhubaneshwar-Puri project (km 0.00 to km 59.00) specified conciliation as the first step of DR, followed by arbitration. They also allowed for adjudication as a substitute to arbitration. In the event that adjudication was done, the ruling from the adjudication process would not be legally binding and it was acceptable to appeal to

courts of law. On the other hand, the DR clauses of the project from km 80.00 to km 135.74 on NH 7 specified the first stage of DR as mediation. If the dispute was not resolved through mediation, it would be recommended for settlement between the chairperson of NHAI and the concessionaire board of directors. In the event that settlement was not successful, binding arbitration would commence. By contrast, the DR clauses of the Surat-Dahisar section of NH 8 (km 263.00 to km 502.00), and the Varanasi-Aurangabad section of NH 2 (km 786.00 to km 978.40), specified that disputes would be resolved in line with a DR procedure whose details were not obvious (Sinha and Jha 2020).

2.6.4. Issues affecting DR in infrastructure PPPs

Some of the issues affecting DR in infrastructure PPPs are linked (Cruz, Marques and Cardoso 2015; Currie and Teague 2015). For instance, an inadequate communication plan can be linked to ambiguity on oversight responsibilities for the actions of some of the infrastructure PPP projects parties, which can also be traced back to insufficient detail on DR protocols in regulatory documents for infrastructure PPPs (Currie and Teague 2015). Also, disharmonised training in DR, exclusion of behavioural considerations during DR, and inactive involvement of project staff in DR can be linked to poor collaboration (Musenero, Baroudi and Gunawan 2023). In addition, some issues have an impact on multiple DR approaches. This is unsurprising considering that DR techniques are usually implemented sequentially when a dispute is not resolved after application of the preceding ones (Moseley 2020). Details of the issues affecting DR in infrastructure PPPs as well as the DR practices they affect are discussed in subsequent paragraphs.

Public partner's oversight-related issues, affecting negotiation

In most infrastructure PPPs, the government is a partner, regulator as well as manager of the PPP contracts (Hodge 2005). The issues that are associated with this set-up were experienced in the United Kingdom on the London Underground Project (Currie and Teague 2015). This project had a DR system consisting of two processes – fault attribution and dispute resolution.

As part of the fault attribution process, the public partner – London Underground (LU), computed and reviewed the private companies' penalties and bonuses on a daily basis and attributed responsibility as appropriate; the private companies were allowed 5 days to review LU's attributions. LU's double role as partner and attributor caused a discrepancy in the DR process. For example, LU was reported to have hesitated to participate in joint negotiation-based performance improvement activities that were initiated by one of the private partners. LU is also said to have declared that while they were responsible for overseeing the performance of the private companies, they were not responsible for reviewing their own performance (Currie and Teague 2015). This exhibited a sense of an unequal partnership that can be likened to a contractor-client relationship (Forward 2006). Also, while it was established that LU reviewed the performance of the private companies, the DR procedures were not specific on the party responsible for reviewing LU's performance. Similarly, on the Spencer Street Station Redevelopment project in Australia, the negotiation style of the government was reported as being inspired by their perception of an unbalanced partnership with the private entities of the PPP contract. This was likened to a slave-master relationship (Hannan 2004; McCann, Aranda-Mena and Edwards 2016).

Regulatory framework and legal issues, affecting all DR techniques

Many country-specific infrastructure PPP regulatory documents do not detail the recommended DR protocol when dispute is encountered on any given project. In India, for instance, the PPP rules that were sighted at the time of writing this thesis do not give elaborate DR guidelines for protecting infrastructure PPP parties from time-consuming and costly litigation (Harisankar and Sreeparvathy 2013). Equally, while the Australian National PPP Guidelines stress the significance of relationship management and DR, they do not elaborate on the process of achieving them (Department of Infrastructure and Regional Development 2015). Likewise, the regulations governing infrastructure PPP delivery in Nigeria do not provide for alternative dispute resolution (ADR) methods in place of litigation (Uwaegbulam 2016) despite ADR being known for resolving commercial disputes in a more efficient manner compared to

litigation. These insufficient regulatory frameworks are also typical of other countries, as discussed by Kwak, Chih and Ibbs (2009) and Jang et al. (2018). In an ideal world, all infrastructure PPP projects should be structured with detailed provisions of the recommended DR procedures that should be followed when disputes are encountered (Marques 2018). A reasonable query would be why common contracts that are usually applied on traditional construction projects – such as Fédération Internationale des Ingénieurs-Conseils (FIDIC) or New Engineering Contract (NEC) cannot be used on infrastructure PPPs. But, these have been reported as inappropriate for application on infrastructure PPPs, as stated by Opawole and Jagboro (2018). The absence of elaborate legal frameworks in part hinders effective DR on some infrastructure PPP projects (Li et al. 2005; Chan et al. 2010).

Poor collaboration, affecting litigation, negotiation, and arbitration

On many infrastructure PPPs, project parties prioritise their own interests when disputes arise (Shrestha et al. 2017). This reduces their capacity to resolve disputes in a cooperative way. This occurred in South Korea on the Yongin Light Rail Project where a dispute arose between the private operator and the government because of traffic shortfalls on the PPP. As such, the government was expected to support the private operator financially (Jang et al. 2018). Instead, the government attempted to raise the private operator's financial obligations despite being warned that the private operator was at the verge of being bankrupt. Initially, the discussions were done through negotiation, which was not successful because of the government's determination to achieve their bargaining position (Jang et al. 2018). Eventually, the private operator pursued international arbitration and the ruling ordered the government to pay a significant amount of money to the private operator. This may have been evaded if both the private operator and the government had collaborated throughout the negotiation process. In the same way, a substantial sum of money was incurred on litigation between the borrower and the contractor of the South Bay Expressway Project in the United States (Adarkwa, Smadi and Alhasan 2017). The borrower eventually filed for bankruptcy following the use of an

uncollaborative DR process. Relatedly, project parties on the Nathpa Jhakari Hydro-electric Project in India rejected the dispute board's decision on some claims and initiated adversarial arbitration. However, the arbitration process delayed the project by approximately three years, and the ruling instructed some payments to the contractor (Harisankar and Sreeparvathy 2013). Also, in Nigeria on the Lagos-Ibadan Expressway Project, a concessionaire agreement was terminated with the first private company (Bi-Courtney Nigeria Limited). Afterward, talks were reinitiated between the government and Bi-Courtney Nigeria Limited for the purpose of reaching an agreeable settlement. This happened only after lawsuits were made by Bi-Courtney Nigeria Limited and the court instructed the government to cancel their financing agreement with Julius Berger Plc and Reynolds Construction Company, Bi-Courtney Nigeria Limited's successor on the project. In their court submissions, Bi-Courtney Nigeria Limited claimed that the government was offering their successors more support than they had been given. In response, the government argued that Bi-Courtney Nigeria Limited's contract was wrongfully terminated by the previous government regime, and that it should have been re-negotiated instead (Uwaegbulam 2016). If the previous government regime had collaborated better with Bi-Courtney Nigeria Limited, litigation, which threatened project success, could have been avoided.

Inadequate monitoring and evaluation, affecting all DR techniques

Despite some researchers such as Costantino and Merchant (1996) emphasising the role that in-built learning abilities play in enhancing effectiveness of dispute resolution systems, it was noted that the DR processes that are commonly applied on infrastructure PPP projects do not undertake sufficient monitoring and evaluation of the performance of DR procedures that are used on infrastructure PPP projects. Normally, each infrastructure PPP party may undertake separate scrutiny of the DR procedures for their private use. Even in circumstances where a log of claims that have been raised on a single infrastructure PPP project is kept, the data is hardly ever used to advise on improvements to the DR systems for these projects (Currie and Teague

2015). This denies the DR processes of learning abilities which would boost proactive evasion of past mistakes and foster early detection of disputes and DR-related issues. A few attempts at embedding early detection of disputes and associated issues have not yielded considerable success previously mainly because the conflict recognition function was allocated to the same group of individuals that were responsible for DR, as explained in the next issue.

Combination of dispute resolution and conflict avoidance functions, affecting dispute boards

On some infrastructure PPP projects where dispute boards are given both the dispute resolution and conflict avoidance roles, the conflict evasion role is undermined. For example, on the London Underground project in the United Kingdom, a dispute board was constituted to recognise potential issues on the project and resolve them. However, the board was not successful at delivering on both roles, and some of the contract managers on the project noted that such an information sharing forum could not have successfully delivered on DR (Currie and Teague 2015). In Australia, a dispute board was created on the Sydney CBD and South East Light Rail PPP project to facilitate interim-binding dispute resolution and conflict avoidance. However, it did not successfully deliver on its mandate because project parties who were dissatisfied with the outcome of the dispute resolution processes grudged the board. Thus, their respect of the board lessened and the conflict avoidance function of the dispute board was undermined (Worthington et al. 2017). To avoid similar occurrences, the dispute resolution role of the dispute board was withdrawn for the Sydney Metro PPP. Despite the challenges encountered during application of dispute boards on the above projects, dispute boards have been implemented on several infrastructure PPPs in both established and emerging PPP markets, with success. The issue with dispute boards that has been discussed above is not to suggest that dispute boards cannot be suitably applied on infrastructure PPP projects. Rather, it highlights potential challenges that could arise during their usage with the aim of inspiring

instatement of suitable mitigation measures in situations where the likelihood of the issue is foreseen.

Unsuitability of hypothetical DR scenarios, affecting arbitration

On some infrastructure PPPs, independent arbitrators are usually appointed to the project to assist with certain DR processes. For instance, on the London Underground project (United Kingdom), an independent arbitrator reviewed the project pricing made by the private companies against a theoretical model based on a made-up company that fulfilled the principles of the arbitrator's understanding of best practice for infrastructure PPP projects (Currie and Teague 2015). This was described as misleading in some instances because the superlative environment of the fictitious situations often differs from real world scenarios (Lai and Lee 2013).

Inadequate communication plan, affecting all DR techniques

In their research, Montoya-Weiss, Massey and Song (2001) recognised clear communication as an essential component of effective DR. However, many DR practices applied on infrastructure PPP projects do not advocate for improved communication channels among project staff. Attempts by some projects have in the past involved establishment of information databases for contract performance, which private partner(s) utilised for disagreeing or agreeing with liabilities that were attributed to them. But, these attempts did not provide detailed recommendations for cross-organisational communication channels particularly when a dispute arises (Currie and Teague 2015).

Additionally, the governance structures of infrastructure PPP projects have been reported as irresponsive and imprecise especially in regard to reporting lines to, and across, different government entities (Liu, Wang and Wilkinson 2016). This prolongs the DR decision-making processes. For instance, the operational staff of one of the private companies on the London Underground project were said to have encountered challenges when they attempted to

communicate with their counterparts in government because they were not sure of who the right contact people in government were for specific dispute/conflict situations (Currie and Teague 2015). On other projects such as the Lane Cove Tunnel Project in Australia, the lack of a clear DR communication plan led to misunderstanding of contractual obligations by some of the project parties (Pryse 2016). Also, during a dispute on the Costa de Prata Concession project in Portugal, the PPP private partner is said to have provided insufficient information to support resolution of the dispute. This, coupled with the government's ineffective use of the little information they were given, led to information asymmetry. As a result, the government was not armed with enough information to safeguard the interests of the targeted users of the project, and toll fees were introduced – to the dismay of the targeted users (Cruz, Marques and Cardoso 2015). Infrastructure PPP projects are also disposed to communication channels that are not effective owing to the institutional differences between the public sector and the private sector (Ng, Wong and Wong 2012).

Disharmonised DR training for project staff, affecting all DR techniques

On most infrastructure PPPs, the DR techniques used do not promote harmonised inter-organisational DR training to equip project staff with the competency required to deal with conflicts and disputes during project implementation. Normally, each organisation focuses on their own training priorities for their staff. For example, on the London Underground project, while the public partner prioritised skilling their staff with general knowledge on PPP contracts and negotiation strategies they could employ when the private partners raised claims, one of the private companies chose to upskill their staff in problem-solving, and information sharing and mining (Currie and Teague 2015). This gave rise to divergent DR approaches among the PPP project parties. Also, while one of the private companies (Tubelines) pursued formal win-lose rights-based DR techniques, the second private company (Metronet) implemented an informal and collaborative approach. Subsequently, Metronet became insolvent approximately four years into the PPP contract. According to the research findings of De Dreu et al. (2001),

harmonised or collective inter-organisational training of project staff could have aligned the differences in each organisation's DR style and empowered the project parties to resolve disputes constructively irrespective of their organisational culture, values or interests (Vaara et al. 2012). The final result might have been improved working relationships and enhanced awareness of the inclination of each party towards problem-solving. Another case that highlighted the downside of separate DR training of each PPP project entity's staff was the Seoul Subway Line 9 in South Korea. On this project, a dispute was encountered when the private operator of the subway attempted to raise the fares charged to users of the subway. When the government objected to their proposal, the private operator declined to take part in financial renegotiation sessions and initiated a court case against the government. This provoked both parties to exhibit win-lose attitudes characterised by DR strategies that magnified their own interests (Jang et al. 2018). Eventually, the private operator agreed to renegotiate with the government after knowledge of the government's intentions to forcefully terminate their contract if the dispute had not been resolved. The DR styles adopted by the private operator and the government are typical of the "obliging" and "dominating" styles of DCT, respectively (Musenero, Baroudi and Gunawan 2021). Had both parties had harmonised DR training, the private operator may have predicted the government's response to their rejection of negotiation and acted accordingly earlier.

Limited coverage of the beneficiary communities' concerns, affecting all DR techniques

On many infrastructure PPPs, DR provisions are not elaborate on the recommended DR procedures for disputes involving the beneficiary communities of the project, despite operational and implementation project changes largely affecting them and their taxes often contributing to funding of the projects. This leads to an increase in trivial issues that would otherwise not have happened. For instance, on the Bhubaneshwar-Puri project (section of NH 203) and the Gwalior Bypass in India, the lawsuits made when the general public expressed discontentment because of issues related to land, were left pending in court for years.

Additionally, the general public is often left out during decision-making processes (Kim et al. 2014) and there is limited transparency on fundamental aspects of projects in the name of "confidentiality" (He et al. 2020). On the Myingyan Gas Power Project in Myanmar, for example, the power purchase agreement and the PPP contract terms were not accessible to the general public despite them incurring large national debt to fund the project. Moreover, the general public was charged highly for connecting to the power grid. This heightened the scrutiny of the project's benefits to them, among other fears (Geary 2020). This, together with other disputes that ensued on the project, led to the collapse of the consortium. A similar case was reported on the Cross City Tunnel in Australia when the targeted beneficiary users of the tunnel lost trust in infrastructure PPP projects after the government supposedly rechannelled traffic into the tunnel as a move towards assisting the private operator to bridge their revenue shortfalls, having increased toll fees earlier (Phibbs 2008).

Inactive involvement of project staff in DR, affecting conciliation, mediation and litigation

On many infrastructure PPPs, the DR techniques of conciliation, mediation and litigation neither encourage active participation of project staff in DR nor do they emphasise nurturing of behaviour and skills to enhance their dispute assessment capabilities. Rather, DR responsibilities rest on individuals who are not part of the main implementation team of the project, although they are usually nominated by the PPP project parties. Despite this model yielding success in some cases, it sometimes cultivates a casual approach to problem-solving and DR among project staff (Currie and Teague 2015).

Exclusion of behaviour and attitudes of project parties, affecting all DR techniques

Finally, even though behaviour is recognised as a de-escalator and escalator of disputes (Chen, Liu and Tjosvold 2005), DR techniques for infrastructure PPP projects do not consciously incorporate behaviour of project parties in DR processes. This may be attributed to DR processes mostly being concerned with using the safest and cheapest DR techniques available in the dispute manager's toolbox. In today's fast-evolving commercial world, an understanding

of behavioural orientations of infrastructure PPP project parties during disputes boosts business success (Walker, Walker and Schmitz 2003). Hence, it is deduced that an awareness of the behavioural inclinations of infrastructure PPP project parties when disputes arise fuels effective DR in infrastructure PPP projects.

2.7. Knowledge Gaps

Based on the literature reviewed in this section, a number of knowledge gaps in the field of DR in infrastructure PPPs were identified. These are discussed in the subsequent paragraphs.

The suitability of DR practices that are currently applied on infrastructure PPPs has been a lingering issue considering the frequency of 'dysfunctional' infrastructure PPP projects that emerge after their application. Indeed, Worthington et al. (2017) and Currie and Teague (2015) highlighted the need for better DR systems in infrastructure PPPs. Notwithstanding, research into DR mechanisms for infrastructure PPPs has hardly been prioritised despite the increasing occurrence of disputes on such projects (Osei-Kyei et al. 2019).

Moreover, researchers need to further investigate the nature and sources of disputes in infrastructure PPP projects in order to better their understanding of the subject. Although some researchers such as Cheung and Chan (2011); Babatunde et al. (2015); McCann, Aranda-Mena and Edwards (2016); Osei-Kyei et al. (2019) have attempted to bridge this gap using case-based analyses, there is still need for an extensive understanding of the sources and nature of disputes on a broader scale, and in the Australian context as well. Besides, the majority of studies investigating the causes of conflicts and disputes on construction projects have focussed on traditionally procured projects, and not PPP ones. A deeper understanding of causes of disputes on infrastructure PPPs can provide a more informed basis for designing effective DR systems for infrastructure PPP projects.

This literature review also revealed the necessity for integrated DR systems for infrastructure PPPs that incorporate the project parties' behaviour and attitudes in addition to having a means

of monitoring and evaluating the efficacy of previously applied DR practices on the projects (Currie and Teague 2015; Musenero, Baroudi and Gunawan 2021). Considering that most of the current DR practices for infrastructure PPPs do not deliberately incorporate project parties' behaviour in the DR process – despite behaviour being recognised as an escalator and de-escalator of disputes (Chen, Liu and Tjosvold 2005), there is need for research into DR systems for infrastructure PPPs that take into consideration the influence of behaviour on approach to conflicts and disputes. DR frameworks depicting the same would then be developed. Further still, consideration could be made for the preservation of the interests of the general public as recommended by Johnston and Kouzmin (2010); Wilson, Pelham and Duffield (2010).

In relation to incorporating behaviour of project parties, it was found that DCT has not been applied in understanding behavioural orientations of infrastructure PPP project parties during disputes and conflicts.

Finally, no research was found explicitly highlighting the critical success factors for effective DR in infrastructure PPP projects. Research in this area is therefore required to inform improvement to the current DR practices for infrastructure PPP projects.

From the knowledge gaps identified above, there is a clear need for more research in the field of DR in infrastructure PPP projects.

2.8. Conceptual DR Framework for Infrastructure PPPs

In view of the unsuitability of a single DR method for addressing the complex range of disputes that may be encountered during the long-term course of any given infrastructure PPP project (Chou and Lin 2013), a reasonable DR approach would involve a rational framework. Instead of only trying to understand which of the currently available DR approaches should be applied when a specific dispute arises (Osei-Kyei et al. 2019), some effort should be devoted to recognising the aspects of each dispute that can impede its effective and timely resolution. Following that, appropriate DR strategies can be recommended (Jacobson and Choi 2008).

Having shown the relationship between the dispute environment of infrastructure PPP projects and DCT (Section 2.5 of this thesis), a conceptual framework showing how the behavioural orientations depicted in DCT can be incorporated in the DR processes for infrastructure PPPs, has been developed. Besides embedding attitudes and behaviour of infrastructure PPP project parties, the conceptual framework attempts to design a unified DR system for typical inter-organisational interactions that are encountered on infrastructure PPPs. It is often difficult to design effective DR systems for inter-organisational arrangements due to several reasons. First of all, the organisational culture of the parties may have different DR approaches and the integration of these for the purposes of the project may be difficult (Ng, Wong and Wong 2012). Secondly, the parties usually have differing commitment to prioritisation of DR as well as dissimilar values on trust and cooperation (Currie and Teague 2015). A beginning point would be to incorporate behavioural tendencies and attitudes of key project parties in the DR process. This could enhance practitioners' understanding of the motivational forces behind the differing DR approaches. Consequently, a DR system that effectively accommodates the concerns of all main project parties, their different goals notwithstanding, can be established (Zhang and Chen 2013).

Infrastructure PPP projects typically have an official 'business contract' that is formally set up for implementation of the project and a casual 'social contract' that informally grows through social interactions among the project parties over the extended length of the project. When disputes arise, the intersection of the two 'contracts' can influence the behavioural response of the parties (Innes and Booher 1999). A basic framework would assist with clarifying how such behavioural responses can be purposely incorporated in the DR processes for infrastructure PPP projects.

Based on the above and considering the infrastructure PPP project cycle as a whole as well as the necessity of involving key project stakeholders in all steps of the DR process, a cyclical conceptual framework (Figure 2.4) consisting of four steps was developed for constructive

resolution of disputes in infrastructure PPPs with incorporation of project parties' behavioural tendencies. The framework is based on a plan-do-study-act method with emphasis on improving DR systems through continuous monitoring and evaluation (Taylor et al. 2014). The four parts of the framework include: a) identifying nature and causes of disputes; b) assessing behavioural responses; c) intervention; and d) monitoring and evaluation.

The earlier discussion on DCT and DR in infrastructure PPP projects adds value to the conceptual framework by expounding the typical behavioural dimensions under the different possible circumstances when disputes arise on the projects. A distinction is provided between the compromising, distributive, and integrative dimensions of DCT as presented in step b) of the framework. As such, application of DCT principles in DR for infrastructure PPPs enhances our appreciation of the behavioural leanings of project parties when disputes arise. This provides two-fold insight: 1) behavioural leanings of infrastructure PPP project parties during disputes are not notional and can be explicated using known theories; 2) the interpretation of infrastructure PPP project parties' behaviour through the lens of existing theory can be exploited for constructive resolution of disputes in infrastructure PPPs.

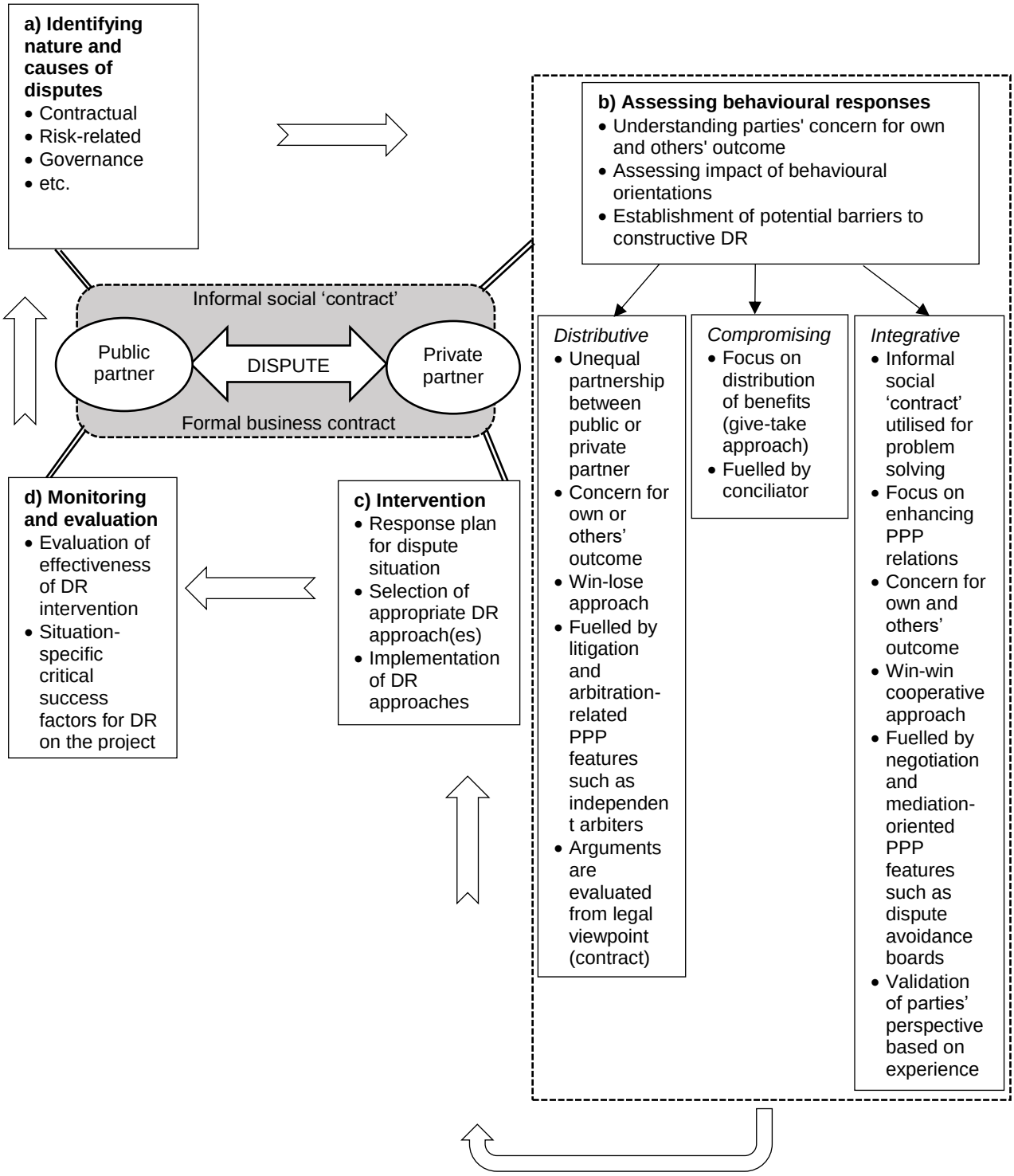

Figure 2.4: Conceptual framework for DR in infrastructure PPPs

a) Identifying the nature and causes of disputes. Disputes in infrastructure PPP projects can result from a range of factors such as the institutional arrangements of the organisations involved in the projects, natural occurrences, interpretation of contractual obligations, market conditions, governance issues, risk-related issues, cost, among others (Tang et al. 2013;

Babatunde et al. 2015; McCann, Aranda-Mena and Edwards 2016). Thus, it is imperative that the nature and causes of disputes are clearly documented and understood, instead of being assumed. This warrants proposal of the right interventions for each situation encountered.

Additionally, causes of disputes could differ depending on the different project parties' perception of the situations preceding the disputes (Osei-Kyei and Chan 2017a). It is therefore recommended that open-minded communication is emphasised during this DR step. The origin and nature of disputes should preferably be understood by all the parties affected by the dispute. That way, inadequate information is excluded as a key factor influencing their attitudes towards DR (Cruz, Marques and Cardoso 2015). Otherwise, misunderstanding of other parties' levels of concern for the DR outcomes could arise.

This step allows infrastructure PPP project parties to collate the available information on the dispute and examine their assumptions on a number of aspects such as other parties' intentions, their own interests, third party intervention in the DR process, among others (Medda 2007). The project parties involved in the dispute may confirm the following elements: number and identity of the parties affected by the dispute, the relative power or status of the parties involved, interconnection of the dispute to any other previous disputes, whether the dispute is forward-looking (motivated by the need to define future acceptable behaviour) or retrospective (motivated by the need to apportion blame), if any of the parties is using the dispute to seek publicity, whether the parties agree on the issue in question, if any monetary concerns involve fixed amounts or whether the amounts will be established subjectively at a later stage, and whether the dispute is a mere tactic or distraction for buying time on the project, among others.

b) Assessing behavioural responses. Based on the linkages established between DCT and DR in infrastructure PPP projects, the conceptual framework proposes a step for assessing the behavioural responses of infrastructure PPP project parties to any given dispute. This could involve examining the project parties' degrees of concern for other parties' or their own

interests and outcomes. This step shapes the dispute manager's understanding of the institutional setting of the project (Gunarathna, Yang and Fernando 2018). Further still, where incentives are used to motivate the private sector infrastructure PPP project partners especially in relation to risk transfer and sharing, understanding the behavioural context of the private sector partner may alleviate disputes associated with risk-related concerns (Shrestha et al. 2017). As discussed in earlier sections of this thesis, DR approaches in infrastructure PPPs may be inclined to any of the three DCT dimensions – distributive, compromising and integrative.

During the long project duration of infrastructure PPPs, it is common for project parties to develop a level of concern for one another's needs. This is inspired by the likelihood of them interfacing for several decades long after the dispute at hand has been resolved (Isen and Levin 1972; Clark and Mills 1979). When this happens, the parties' actions may be guileless and could be exploited indirectly for integrative DR behaviour (O'Brien 2017). The integrative DR would entail understanding the needs, interests and fears inspiring the dispute. A key precursor of integrative DR is usually an interests analysis, and the likelihood of integrative DR is influenced by the level of creativity that is applied after the interests analysis, the available time for DR and the parties' ability to multitask on both their own and other parties' interests (Rahim 2001). The parties involved in dispute do not necessarily need to disclose their bottom lines and ambitions and or have total confidence in one another – as long as they can share honest information on their interests. Integrative DR was observed on the Sydney Metro PPP project in Australia when emphasis was placed on the conflict avoidance function of the dispute board (Worthington et al. 2017).

On the other hand, DR systems that are preoccupied with positions or demands of the affected parties are usually inclined towards the distributive DR dimension (Ertel 1991). This may be experienced through situations where the parties are engrossed in being paid a fixed sum of money. Also, project teams which are fixed on avoiding financial losses at all costs usually inspire censorious relationships with other parties (Tsai and Chi 2009). This was witnessed on

the Spencer Street Railway Station Redevelopment PPP in Australia, as presented in Section 2.5 of this thesis. Additionally, strict application of the formal business contract in a manner that emphasises uncompromising assertion of legal rights, administrative systems and bureaucracy can result in the distributive DR dimension of DCT (Zhang et al. 2009). However, this can vary based on the situation – hence the importance of a deliberate step in the DR process where the behavioural response of parties that are affected by the dispute is assessed. In the event of breakdown of working relationships during the course of DR – subsequently prohibiting the project parties from resolving the dispute or conflict on its merits, an impartial third party could intervene to facilitate containment of the parties' personality issues as done on the Kaesong Industrial Complex PPP project (Lee 2016). This leans to the compromising DR dimension of DCT (Özkalp, Sungur and Özdemir 2009).

Following assessment of the project parties' behavioural orientations, an understanding of the potential barriers to effective resolution of disputes can be established and the appropriate interventions can be proposed.

c) Intervention. The third step of the conceptual framework involves crafting a response plan for the dispute in line with the alignment exercise of the project parties' contractual and non-contractual interests with the causes of disputes and behavioural dispositions of the project parties. Additionally, it directly scrutinises possible DR interventions under the direction of the applicable project documentation. Differing from the typical practice of specifying recommended DR methods in contract documents, this stage identifies suitable interventions on the basis of the findings from steps a) and b). This is of particular importance in infrastructure PPP projects because it guarantees that the different dispute situations that may be encountered over the multi-decade duration of the project are matched with the right intervention, irrespective of their origins (Harisankar and Sreeparvathy 2013). Additionally, when a dispute that affects parties without direct contractual agreements arise – for instance from a claim made by a D&C contractor to the SPV that is in turn passed onto the government (with whom the

D&C contractor has no direct contractual arrangement), a legally binding ruling between the D&C contractor and the government is not achievable through enforcing their independent contractual obligations (Worthington et al. 2017). Also, disputes caused by other factors such as negative public perception of the infrastructure PPP project cannot be covered by a contract. Therefore, even if this step of the conceptual framework can be guided by the project contract, the implementation and selection of interventions does not exclusively depend on the presence of direct contractual agreements among the affected parties. This makes this step appropriate for the dispute environment for infrastructure PPP projects.

Some of the typical dispute resolution interventions that can be implemented for different dispute situations on infrastructure PPP projects are described in this section. Similar to the concepts of various leadership and organisational theories like the decision theory by Vroom and Yetton (1973) and the contingency theory by Fiedler (1967), the interventions proposed during this step of the conceptual framework should fully recognise that there exists no 'one best' method for resolving any given dispute. Instead, the suitability of the interventions depends on the specific circumstances. Rahim (2002) outlines the situations that can prompt the different DCT behavioural dispositions as follows: a) For integrative DR, the "integrating" style is triggered when combination of thoughts and/or resources would facilitate the formulation of a satisfactory solution, the available time for DR is adequate, or all parties involved in the dispute are keen on the outcome. On the other hand, the "avoiding" style is prompted when the matter at hand is insignificant, the involved parties could benefit from some time to calm down, or potential dysfunctionality from confrontation of the other party could be more unfavourable than the merits of heads-on DR; b) For distributive DR, the "dominating" style usually takes effect when one party is more powerful or influential than the other, or when an antagonistic decision by one party could cost the partnership or project, or one of the parties lacks the competence needed for making some decisions, or decision-making on the dispute should be done swiftly. The "obliging" style on the other hand is common when the party

obliging is weaker than their counterparts or when they are uncertain of whether they are right; c) Compromising DR happens when an agreement cannot be made between parties who are equally powerful, or in situations where the dispute has not been resolved after applying distributive and/or integrative DR.

Prior to selecting an intervention for DR, it is advisable that the nature of relationship that the parties in dispute want to have is established; consequently, the parties are encouraged to work towards that relationship (Mwesigwa et al. 2020). If the parties aspire to have a long-term relationship where acceptance of one another's views and cooperation prevail, DR styles that do not capitalise on apportioning blame are recommended (Khalifa, Farrell and Emam 2015). Such styles may include negotiation and mediation, which are both integrative approaches. Taking an example of a dispute arising from issues related to past performance on the project, the parties affected by the dispute can exploit integrative DR approaches to formulate ways of achieving better performance and also avoid similar events in future (Rahim 2002). Government intervention is also not uncommon for situations where the wider beneficiary communities of the infrastructure PPP project perceive the private sector PPP partners as unfair even on occasions where the private sector PPP partner may be operating within their contractual obligations (Li and Wang 2018). This was experienced on the Spencer Street Railway Station Re-development in Australia where the government intervened in the dispute and committed to partially funding the installation of extraction fans in the railway station following several people's complaints about the diesel fumes that were emitted by idle trains at the station (McCann, Aranda-Mena and Edwards 2016).

Conversely, where the parties have no interest in keeping any future relationship, the applied DR styles often emphasise closing of the dispute (Chou and Lin 2013). Such styles may include litigation and arbitration. In some cases, litigation – which is typical of the distributive DR dimension, is applied when integrative DR and compromising have not successfully resolved the dispute. This was observed on the Lane Cove Tunnel PPP project in Australia. When the

roof of a section of the tunnel collapsed on this project, the D&C contractor settled all outstanding claims against the independent verifiers and designers on the project, and opened a court case against the geotechnical engineer (Pryse 2016).

It is worth noting that in choosing litigation, the affected parties should not damage their prospects of working together again, should the need or opportunity arise (Zheng et al. 2021). In situations where the affected parties are fixed on positional bargaining which is characteristic of the distributive DR dimension, DR approaches that distinguish the parties' demands from the interests of the project are recommended (Shaffer 2003). For instance, if one of the affected parties is fixated on bargaining for a fixed sum of money that their counterpart is either unwilling or unable to pay, an interests' analysis may be done to understand the motivation behind the said sum of money. Subsequently, it can be determined whether the parties' demands can be fulfilled in other ways (Jang et al. 2018). If no agreement is reached, the parties can consider litigation. However, before litigation is considered, it is advisable that risk analysis tools are applied to provide a realistic assessment of the probability of its success. In some circumstances, unpromising results from the risk analysis can draw the project parties towards integrative DR (Li and Wang 2018). For instance, a party who is fixed on being paid a certain sum of money by another party can, following completion of the litigation risk analysis, appreciate that their counterpart is insolvent and resolve that maintaining their position on the fixed sum may result in a non-actionable court ruling. This was seen in the United States of America on the South Bay Expressway (SBX) when the original borrower and private operator of the project under the Transportation Infrastructure Finance and Innovation Act (TIFIA) program, SBX LP, filed for insolvency because of revenue shortfalls and substantial costs they incurred on litigation in a case with the project contractor (Adarkwa, Smadi and Alhasan 2017).

In the event of unequal power distribution among the parties affected by the dispute (Pongsiri 2003), distributive and integrative DR dimension may intersect through the support of a conciliator to protect the less-powerful party using clearly specified ground rules; all parties

involved should be aware of the consequences of nonconformity to the rules (NSW 2014). The conciliator can also hold secluded sessions with the seemingly stronger party to disarm them from controlling the weaker party (Brinkerhoff and Brinkerhoff 2011).

All in all, the goal of the DR manager should be to inspire adversarial tendencies towards collaborative ones whenever possible. This may be achieved by taking advantage of the behavioural inclinations of the parties specifically by encouraging them to cooperate through observation of the DR manager's manner in which they handle their differences. For example, if a party intending to adopt integrative DR has a dispute with another party who is invested in dominating (distributive DR), they may be able to demonstrate to the other party that they are also able to apply the "dominating" style and that the results will not be favourable (Ertel 1991). Empirical evidence could further enrich this step of the DR framework.

d) Monitoring. The fourth step of the conceptual framework involves monitoring and evaluating the effectiveness of the DR interventions applied in step c) above in order to foster continuous improvement (Musenero, Baroudi and Gunawan 2023).

The following metrics can be used for monitoring: change of behaviour and attitudes of the parties when disputes arise, changes in the quality of work, team-building and coordination, among others (Johnston and Kouzmin 2010). Targeted monitoring of results of different dispute episodes encountered on the infrastructure PPP project can incentivise the project parties to share information more openly. This information can be used in future dispute resolution processes on the same project. Considering the vast room for wider understanding of DR on infrastructure PPP projects (Johnston and Kouzmin 2010; Siddiquee 2011; De Schepper, Dooms and Haezendonck 2014), this step of the conceptual framework provides an opportunity for mapping out contextualised success factors for constructively resolving disputes on infrastructure PPP projects. Consequently, practitioners' appreciation of the required elements for constructive DR in infrastructure PPP projects is enhanced. If the contributory factors to

effective DR under different conditions are properly documented, recurring disputes within the infrastructure PPP project environment can be managed in the future within a shorter time and at a smaller cost.

In monitoring the efficacy of the different DR approaches, the distributive DR dimension typically encourages one-way learning while the integrative dimension promotes double-loop organisational learning (Rahim 2002). For distributive DR, the monitoring and evaluation may focus on assessing ways of improving cooperation among the affected parties and preventing accusatorial incidents in the future. In rare cases where the parties may not anticipate any future business together, the documented lessons from the monitoring and evaluation process can be applied when similar situations arise among other parties in future (Essia and Yusuf 2013). On the contrary, the monitoring and evaluation step during integrative DR may cause change of course of DR in light of the experience gained.

If it is established that constructive DR was not achieved, the DR steps a) – d) of the conceptual framework can be repeated. This feedback process from applying the steps of this conceptual framework ensure that learning is incorporated in the DR cycle for infrastructure PPP projects (Musenero, Baroudi and Gunawan 2023).

The conceptual framework may be used as a guide for constructively resolving disputes in infrastructure PPP projects. Besides identifying the essential steps for resolving disputes in infrastructure PPPs, it integrates the behavioural responses of project parties who are affected by disputes. This enables the implementation of DR interventions after thorough consideration of the behaviour and attitudes of project parties during disputes (Musenero, Baroudi and Gunawan 2021). Secondly, the conceptual framework provides an unbiassed guide to DR that allows both the private and public sector to resolve disputes in a constructive way while monitoring the efficacy of DR interventions that have been previously applied on the projects.

The conceptual framework can be used by both public and private partners of infrastructure PPPs for resolving disputes among all possible combinations of project parties such as public to [general] public, public to private, private to private, among others. An independent negotiator may also use it to resolve disputes among project parties of infrastructure PPPs. The conceptual framework can be used on both social and economic infrastructure PPPs.

The conceptual framework formed the basis for development of the empirical DR framework for constructive DR in infrastructure PPPs as discussed in latter chapters of this thesis.

2.9. Summary

This chapter commenced with a general review of the concept of PPPs, application of PPPs and related challenges as well as their benefits. Following this, PPPs in the infrastructure sector were reviewed. A discussion on the general principles of DR was then presented – highlighting the definition of conflict, dispute, conflict management and DR in addition to discussing key conflict theories, including the dual concern theory (DCT). The research then narrowed down to DR in infrastructure PPP projects. Based on the information that was sourced on DR in infrastructure PPPs (such as sources of disputes, current DR practices, critical issues in DR, etc.) and the DCT, a relationship was established between the two. This formed the basis of development of the conceptual framework, which was the foundation for the empirical DR framework for constructive DR in infrastructure PPPs discussed in a latter chapter of this thesis. Additionally, knowledge gaps in the literature were identified and discussed.

The literature review undertaken emphasised the benefits of effective DR towards the success of infrastructure PPP projects. It also highlighted that only a handful of research studies have been undertaken in the area of DR in infrastructure PPPs, despite several researchers emphasising the importance of DR in the success of these projects.

CHAPTER 3 RESEARCH METHODOLOGY

3.1. Overview

The research methodology that was adopted for achieving the objectives of this research is summarised in this chapter. Firstly, the rationale behind the selected research design for this study is presented. This is followed by a discussion of the research design and the data collection methods employed. Finally, the methods employed for data analysis are presented.

In the first instance, the research was pursued through literature review where an extensive examination of the existing body of knowledge on infrastructure PPPs and DR was undertaken. This led to the development of a conceptual framework (Section 2.8 of this thesis), and selection of the most appropriate conflict theory for this study (Section 3.3 of this thesis). Subsequently, qualitative and quantitative data was collected through a number of approaches and the collected data was analysed accordingly.

3.2. Context of the Research

The empirical part of this research focused on infrastructure PPP projects in Australia. Given that Australia is one of the leading countries in PPP infrastructure project delivery in the world (Barrett 2003), it is hoped that the results are scalable in other established PPP markets. Emerging markets can also use the findings of this research as lessons learnt from the established PPP market of Australia.

3.3. Selection of Conflict Theory for this Study

At first, many conflict theories were reviewed to inform the initial screening of candidate theories. Following this exercise, the candidate theories that were identified were: Mary Parker Follett Model (Giritli, Balci and Sertyesilisik 2014), the Constructive Controversy theory (Vollmer and Seyr 2013), Hall's Win-Lose Approach (Vu and Carmichael 2009), and Dual

Concern Theory, DCT (Pruitt and Rubin 1986; Rahim 2002). Background information on these conflict theories has been provided in Sections 2.4.3 and 2.4.4 of this thesis.

To select an appropriate theory from the candidate theories, three criteria were followed. These included: 1) the principles on which the theories were founded; 2) the general implementation of the theories in dispute and conflict research; and 3) the appropriateness of the theories for explanation of DR in the context of infrastructure PPPs.

Based on the founding principles, the Mary Parker Follett Model was not considered as an appropriate theory because it made no consideration of recognised flexible DR approaches that are typical of infrastructure PPP DR. Hall's Win-Lose Approach was also eliminated because it only provided for a common DR approach and did not account for behavioural DR approach, despite behavioural DR being regarded as more suitable for resolving conflicts and disputes (Vu and Carmichael 2009; Giritli, Balci and Sertyesilisik 2014). It was also observed that the Constructive Controversy is founded on the DCT. DCT makes use of a behavioural approach to DR consisting of both flexible and rigid DR approaches that put into consideration the viewpoints of all parties affected by any given dispute (Zhang, Chen and Sun 2015). Thus, DCT makes provision for a larger spectrum of behavioural inclinations and their respective DR approaches. In a meta-analysis of twenty-eight research studies, De Dreu, Weingart and Kwon (2000) presented supporting evidence for the projections of DCT and concluded that DCT satisfactorily predicted "integrating" DR behaviour – which is regarded as the most effectual DR approach (Acharya, Lee and Im 2006; Cheung, Yiu and Yeung 2006; Tsai and Chi 2009).

Concerning the general implementation of the theories in dispute and conflict research, it was observed that most conflict and dispute research seems to meet on DCT (De Dreu et al. 2001; Rahim 2002). In addition, some scholars (Sorenson, Morse and Savage 1999; Chou and Yeh 2007; Guerrero, Anderson and Afifi 2007) claim that DCT is the most commonly used theory in DR studies. Therefore, it can be said that DCT is more frequently used in conflict and dispute

studies than the Constructive Controversy theory. Undeniably, several studies have applied DCT to resolve, analyse and understand conflicts and disputes in the fields of religion (Dunaetz and Greenham 2018), organisational and social psychology (De Dreu et al. 2001; Özkalp, Sungur and Özdemir 2009; Zhang, Chen and Sun 2015), construction (Yiu and Cheung 2006; Lee 2008; Tsai and Chi 2009; Akiner 2014; Tabassi et al. 2017; Gunarathna, Yang and Fernando 2018), among others. DCT is also considered as a firm basis for evaluation of DR options (De Dreu et al. 2001) and designing of constructive DR procedures (Dunaetz and Greenham 2018).

Although it might appear that DCT has not been widely adopted in conflict and dispute studies related to infrastructure PPP projects, an assessment of the concepts of DCT showed a likeness between the behavioural inclinations of infrastructure PPP project parties faced with dispute, and the behavioural dimensions depicted by DCT. While assessing the practicality of DCT, it was found that parties affected by disputes develop concern for one another's needs when they foresee future interaction (Isen and Levin 1972; Clark and Mills 1979). This is similar to the dispute environment of the multi-decade arrangements of infrastructure PPP projects where disputes continuously occur amongst the same sets of project teams. In comparing the appropriateness of the Constructive Controversy theory for explanation of DR in the definite context of infrastructure PPPs, it was noted that Constructive Controversy theory is premised on the assumption that parties in dispute are always inspired to cooperate with each other as the dispute progresses. However, this is not always the case with infrastructure PPP projects because their dispute environment is not only characterised by cooperation but also competition.

Therefore, DCT was chosen as the appropriate theory for this research study.

For this research, DCT was used as a theoretical lens for understanding the behavioural tendencies of infrastructure PPP project parties during conflicts and disputes. Following a

discussion on infrastructure PPP project parties' inclination towards the three DCT behavioural antecedents (Section 2.5 of this thesis), a conceptual framework demonstrating how the behavioural inclinations described in DCT can be embedded in constructive DR in infrastructure PPPs was developed (Section 2.8 of this thesis).

Understanding how DCT principles manifest in infrastructure PPP dispute situations guided the structuring of questions that queried into dispute behavioural tendencies of infrastructure PPP parties at the empirical data collection phases of this research. This was done without explicitly mentioning DCT to any of the research participants.

Finally, the DCT-founded behavioural inclinations depicted in the conceptual framework, together with the empirical data guided the process of proposing the DR approaches presented in latter chapters of this thesis.

3.4. Selection of Research Design

Research design may be categorised under quantitative, qualitative, or mixed methods. Because the choice of research design is mainly influenced by the objectives of the research, an understanding of the three research designs was essential prior to selection of the appropriate research design for this study.

3.4.1. Understanding research design

According to Punch (2005, p. 3), "quantitative research is empirical research where the data are in the form of numbers." Quantitative research tends to use deductive research techniques to test a theory or hypothesis (Creswell and Clark 2007). Usually, surveys and experiments are used for collecting quantitative data (Creswell 2009) and the results are often generalisable (Saunders, Lewis and Thornhill 2007). During surveys, the same set of questions is administered to a group of people and their responses are used to explain, compare or describe their views on a given topic. On the other hand, experiments utilise variables to understand the influence of independent variables on dependent ones. Quantitative research design is said to

have a number of disadvantages such as: the researchers' data collection approach and analysis may not be fully reflective of all the actual interactions or natural occurrences of a given phenomenon (Gnisci, Bakeman and Quera 2008), the focus on testing hypotheses or theories may lead to oversight of some important phenomenon, and the conclusions from the research design may not be directly applicable to certain groups of individuals (Johnson and Onwuegbuzie 2004), among others.

Contrary to quantitative research design, qualitative research design involves collection and analysis of data that is not numeric (Punch 2005). It usually explores experiences, insights and perceptions of research participants (Fellows and Liu 2003) on a given research area. Qualitative research may take the form of case studies, ethnography, narrative research, grounded theory or phenomenology (Creswell 2003). Case studies present an in-depth inquiry into a case or cases in order to investigate specific circumstances with reference to real world situations (Yin 2013). Ethnography involves extended contact with a specific ethnic group to gain insight into their routine (O'Reilly 2012). Narrative research interrogates individuals on specific topic areas and chronologically organises the collected data into a collaborative narrative (Creswell 2003). Grounded theory uses collected data to inductively develop a theory (Strauss and Corbin 1990). Finally, phenomenology involves prolonged interaction with specific individuals in order to understand their lived experiences in relation to a particular phenomenon. Conclusions from qualitative research are normally derived inductively. Qualitative research design has been reported to have a number of limitations including but not limited to: the data collection and analysis process is more time consuming than quantitative research (Johnson and Onwuegbuzie 2004); the results from qualitative research may not be generalised and are susceptible to individual biases of the researchers.

Mixed research design integrates both quantitative and qualitative methods into one research design. Johnson, Onwuegbuzie and Turner (2007, p. 123) defined mixed design methods as "*the type of research in which a researcher combines elements of qualitative and quantitative*

research approaches (e. g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration." Integrating quantitative and qualitative research designs allows the methods to complement each other by way of compensating for each method's weaknesses throughout the research process (Neuman 2011) in addition to increasing generalisability of results. According to Johnson and Onwuegbuzie (2004), mixed research design requires deduction (where hypotheses and theories are tested), induction (where patterns are discovered), and abduction (where the best explanations for results are unveiled and relied on). There are three possible procedures for applying mixed design methods – sequential, concurrent and transformative procedures (Creswell and Clark 2007). In the sequential procedure, one research design (qualitative or quantitative) is used to elaborate the findings of the other; a study may commence with quantitative methods followed by qualitative or vice versa. For concurrent mixed methods procedure, qualitative and quantitative data is collected simultaneously and consolidated for interpretation. Finally, the transformative procedure draws its dominant perspective through a theoretical lens and could use both concurrent and sequential procedures.

Opponents of mixed research design argue that the approach is time consuming and costly. Some researchers have also argued that combining quantitative methods with qualitative ones results in incompatibility given that both methods are embedded in different research standards. To overcome the likely validity issues of mixed methods research design, Creswell and Clark (2007) suggested that a large sample size should be selected for the quantitative study, and a smaller one for the qualitative study. In situations where the findings from the qualitative study are found to be weak, a follow-up quantitative study covering the themes where inadequacies were encountered, is recommended.

Having obtained a background of the possible research designs, the research designs for studies on DR in infrastructure PPP projects were explored.

3.4.2. Review of research design for conflict management and dispute resolution-related research in infrastructure PPP projects

As presented in Chapter 2 of this thesis, PPP research has gained popularity over the last few decades. Prior to selection of the most appropriate research design for this research project, it was beneficial to investigate the research methods via a traditional literature review that critically assesses previous studies on infrastructure PPPs both internationally and within the Australian context. This not only provided an understanding of the most popular research approaches used in infrastructure PPP studies but also ensured that the research design adopted for this study was innovative whilst yielding research output that contributes to improving existing DR practice.

To select the research studies, peer-reviewed journal articles published in ABDC A* and A rated journals relevant to this research topic were reviewed. These journals included the International Journal of Project Management; Journal of Construction Engineering and Management; Construction Management and Economics; Journal of Management in Engineering; and Engineering, Construction, and Architectural Management. In addition to these journals, five journals that often publish articles on conflict and dispute-related issues in the construction sector were included. These included: Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, Journal of Infrastructure Systems, Leadership and Management in Engineering, Journal of Strategic Contracting and Negotiation, and Negotiation Journal.

The search was restricted to journal articles published between the years 2000 and 2020, in the language of English. The search words for the abstract and title were: (private finance initiative OR build-operate-transfer OR public private partnerships OR build-own-operate-transfer OR public private partnership OR build/operate/transfer OR build operate transfer OR design build finance maintain OR build own operate transfer OR build/own/operate/transfer OR design/build/finance/maintain OR build own operate OR design-build-finance-maintain OR

build-own-operate OR build/own/operate OR PFI OR BOT OR PPPs OR BOOT OR PPP OR BOO OR DBFM); whereas those for the full-text were the following: (construction OR infrastructure) AND (conflict management OR conflict resolution OR dispute resolution).

Knowing that relevant studies often refer to other useful studies documenting similar topics, snowballing was done in line with the commendations of Pawson et al. (2005). During this process, references of relevant studies as well as their references were reviewed.

A summary of the studies is presented in Table 3.1. The articles were divided under two categories: Australian – for those whose focus was solely on DR-related issues in infrastructure PPPs in Australia; and International – for DR-related articles published on infrastructure PPPs elsewhere in the world.

Table 3.1: Number of studies published in selected journals between the year 2000 and 2021.

Name of Journal	Australian	International
Journal of Construction Engineering and Management	0	4
International Journal of Project Management	0	3
Journal of Management in Engineering	0	1
Construction Management and Economics	0	3
Engineering, Construction and Architectural Management	0	2
Journal of Legal Affairs and Dispute Resolution in Engineering and Construction	0	2
Journal of Infrastructure Systems	0	0
Leadership and Management in Engineering	0	0
Journal of Strategic Contracting and Negotiation	1	1
Negotiation Journal	0	1
Total	**1**	**17**

The research articles were categorised by research design as presented in Table 3.2. The methodology adopted in the research studies was classified under the categories of mixed methods, qualitative, and quantitative in line with the categories that are commonly applied in the construction sector (Agyekum-Mensah, Reid and Temitope 2020).

Table 3.2: Number of studies per research method

Research Method	Australian	International
Quantitative		
- Surveys	0	4
- Experiments	0	1
Qualitative		
- Case study	1	6
- Review	0	2
- Interviews	0	2
Mixed	0	2
Total	**1**	**17**

According to the journals reviewed, it was clear that DR-related research has hardly been published in the Australian context compared with the international context.

For research methods, qualitative methods were the most popular research design followed by quantitative research design. Case study research was found to be the most utilised qualitative approach whereas surveys were the most popular quantitative approach. The mixed methods research design was the least utilised for DR-related research in infrastructure PPPs. This suggested that it was worth undertaking DR research using the mixed method research approach in the Australian context.

3.4.3. Nature of the research

This research investigated a complex phenomenon – DR in infrastructure PPP projects, that has not been widely researched (as presented in Section 2.7 of this thesis). The research was classified as action research because it utilised interactive data-driven analysis and collaborative problem-solving to propose practical transformation in conflict and dispute resolution practices for infrastructure PPPs (Reason and Bradbury 2007).

3.4.4. Selected research design

For this study, a mixed research design approach was selected involving both qualitative and quantitative research designs. For the qualitative research design, empirical data was collected through focus group discussions and semi-structured interviews. In addition to the empirical

data, secondary data was gathered through literature review. For the quantitative component, a questionnaire survey was used. The transformative procedure for applying mixed method research design was selected – involving the dual concern theory (DCT) as the theoretical lens of the research. Empirical data was collected in the order of focus group discussions, followed by questionnaire surveys, and finally semi-structured interviews.

3.4.5. Justification for selected qualitative research design

Owing to the limited studies on DR in infrastructure PPPs, the qualitative research design was undertaken using an exploratory approach involving experienced infrastructure PPP practitioners. Of the commonly used qualitative research methods presented in Section 3.4.1 of this thesis, the narrative research methodology was established as the most appropriate for this study as outlined in Table 3.3. This is because for this research project, infrastructure PPP practitioners shared their professional experience through in-depth discussions.

Table 3.3: Selection of qualitative research method

Research method	Applicability for this research	Selected
Grounded theory	This research does not develop a new theory	No
Ethnography	Given the nature of infrastructure PPPs and the dynamics of DR on these projects, direct extended study of a single ethnic group would not yield representative results.	No
Narrative research	Data to inform improvements to DR practice in infrastructure PPPs could be collected through interviewing and interacting with infrastructure PPP experts.	Yes
Case studies	It was found that conflict and dispute situations in infrastructure PPPs were not usually documented enough for adequate research data to be extracted from specific case studies.	No

3.4.6. Justification for selected quantitative research design

The quantitative research design was informed by the outcome of initial qualitative research data collection (focus groups) using a larger sample size. It also confirmed the design of the second qualitative data collection process (interviews). Among the quantitative research methods presented in Section 3.4.1 of this thesis, surveys were identified as the most

appropriate for this research project. Justification of the appropriateness of the selected quantitative research design is presented in Table 3.4.

Table 3.4: Selection of quantitative research method

Research method	Applicability for this research	Selected
Experiments	The data being sourced to facilitate this research project could not be collected through experiments.	No
Surveys	Surveys could be ably applied to gather opinions on relevant topics, from a broad representation of infrastructure PPP practitioners.	Yes

3.5. Data Collection Approaches

Having selected the appropriate research designs, the most suitable data collection approaches were determined. In selecting the data collection methods, care was taken to ensure that the methods were suitable for addressing the research questions as well as aims and objectives of this study.

Initially, the data collection process targeted project managers with experience on infrastructure PPP projects in Australia. However, on contacting some project managers, it was established that organisations usually hired lawyers to assist with any issues that could potentially culminate into conflicts or disputes. This was a surprising finding especially in regard to the extent to which lawyers are involved in the various stages of infrastructure PPP projects in Australia. Indeed, some of the project managers that were contacted made referrals to the lawyers who had helped with conflict management or dispute resolution on the different infrastructure PPP projects they had been involved in. With this finding, the data collection process was extended to lawyers with experience in managing conflicts and resolving disputes in infrastructure PPP projects in Australia. For this research, it was important that respondents with significant experience in DR for infrastructure PPPs participated in the empirical data collection processes, irrespective of their professional affiliations or roles on the projects.

To facilitate effective data triangulation, each of the data collection processes (focus groups, questionnaire surveys and interviews) used a different set of participants to enable the development of findings based on varied opinions and experiences from different infrastructure PPP practitioners at every stage of the project. The participants were a good representation of the public and private sector from various players in the infrastructure PPP sector in Australia. A significant number of them were legal professionals because they are quite often the most involved in significant PPP DR in the Australian context.

3.5.1. Qualitative data collection

Data collection methods for qualitative research may involve the use of secondary data such as documents, audios, videos, interviews, focus group discussions or observations. A literature review was undertaken as presented in Chapter 2 and summarised in Section 2.9 of this thesis. Because of the specificity of data on DR in infrastructure PPPs and its scarcity in secondary data sources, empirical qualitative data was collected through focus group discussions and semi-structured interviews. These empirical data collection methods were selected in order to facilitate detailed inquiry into the various aspects of DR in infrastructure PPPs.

3.5.2. Quantitative data collection

For data collection using surveys, an online self-administered questionnaire was selected. This was because it provided a relatively inexpensive means of collecting volumes of quantitative data whilst maintaining anonymity of the survey participants (Kumar 2014; Sekaran and Bougie 2016).

Overall, data collection for this research project was designed in such a way that focus groups provided an understanding of the general themes and areas of concern in regard to DR in infrastructure PPPs. These confirmed the design of the questionnaire surveys. One-on-one interviews then followed – providing an opportunity to the practitioners to voice their experience in a more elaborate manner. This was particularly important because much as there

was room for sharing additional thoughts in the questionnaire survey, the platform could not allow for in-depth views without making the survey significantly too long to be conveniently completed by most participants.

3.5.3. Data reliability

The application of both qualitative and quantitative data collection approaches increased the reliability of the collected data by enabling data triangulation. Rooke, Seymour and Crook (1997) argue that purely scientific approaches are not appropriate for application in research in the construction industry because most of the problems encountered in the construction industry are social in nature. On the other hand, Gill and Johnson (1991) assert that the social aspect of managerial challenges cannot be ably represented by simplified causal relationships. With due consideration of the above, this research study benefitted from the in-depth inquiry into complex situations that the qualitative part of the research offered, as well as the objective, rigorous and mechanistic efficiency from the quantitative component. This increased reliability of the findings.

Also, prior to commencement of the questionnaire survey and the interviews, the survey and interview questions were trialled through piloting exercises as described in subsequent sections of this thesis. This not only ensured that the questions were easy to understand and logical but also enabled checking of the motivation behind some questions and whether they added value to fulfilling the research objectives.

3.6. Qualitative Research Process

3.6.1. The focus group discussions

A focus group comprising experienced infrastructure PPP practitioners was constituted. This facilitated inter-participant discussions guided by open-ended questions on the nature of typical conflicts and disputes in infrastructure PPPs, critical issues in DR, performance of current DR practices in infrastructure PPP project settings, and recommended improvements to DR.

Perspectives from the focus group enriched insight on the information obtained from literature and confirmed the design of questionnaires.

Given that DR in infrastructure PPPs is a highly specialised subject, participants of the focus group discussions were purposively sampled to ensure that the individuals selected had the appropriate expertise and experience required for providing relevant information on the topics of discussion.

For focus groups, sample size usually varies from 4 to 15 individuals; large sample sizes – typically more than 12 individuals, are discouraged because participants tend to disintegrate into smaller groups thus defeating the purpose of the focus group (Ochieng et al. 2018). The widely accepted range for sample size is 6 to 8 participants (Krueger and Casey 2000). This research targeted to have 10 participants in the focus group discussions.

Due to the travel restrictions that had been imposed across Australia in a bid to control the spread of COVID-19, a face-to-face focus group discussion session with the research participants was not possible. Therefore, an online video focus group session was held via Zoom software. This was done on 16th October 2021 in one session that lasted approximately three hours. The discussions were guided by a set of open-ended questions as presented in Appendix 1. Recordings obtained from the focus group discussions were used to make a transcript that was analysed using content analysis. Audio recordings were used for verification of any participant quotations of interest and harvesting more information.

3.6.2. Designing the semi-structured interviews

The in-depth interviews were designed to be semi-structured. Interview question guides were prepared under five broad sections namely: background information, current DR practice in infrastructure PPPs, critical issues in DR in infrastructure PPPs, improvement to DR practice in infrastructure PPPs, and additional thoughts. Specific questions to the interviewees varied

based on their responses. This facilitated the gathering of each interviewee's holistic viewpoint on DR in infrastructure PPPs.

In order to understand the influence of behaviour of project parties on the DR approaches or processes, interview questions querying into behavioural aspects of project parties were embedded in the interviews in line with the principles of DCT as depicted in the conceptual framework of this research study. This was also done for focus group discussions and survey questionnaires. However, no explicit mention of DCT was made in the questions used for data collection in order to avoid overwhelming the respondents with conflict research theories and instead redirect their focus to describing the different scenarios that were relevant for analysis of the research findings.

3.6.3. Sampling for interviews

Given the difficulty in sourcing individuals from the niche players of the Australian infrastructure PPP market, interview participants were purposively sampled.

During the planning phase for the interviews, it was anticipated that 15 – 20 infrastructure PPP practitioners with at least 5 years of experience in infrastructure PPPs would be interviewed. A fair balance between government and private sector representation was targeted. Marshall et al. (2013) suggested that the number of research participants for interviews can be determined through examining similar past research and using the same sample size used in the past research or a sample size at which data saturation is achieved. Data saturation is said to be achieved when addition of data from more interviewee participants does not significantly contribute to more meaningful understanding of the phenomena under investigation (Guest, Bunce and Johnson 2006). The optimum sample size is determined when data from interviewee respondents becomes repetitive and interviewing additional participants only returns the same information submitted by previous interviewees (Francis et al. 2010). According to Guest, Bunce and Johnson (2006), a minimum of 10 interview participants is required for data

saturation and 11 participants can be sufficient to achieve it. In line with this, 18 participants were interviewed for this research and data saturation was achieved with this number.

Prior to the interviews, pilot interviews were done.

3.6.4. Pilot interviews

Four pilot interviews were undertaken to test the clarity of interview questions as well as efficiency of recording equipment that was used during data collection. Subsequently, the final question guide for the semi-structured interviews (Appendix 2) was drawn based on the feedback from the pilot study as suggested by Maxwell (2013).

3.6.5. Interview process

Infrastructure PPP practitioners whose contact details were publicly available were contacted directly by email to request for their participation in the interviews. Participants were also sourced via existing professional networks. To broaden the interviewee sample, snowball sampling was employed by requesting interviewees to nominate other experts for consideration in the data collection process.

The personalised invitation emails to prospective interviewees had a Participant Information Sheet (Appendix 4) and Consent Form (Appendix 5) attached. This served as preliminary information on the research project.

The interviews were held between 1st August 2022 and 30th September 2022 with a mix of face-to-face and Zoom video online sessions each lasting between 45 and 120 minutes. Although the preference was to conduct only face-to-face interviews, a compromise was made for Zoom online interviews because most people were still cautious about physical meetings accelerating the spread of COVID-19. Moreover, the interviews were conducted in late winter / early spring – a season that saw a peak in flu and cold cases whose symptoms could be hardly differentiated from those for COVID-19. This resulted in some people opting out of face-to-face interviews out of precaution. Out of respect for their health decisions, the interview protocol was adjusted

to accommodate online interviews. The online interviews were more like virtual face-to-face interviews because they were video meetings via Zoom. The Zoom video meetings came with an additional advantage of enabling interviewees across different geographical locations in Australia to participate in the research, considering that South Australia only contributes a small percentage to the infrastructure PPP inventory in Australia. In Australia, the highest percentage of infrastructure PPP projects is located in New South Wales (NSW) as discussed in Section 2.3.2 of this thesis. Therefore, the Ph.D. Candidate travelled to Sydney, NSW to conduct a number of face-to-face interviews.

3.7. Quantitative Research Process

3.7.1. Development of questionnaire

An electronic questionnaire was developed to gather data on DR-related issues in infrastructure PPPs, using a relatively large data sample. For this, an online survey tool 'Qualtrics' was used. Using this tool, the criticality of DR issues in infrastructure PPPs was assessed, among other aspects. Additionally, the questionnaire was designed in such a way that the data collected would empirically test DCT in the context of infrastructure PPPs as portrayed in the conceptual framework of this research study.

The questionnaire comprised five sections namely: background information, the importance of DR in infrastructure PPP projects, behavioural tendencies of infrastructure PPP project parties in dispute situations, DR issues in infrastructure PPPs, and best practice for constructive DR in infrastructure PPPs. The questionnaire had both closed-end and open-end questions. Closed-end questions facilitated quick selection of responses by the participants (Sekaran and Bougie 2016) from a list of pre-defined responses whereas open-ended responses provided respondents with the option of adding more information or sharing their additional thoughts on a number of questions. When designing questionnaires, it is important to suitably scale the range of possible responses provided to the respondents (Hair et al. 2009). Hair et al. (2009) list four types of scales that are usually used; these include interval, nominal, ratio, and ordinal. Nominal scales

were used for some sections of the questionnaire because of their ability to categorise subjects into different mutually exclusive groups. For other sections, a five-point Likert scale was used.

The questionnaire survey was designed to be completed in approximately 15 minutes so as not to impinge on the time of busy professionals.

3.7.2. Sampling for the questionnaire survey

During the initial stages of this study, a sample size of about 120 participants was targeted for the questionnaire surveys in order to achieve a minimum number of 100 responses for analysis as proposed by Bujang, Omar and Baharum (2018). Participants were sampled from infrastructure PPP practitioners in Australia with experience in DR in at least one infrastructure PPP project. To facilitate coverage of a more holistic DR story from all project parties that are usually involved in infrastructure PPPs, distribution lists containing prospective participants in the survey were made to include infrastructure PPP practitioners with experience as the public partner of a PPP, private project company (SPV), contractors, sub-contractors, and PPP commercial, technical and legal advisors.

Prior to the main questionnaire survey, a pilot survey was undertaken.

3.7.3. Pilot questionnaire survey

Pilot questionnaire surveys were done to rid the questionnaire of any ambiguity that could have negatively impacted respondents' completion of the questionnaire (Fellows and Liu 2003). Loaded, leading and double-barrelled questions were also eliminated. This enhanced the reliability and validity of the data (Saunders, Lewis and Thornhill 2007). Fink (2002) recommends ten as the minimum number for questionnaire pilot surveys. In line with that, ten pilot surveys were undertaken for this research.

The feedback from the pilot survey was mostly positive, However, some changes were requested and these were implemented. Some of the changes included: generalising the DR-related questions in relation to the overall DR experience on PPPs instead of asking respondents

to reflect on one infrastructure PPP project while answering the questions; clarifying whether the joint DR system was real (currently used in practice) or hypothesised; and harmonising the terminology used to describe the joint DR system – previously "joint" had been used interchangeably with "unified". Additional feedback was also received on expanding the focus of the survey beyond the Government/SPV interface with the argument that the SPV is really a representative of the banks and equity in the structure. In Australia, the SPV tends to transfer most of the risks associated with design, construction, operation and maintenance to the respective contractors. There was also an argument that excluding the SPV and banks from any negotiation/dispute would exclude very little because the risk was being taken by everyone else but them. This feedback was also incorporated in the questionnaire during the pilot surveys. Following the pilot surveys, the questionnaire was revised to its final version (Appendix 3).

3.7.4. Executing the questionnaire survey

During the process of recruiting survey participants, individuals affiliated to private organisations and government departments in the construction and infrastructure sector in Australia, and whose email addresses were available publicly, were contacted directly by email. In total, 1233 personalised email invitations were sent out. In addition to these, requests were made to various professional institutions in Australia to assist with distributing the survey to their members. These institutions included the different Project Management Institute (PMI) chapters in Australia – Adelaide, Western Australia (WA), Sydney, Canberra, Melbourne and Queensland; the different chapters of the Australian Institute of Project Management (AIPM) – Victoria, Australian Capital Territory, New South Wales (NSW), Northern Territory, Queensland, South Australia (SA), Tasmania and WA; different chapters of Engineers Australia – WA, Tasmania, Queensland, Northern Territory, Newcastle and Sydney; Society of Construction Law Australia; Australian Constructors Association (ACA); Consult Australia; Global Infrastructure & Energy Network (IPFA); Dispute Resolution Board Foundation; and World Association of PPP Units & Professionals. Other organisations that were contacted

include Infrastructure and Structured Finance Unit (NSW Treasury), WA Department of Treasury, Partnerships Victoria, Partnerships Australia, Office of Projects Victoria, SA Department of Treasury and Finance, Infrastructure SA, Australian Institute of Building, University of Queensland International Development, Infrastructure and Commercial Advisory Office, and engineering, law and management faculties of various universities across Australia.

A few of the organisations and professional bodies that were contacted supported the distribution of the survey link in several ways: ACA publicised the survey on their website (Australian Constructors Association 2022) and promoted it on their LinkedIn page; PMI WA published the survey link in their July newsletter (Project Management Institute Western Australia 2022); PMI Adelaide also marketed the survey in their newsletter (Project Management Institute Adelaide South Australia 2022) and so did the Society of Construction Law Australia. NSW Treasury, PMI Canberra and AIPM Victoria shared the survey link with individuals within their teams. The President of AIPM Victoria also publicised the survey on their personal LinkedIn and Twitter pages. Given that the survey was anonymous, the actual number of survey respondents that were sourced through the assistance provided by the different organisations and bodies could not be ascertained. However, their contribution to publicising the survey and boosting the response rate was greatly acknowledged.

To further boost responses to the survey, participants in the focus group discussions and interviews were requested to share the survey link with their networks. However, participants in the focus group and interviews were requested not to complete the questionnaire in order to ensure effective triangulation of results. The survey was also advertised on LinkedIn in the groups of “Public Private partnership Research” and “PPP Australia” as well as on the researcher’s personal page.

As mentioned, the survey responses were collected through Qualtrics – an online platform that is commonly used for developing and distributing surveys. The responses were collected between 9th May and 30th September 2022.

3.8. Ethical Considerations

The research process was undertaken in compliance with the ethical standards specified by the National Statement on Ethical Conduct in Human Research 2007 (updated 2018), and the Australian Code for the Responsible Conduct of Research 2018 in line with the requirements by the Human Research Ethics Committee (HREC) of the University of Adelaide.

Prior to collection of empirical data, ethics approval (Appendix 6) was obtained from the University HREC secretariat under the approval number H-2020-230. The ethics application covered aspects of research methodology, participant recruitment, data analysis and use, participant confidentiality, among others. Additionally, the Participant Information Sheet, Consent Form, as well as questions for the focus group discussions, interviews and questionnaire surveys were submitted for approval.

For the interviews and focus group discussions, the Participant Information Sheet was sent to participants ahead of the respective meetings to provide them with specific information related to the project. This information included the research objectives, how their data would be used, what to expect during the data collection meetings, among others. Consent Forms were also sent to them to ensure that permission was obtained from the participants to use their data in the research and to record the deliberations of the meetings.

3.9. Data Analysis Methods

For data collected through mixed methods, data analysis techniques can differ depending on whether the purpose of the analysis is initiation, development, complementarity, expansion or triangulation (Onwuegbuzie and Hitchcock 2015; Schoonenboom and Johnson 2017). Greene, Caracelli and Graham (1989, p. 259) explained these purposes as follows: “initiation seeks the

discovery of paradox and contradiction, new perspectives of frameworks, the recasting of questions or results from one method with questions or results from the other method; development seeks to use the results from one method to help develop or inform the other method, where development is broadly construed to include sampling and implementation, as well as measurement decisions; complementarity seeks elaboration, enhancement, illustration, clarification of the results from one method with the results from the other method; expansion seeks to extend the breadth and range of inquiry by using different methods for different inquiry components; and triangulation seeks convergence, corroboration, correspondence of results from different methods." These definitions are still in use today (Greene 2007).

Where the purpose of the mixed methods research design is initiation, development and expansion, integrated data analysis techniques are usually suitable. However, where the purpose is triangulation, data analysis strategies that are independent of each other are the most appropriate (Onwuegbuzie and Combs 2010). This is because the aim of triangulation is to research a given topic from differing perspectives to enhance the validity of the collected data.

In line with the above and given that the motivation of using a mixed methods research design was to achieve triangulation, data collected from all three stages of the data collection process was analysed separately. Data from the focus group discussions was analysed first, followed by that from the questionnaire survey, and finally that from the semi-structured interviews.

3.9.1. Analysis of Qualitative Data

There are several methods of analysing qualitative data such as grounded theory, phenomenology, ethnography, and content analysis, among others (Burnard 1995; Bazeley 2009). For this study, content analysis was selected in line with the steps recommended by Sekaran and Bougie (2016). Unlike other methods, content analysis has no linkage to any science in particular and it is associated with few rules (Bengtsson 2016). This reduced the risk of convolution in aspects of philosophical discussions and concepts.

Qualitative data was collected in the form of hand-written notes and audio recordings from the focus group discussions and semi-structured interviews. First, the audio recordings were transcribed in Microsoft Word. This was followed by familiarisation and re-familiarisation of the transcriptions through thorough reading of the information in the transcripts. Subsequently, data reduction was commenced through coding and categorisation. For this, NVivo software was used. NVivo is a qualitative research software that facilitates analysis of data through coding that results into highlighting of common themes and categories (Hilal and Saleh 2013). Following data coding, categories were generated and these represented the different narratives in the data. The categories were used to derive meanings from the data.

Behavioural antecedents of parties during dispute were discussed in relation to DCT (Sections 2.4.4 and 3.3 of this thesis).

3.9.2. Analysis of Quantitative Data

The main aim of the quantitative analysis was to understand how infrastructure PPP practitioners rated the different factors extracted from the literature review and focus group discussions as well as to understand the behavioural orientations of infrastructure PPP parties during conflicts and disputes. This was pursued through statistical analysis using version 27 of IBM SPSS Statistics software via a series of steps.

Standard statistical methods for screening, validating, and analysing quantitative data were employed. Descriptive statistics were used for summarising data in form of standard deviations and means. To compare data from two groups, T-tests were used to compare the mean values. Correlation analysis was also done to investigate the relationship between variables.

For the quantitative datasets of this research, data was first screened for unengaged responses, missing data, reliability, normality and content validity. Following that, descriptive statistics were undertaken by examining the standard deviation, mean, and t-values. The Mann-Whitney U test was also done to assess whether there was any difference between views of PPP

practitioners who had acted on behalf of the public partner (government) and those from the private sector. Furthermore, factor analysis was conducted, and Pearson correlation analysis.

3.10. Summary

This Chapter described the methodology that was adopted to achieve the research objectives of this study. This covered the methodology employed for both data collection and data analysis. First, the process for selecting the theoretical lens for the research was presented. Subsequently, the appropriate research design and a description of how data collection methods for the research were selected including the justification for their selection was presented. Finally, the methods used for analysing data were presented. To understand the influence of behaviour of project parties on the DR approaches and processes, questions querying into dispute behavioural tendencies of infrastructure PPP project parties were embedded in the interviews and questionnaire survey in line with the principles of DCT as depicted in the conceptual framework of this research study. However, this was done without exclusive mention of DCT to the respondents in order to avoid overwhelming the respondents with conflict research theories and instead redirect their focus to describing the different scenarios that were relevant for analysis of the research findings.

The research adopted a transformative mixed design approach involving qualitative and quantitative research designs. For collection of empirical qualitative data, focus group discussions and semi-structured interviews were selected. Quantitative empirical data was collected using questionnaire surveys. The data was collected in the order of focus group discussions, followed by questionnaire surveys, and finally semi-structured interviews. The chapter also presented the methods that were used to analyse the empirical data collected in this research as well as the ethical procedures that were applied for the study.

The next chapter discusses the findings of this study.

CHAPTER 4 RESULTS AND DISCUSSION

4.1. Overview

This section presents the results obtained from all three empirical data collection stages of this research namely: - focus group discussions, a self-administered questionnaire survey and semi-structured interviews. The qualitative data collected from the focus group discussions and the semi-structured interviews was separately analysed using NVivo software while the quantitative data obtained from the questionnaire survey was analysed using IBM SPSS software. Sections 3.6.1, 3.6.2 and 3.7.1 presented a summary of the broad questions for the focus group discussions, interviews, and questionnaire survey respectively. To minimise repetition in the thesis, the broad questions have not been repeated in this chapter. However, the sub-sectioning of findings from the respective data collection processes was aligned with the broad questions.

4.2. Qualitative Data from the Focus Group Discussions

The focus group discussions iterated the importance of this research from the perspective of industry practitioners. Additionally, the findings from the focus group assisted the design of the questionnaire survey which was used to gather further industry insight from a wider set of infrastructure PPP practitioners. This section presents a summary of the profiles of the participants in the focus group discussion in addition to their views on the DR practices currently used in infrastructure PPPs, DR-related issues, causes and escalators of dispute, and recommended DR practice for infrastructure PPPs.

Although the target number of focus group participants was 10, 12 individuals were recruited to ensure that the focus group had sufficient participants in the event that some recruited individuals became unavailable at the time of the focus group discussions. This was in line with the 10 – 25% recommendation made for over-recruitment by Rabiee (2004). However, to recruit

the 12 individuals, 38 infrastructure PPP practitioners in Australia were contacted through their contact details that were publicly available on the websites of their organisations or LinkedIn.

4.2.1. Profile of participants in the focus group discussion

The focus group discussions were attended by nine individuals – three academics and six industry practitioners. This not only fit within the recommended number of participants as explained in Section 3.6.1 of this thesis but was also ensured adequate representation of the targeted contributors to this research project. Basic information on the focus group participants is presented in Table 4.1.

Table 4.1: Basic information on the focus group participants

Participant	Industry / Sector	Relevant experience
FG1	Academia	• PPP research • Construction management and project management background
FG2	Academia	• PPP research • Construction management and project management background
FG3	Barrister/civil engineer, DRBF Legal and engineering: building construction disputes, ADR (arbitration, mediation, DRBs, DABs, etc)	• Arbitrator on a PPP project • Expert determination in a hospital PPP • Legal counsel for dispute between contractor and sub-contractor • Transaction advisor for a major PPP project in Australia
FG4	Practicing solicitor, practitioner of DAB, DRBF Legal	• Legal advisory to equity on multiple infrastructure PPP projects in Australia • Advisor to the project co. (SPV) from bid stage through to O&M in a hospital PPP • Part of DAB on several infrastructure PPP projects in Australia
FG5	Legal	Legal advisory to PPP contractors and subcontractors for about 15 years on disputes arising on infrastructure PPP projects.
FG6	Legal – front end legal practitioner	• Practised on several infrastructure PPPs including the very first PPP under Partnerships Victoria

Participant	Industry / Sector	Relevant experience
		• Mostly acted for project co. (SPV) for both economic and social PPPs – most have had a level of dispute involved • Acted for financier on major transport PPP in NSW
FG7	Engineering, training & education on infrastructure PPP projects Steering committee member of the WAPPP	• Engineering and project management consultant on PPP projects • CP3P trainer (foundations, execution, preparation) for government officials in various continents • Been involved in the after financial close of PPPs
FG8	Academia	PPP dispute resolution research
FG9	Engineering and PPP research	• PPP dispute resolution research • Preparation and engineering delivery of PPP projects

Most of the focus group participants had a wealth of experience in infrastructure PPPs spanning different stages of project formulation, pre-contract negotiation and financial closure, design and construction as well as operation and maintenance. There was a good representation of academics, legal, engineering and project management practitioners. The main insights drawn from the focus group discussions are discussed in subsequent sub-sections.

4.2.2. Current DR practice in infrastructure PPPs

FG7 highlighted that one of the reasons infrastructure PPPs are becoming less popular is because of the inflexible contracts despite the long-term nature of the projects. This was backed by FG4, FG5 and FG6 who emphasised need for more flexibility in infrastructure PPPs especially in relation to risk that is associated with unforeseen events. FG5 elaborated that the current rigid price contracts require contractors to accurately predict what will happen in 20 – 30 years and commented that this is not only impossible but also fuels many disputes that are experienced in infrastructure PPPs.

Additionally, there was consensus among all the focus group participants that DR planning for infrastructure PPPs is inadequate at project level, and when a dispute arises during the course of project execution. This was in part attributed to the little attention paid to DR clauses and

processes at contracting stage. FG7 and FG3 highlighted that at the time of bidding for an infrastructure PPP project, most bidders are preoccupied with ensuring that they win the project, secure equity, and risks are transferred appropriately, among others.

FG3 further stated that in most cases, the DR provisions that are found in concession deeds are set by the government entity or their nominated representative, highlighting that those provisions are related to the various subcontracts in the PPP set-up through clauses for handling linked claims or pass-through claims. FG6 added that rarely does any party contest the provisions on the basis of inappropriateness of DR processes because PPP bidding processes in Australia are very competitive and the last thing a bidder wants to be seen doing is pushing back DR clauses. FG3 emphasised that since the government agencies seem to be steering DR provisions, education of these agencies is key so that the lawyers drafting the DR provisions on their behalf do so in a more streamlined way.

Finally, FG3 reported that DR provisions usually vary from project to project. FG3 elaborated that most DR provisions specify a senior executive meeting as the first step of DR. In the event that the dispute cannot be resolved at that level, expert determination is sought. As the expert determination may not be binding, arbitration is undertaken and, in some instances, litigation. FG6 reported that on some projects, the order of progression of DR processes and respective timelines are not well elaborated in the DR provisions. As such, infrastructure PPP parties sometimes progress to subsequent DR processes before exhausting the previous ones. For instance, on a big tunnel project in Australia where the DR process had progressed to litigation, the parties were sent back to arbitration, but the dispute was eventually resolved by a more collaborative method. While this was a rare twist of turning a dispute that had progressed to an adversarial process to a path of an amicable process, all the focus group participants were inclined to the view that the best way to manage disputes in infrastructure PPPs is to avoid them using processes like dispute avoidance boards (DABs). FG6 gave an example of a mega transport PPP in Melbourne which had 26 unresolved issues that eventually blew up into

disputes when the relationship among the project parties deteriorated. FG6 added that if these issues had been progressively dealt with through a collaborative platform, relationships would have been preserved and some disputes may have been avoided.

4.2.3. Causes and escalators of disputes

FG4, FG5 and FG6 discussed the causes of dispute and agreed that they include: improper and unclear risk allocation, under-pricing of the project, unforeseen conditions/events such as COVID-19, breakdown of commercial relationships, parties taking on too much risk, exposure of the SPV to liabilities that they cannot pass on to either the government or the contractors, failure to resolve issues in a timely manner, and disagreement on the parties responsible for different scopes of work.

While FG4 noted the escalators of disputes as existence of conflicts between on-site representatives of different parties and communication breakdown, FG6 argued that poor relationship between parties and unwillingness to negotiate escalates disputes on infrastructure PPP projects.

These findings matched with various literature sources (Chan et al. 2011; Tang et al. 2013; Osei-Kyei et al. 2019) on sources, causes and escalators of disputes in infrastructure PPP projects.

4.2.4. Ranking of DR-related issues

As part of the focus group discussions, a ranking of DR-related issues encountered in infrastructure PPP projects was done starting with the most prevalent to the least prevalent. This ranking (Table 4.2) was done collectively by the focus group participants by majority vote. The participants discussed amongst themselves and agreed on the order of ranking of the DR-related issues.

Table 4.2: Focus group ranking of DR-related issues

Ranking	DR-related issues
1	Poor collaboration
2	Unclear communication channels
3	Unclear guidelines on who is responsible for oversight of the public partner's actions
4	Inefficacy of applied conflict management and DR systems / processes
5	Absence of elaborate DR guidelines
6	Absence of monitoring and evaluation
7	Lack of transparency; and government not being transparent on certain issues
8	Exclusion of behaviour of project parties in the DR process

"Poor collaboration" and "unclear communication channels" ranked as the most prevalent DR-related issues while "lack of transparency" and "exclusion of behaviour of project parties in the DR process" were ranked as the least prevalent.

FG6 highlighted Issue #5 (absence of elaborate DR guidelines) as a process issue because current DR practice expects parties to agree on a process to be used for all disputes anticipated during the entire duration of the project, at the beginning of the project. To this, FG5 added that this lack of flexibility around DR options makes effective DR impractical given that not all disputes encountered can be resolved using one single process.

4.2.5. Recommended DR practice for infrastructure PPPs

Dispute boards (DBs) or dispute resolution boards (DRBs) or DABs – as they are commonly known in Australia, were commended by FG3, FG4, FG5, FG6, FG7 and FG8 as one way of avoiding disputes and proactively managing conflicts because they allow parties to jointly discuss matters on a regular basis before they get out of hand.

FG 5 clarified that DABs are gaining popularity in Australia and different parts of the world, but not all infrastructure PPP contracts provide for their application on the projects.

4.3. Quantitative Data from the Questionnaire Survey

This section discusses the results obtained from the questionnaire survey. First, the results from the data screening and checks for normality, validity and reliability were presented. This is

followed by a summary of the profiles of the respondents. Subsequently, the importance of DR and the role of effective DR in successful delivery of infrastructure PPP projects is confirmed. Following this, an understanding of the parties and stage at which DR systems are formulated for infrastructure PPPs is established. The degree of satisfaction with the DR processes is also investigated. The critical sources of disputes, importance of a joint DR system, behavioural tendencies of infrastructure PPP parties during dispute, critical DR issues, recommended DR practice, as well as critical success factors for DR in infrastructure PPP projects are also determined. Furthermore, the views of public sector respondents are compared with those of respondents from the private sector. Correlation analysis and factor analysis are also shown.

4.3.1. Screening for missing data, unengaged responses

The data collected from the Qualtrics survey was exported into an SPSS-compatible format and screened for missing and unengaged responses. For data to be removed from a given dataset because of missing data, 10% of it should be missing (Bennett 2009; Hair et al. 2009).

Responses are said to be unengaged for Likert scale-type questions when respondents provide the same answer to all or most of the questions even when the questions are reversed. To check for unengaged responses, the standard deviations for all Likert scale-type were computed and responses with standard deviations below 0.5 were eliminated from the dataset as proposed by Little and Rubin (2014).

Following this initial screening, 5 out of the 106 responses were not considered for further analysis in this study. Therefore, 101 survey responses as provided by SPSS were analysed going forward.

Sanity checks for normality, reliability and validity were then undertaken on the data.

4.3.2. Checking for normality

Given that most of the statistical tests in existence rely on the assumption that the data is normally distributed, the quantitative data collected from this study was checked for normality

using the SPSS software. Univariate normality was initially done using histograms with normality curves superimposed over them. According to the histograms, the data from all the variables appeared to be normally distributed.

It was also noted that there is a growing acceptance of the use of Kurtosis and Skewness for obtaining a rough indication of distribution of data (Hair et al. 2009). Data can be said to be skewed if its distribution is drawn in one direction from the centre of the dataset (Witte and Witte 2008). If the Skewness for any given dataset is higher than 3.0, the data is said to be very skewed (Kline 2005). On the other hand, Kurtosis measures the peakedness of a distribution (Kim 2013). Data can be considered adequate if the Kurtosis score is less or equal to 2.20 (Sposito, Hand and Skarpness 1983). The Skewness and Kurtosis values that were generated for this dataset are attached in Appendix 7. The values were outside the recommended range (above) for a number of variables. This was not a surprising finding given the nature of the data collected across an Australia-wide geographical coverage characterised by variable levels of infrastructure PPP project implementation. Kim (2013) argued that departure from normality for such cases should not necessarily imply that data should be eliminated from the dataset. Therefore, for this dataset, it was concluded that the assumption of normality was not appropriate for all the collected data. Therefore, nonparametric methods were used in some instances as described in subsequent sections of this thesis.

4.3.3. Validity and reliability of the survey

Validity can be categorised under three forms – construct, criterion-related, and content (Sekaran and Bougie 2016). In line with the recommendations of Hair et al. (2009), validity checks for the survey data under this study primarily focussed on understanding the adequacy of the survey measures used in the questionnaire for representing the phenomena under investigation, and the extent to which the survey was clear from systematic non-random errors. For this study, content validity was achieved through development of the questionnaire survey on the basis of literature review and deliberations of focus group discussions. Furthermore, the

initial version of the questionnaire survey was piloted (Sekaran and Bougie 2016) on some industry experts as detailed in Section 3.7.3 of this thesis.

Reliability checks, on the other hand, investigated consistency of the measures and examined the extent to which they were not biased (Sekaran and Bougie 2016). This may be done using internal consistency – the extent to which items that constitute a scale estimate the same underlying attribute, or test-retest reliability checks (Pallant 2016). Cronbach's alpha is the most common statistical method for measuring internal consistency. It ranges between 0 and 1 – where 1 indicates that the survey instrument has a high degree of reliability (Chan et al. 2010). An alpha value of 0.7 is considered the minimum acceptable for any given item (Nunnally, Bernstein and Berge 1967; Cheung and Chan 2011). Cronbach's alpha values were computed for items with latent variables. These included parts of Sections 2 to 4 of the questionnaire. Section 1 of the questionnaire survey collected information on the respondents' profiles and therefore did not contain any latent variables.

Table 4.3 summarises the results from the reliability tests.

Table 4.3: Reliability tests

Scale	Cronbach's Alpha	No. of items
Importance of joint dispute resolution	0.849	7
Dispute resolution behavioural environment	0.695	10
Own DR behavioural tendencies	0.821	10
Other's DR behavioural tendencies	0.827	10
DR-related management style	0.876	14
DR issues	0.929	16
Recommended DR approaches	0.945	17
DR success factors	0.931	9

The Cronbach's Alpha values of almost all the items were within acceptable range (above 0.7) except for the scale "Dispute resolution behavioural environment" which was 0.695. This indicated that the questionnaire survey was reliable for measuring the scales tested except for "Dispute resolution behavioural environment." Therefore, for "Dispute resolution behavioural

environment", item analysis was done to determine the item(s) responsible for the low Cronbach's Alpha values. For this analysis, an item is said to be problematic if it has an Item-Total Correlation less than 0.40 (Ferris et al. 2005). The item "both opposing sides openly exchange information and examine their differences in order to find mutually acceptable solutions to both parties" had an Item-Total Correlation of 0.190 and was therefore marked as problematic. Once deleted, the resulting alpha value was 0.706.

Following the data screening and sanity checks, the experience of the 101 respondents whose responses was retained was examined. Section 1 of the questionnaire focussed on understanding the background information of the respondents to establish their experience and involvement in infrastructure PPP projects. For this, the percentage representation of each variable was computed (Hair et al. 2009).

4.3.4. Experience of respondents in infrastructure PPP projects

This section summarises the profile of the infrastructure PPP professionals who undertook the questionnaire survey. The respondents were profiled on the basis of their accumulated years of experience on infrastructure PPPs; the number, location, role, and types of infrastructure PPP projects undertaken; as well their roles on the infrastructure PPP projects and their level of involvement in DR. Querying into the above aspects not only provided a sense of the experience of the respondents but also confirmed the broad and diverse representation of the multiple parties that are usually involved in infrastructure PPP projects in Australia.

A summary of the respondents' years of experience in infrastructure PPP projects is presented in Figure 4.1.

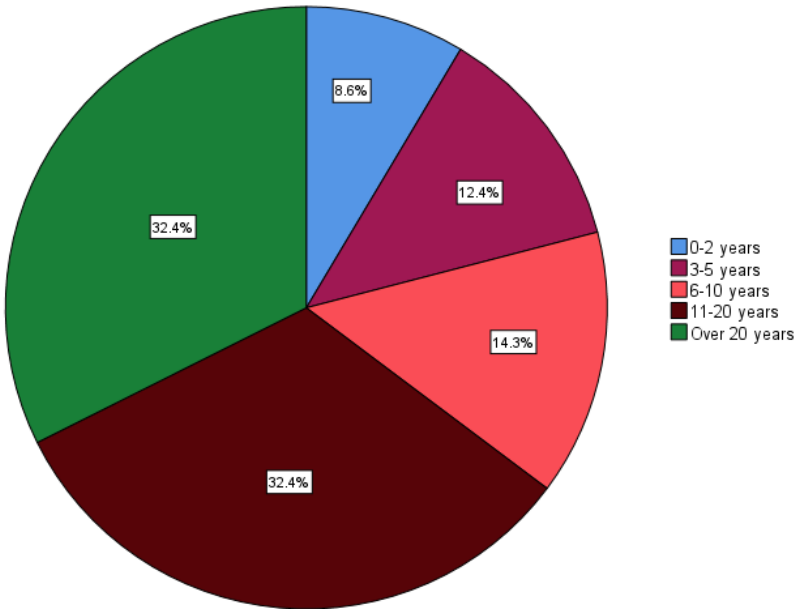

Figure 4.1: Summary of respondents' years of experience

It was observed that 64.8% of the survey participants had been practising in the field of infrastructure PPPs for over 10 years – with about 32% of them having more than 20 years of experience on these projects. This implied that some of the survey respondents were involved in earlier forms of the PPP delivery model in Australia. Moreover, about 59% of respondents had participated in the delivery of more than 5 infrastructure PPP projects (Figure 4.2) and only 9.5% had been involved in 0-1 project. This suggested that majority of the survey respondents were highly experienced in infrastructure PPPs.

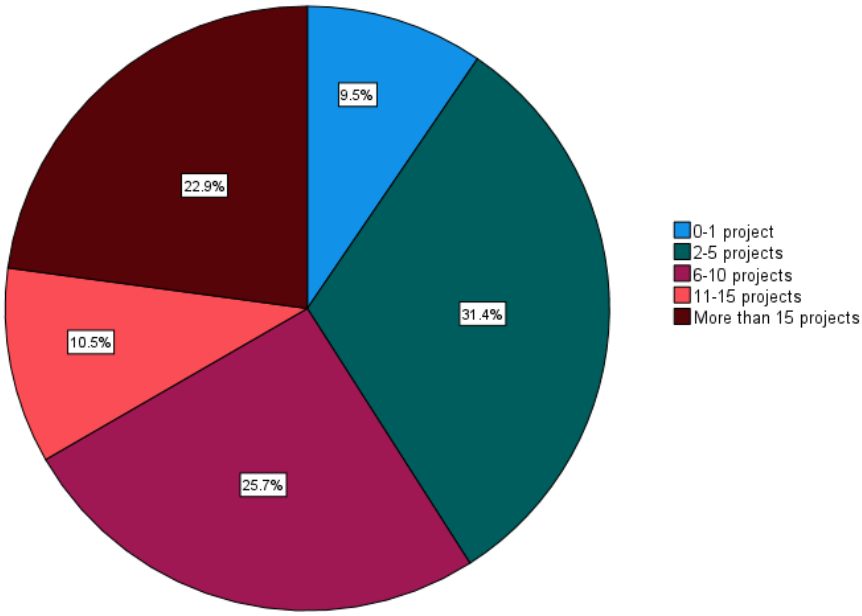

Figure 4.2: Number of infrastructure PPP projects undertaken by respondents

Also, nearly half of the respondents had been involved in infrastructure PPP projects in the states of New South Wales (NSW) and Victoria (VIC) – Figure 4.3. This was consistent with the findings of Jefferies and McGeorge (2009) who reported that the PPP model for delivering infrastructure projects in Australia is mostly applied in NSW and VIC. In Australia, respondents who had the lowest representation were those who had undertaken projects in Tasmania (TAS) followed by Northern Territory (NT). It is worth noting that the question querying location of the infrastructure PPP projects undertaken by the respondents allowed them to select more than one option as well as provide names of project locations outside Australia. This formed the "Other" segment of responses. In addition to infrastructure PPP projects in Australia, it was established that some respondents had been involved in projects in Tanzania, New Zealand, Papua New Guinea, Canada, Indonesia, Bahrain, the UK, Iran, Italy, South Africa, Singapore, Thailand, Brunei and Uganda.

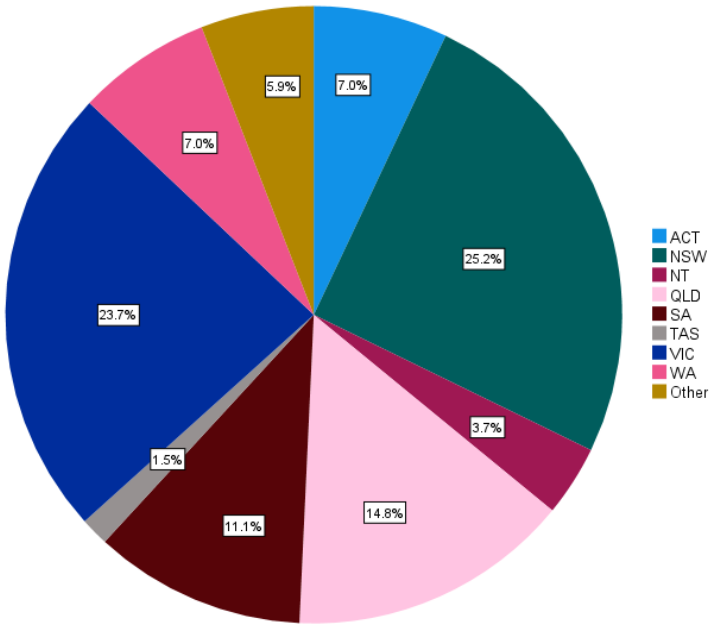

Figure 4.3: Location of infrastructure PPP projects undertaken by respondents

Regarding the respondents' professional roles on the infrastructure PPP projects they had undertaken, majority of the respondents had acted as advisors on the PPP projects as either legal, commercial, or technical advisors (Figure 4.4).

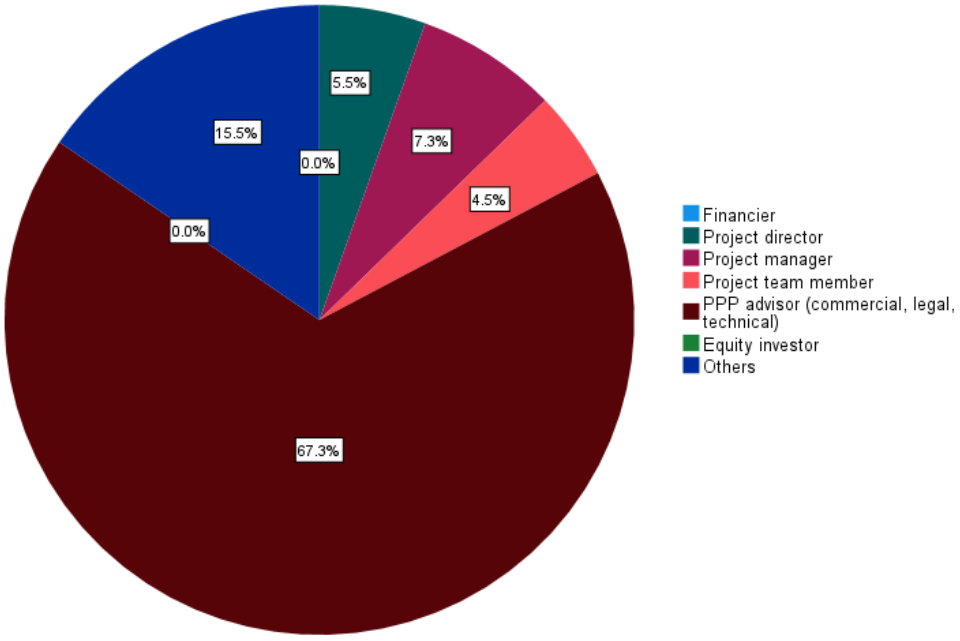

Figure 4.4: Respondents' professional roles on the infrastructure PPP projects

The second-most represented category was that marked as "Others", and this was the option that allowed respondents to specify their roles for those that were not part of the multichoice options. Here, most respondents specified that their main professional roles were as lawyers, barristers and solicitors representing different parties of the infrastructure PPP projects they had been involved in. This was good for the research as DR in infrastructure PPPs is mostly handled by legal professionals in Australia. Therefore, their participation in this research provided great insights on infrastructure PPP DR practice. There was also a commercial manager, a contract manager, an independent engineering consultant, and a government minister. It was also noted that most of the respondents had been largely involved in the DR processes (Figure 4.5) for the projects they had undertaken.

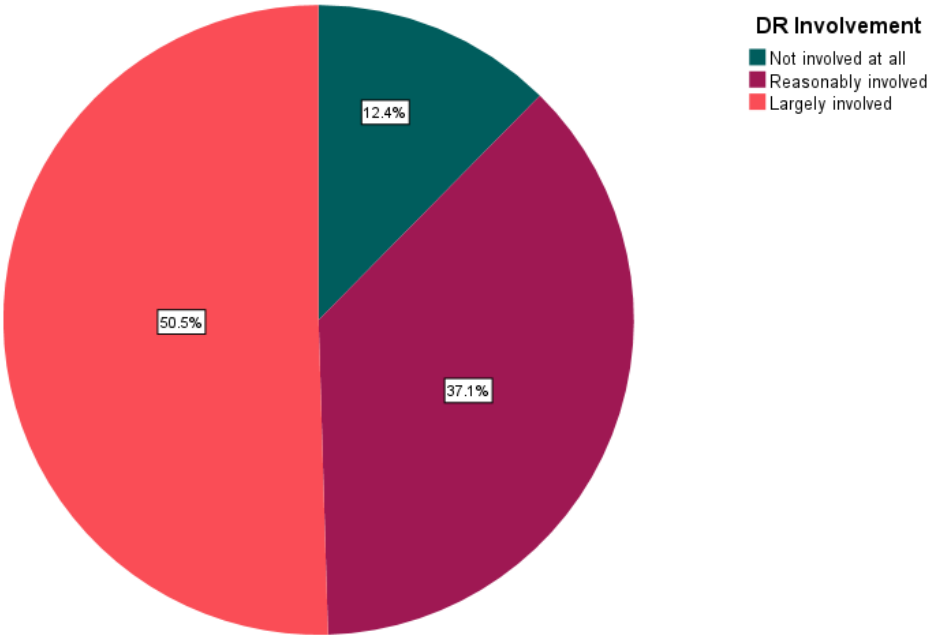

Figure 4.5: Respondents' degree of involvement in DR on the infrastructure PPP projects

Also, it was observed that majority of respondents had participated in the delivery of both economic and social infrastructure PPP projects (Figure 4.6). This provided the confidence that respondents were knowledgeable about the different dynamics associated with implementing both social and economic infrastructure PPPs. An equal 20% split was recorded for those who had participated in either social or economic infrastructure PPPs.

Over half of the respondents had been involved in projects representing the public partner – totalling 51.6% of the respondents. Furthermore, 46.6% had been part of one of the entities within the private partner umbrella (Figure 4.7). The small percentage marked as "Others" was a representation of those who had worked on infrastructure PPP projects as part of both the public and private partner on the different projects they had undertaken.

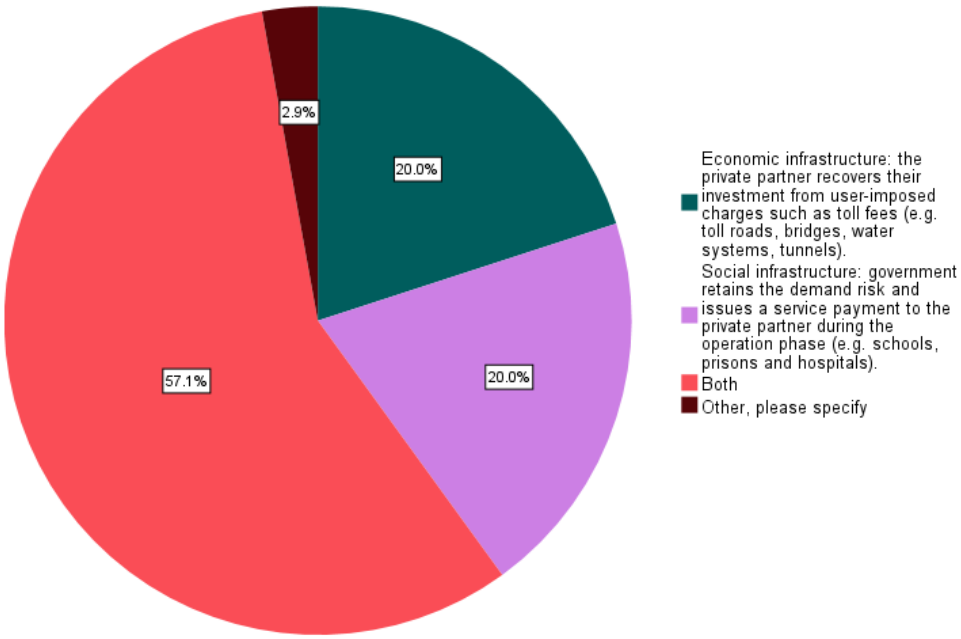

Figure 4.6: Types of infrastructure PPP projects undertaken by respondents

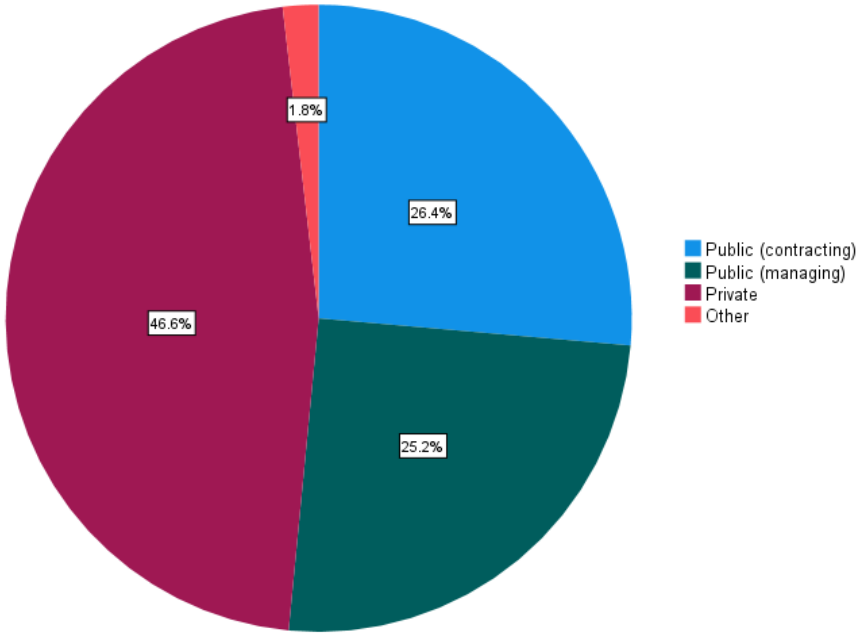

Figure 4.7: Sectors respondents represented on the infrastructure PPP projects

A similar distribution of respondents was recorded to have participated in infrastructure PPP projects at the stages of procurement (23.4%), design and construction (29.8%), and operation and maintenance (26.2%). During the interview phase of data collection, many interviewees reported that majority of disputes that occur on infrastructure PPPs are experienced in the design and construction (D&C) phase. Therefore, it was reassuring to see that the highest percentage of questionnaire survey respondents had participated in the D&C phase of infrastructure PPP

projects (Figure 4.8). Respondents who participated in the formulation stage were represented by 14.9%. The broad representation of respondents across the common stages of infrastructure PPPs provided the assurance that their responses represented the wholesome experience across the PPP project cycle. Respondents represented by "Other" included those who helped with insolvency processes, final account negotiations, contract review on liquidation, but mostly those who were called into the PPP project only after disputes arose at variable stages of the projects – D&C, M&E, post-procurement, and post-construction.

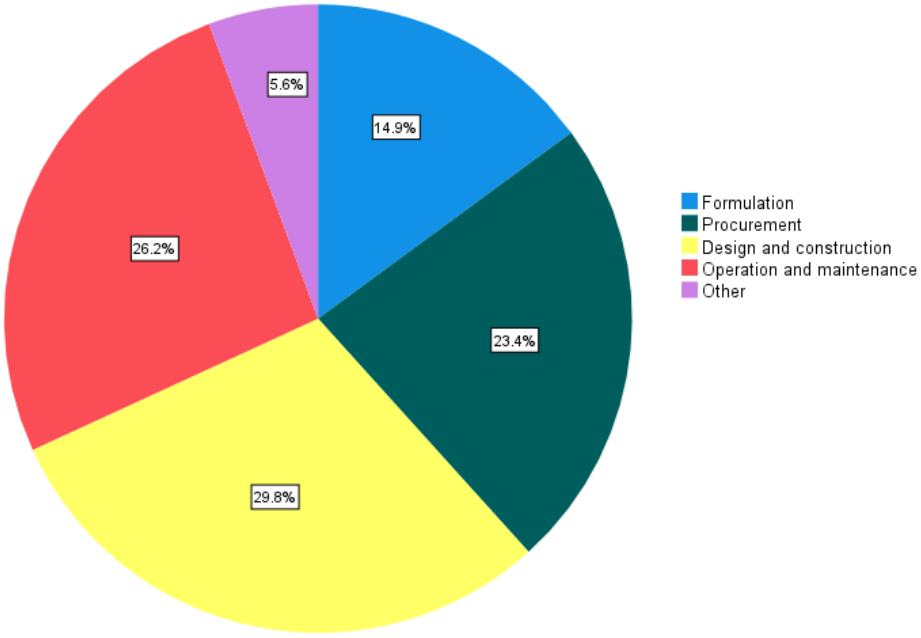

Figure 4.8: Stages of the infrastructure PPP projects undertaken by respondents

4.3.5. Importance of DR in infrastructure PPP projects

To further confirm the importance of this research based on industry experience, an inquiry was made into how conflicts and disputes affect the success of infrastructure PPP projects. The results showed that over 75% of respondents agreed that disputes significantly affect the success of infrastructure PPP projects (Figure 4.9).

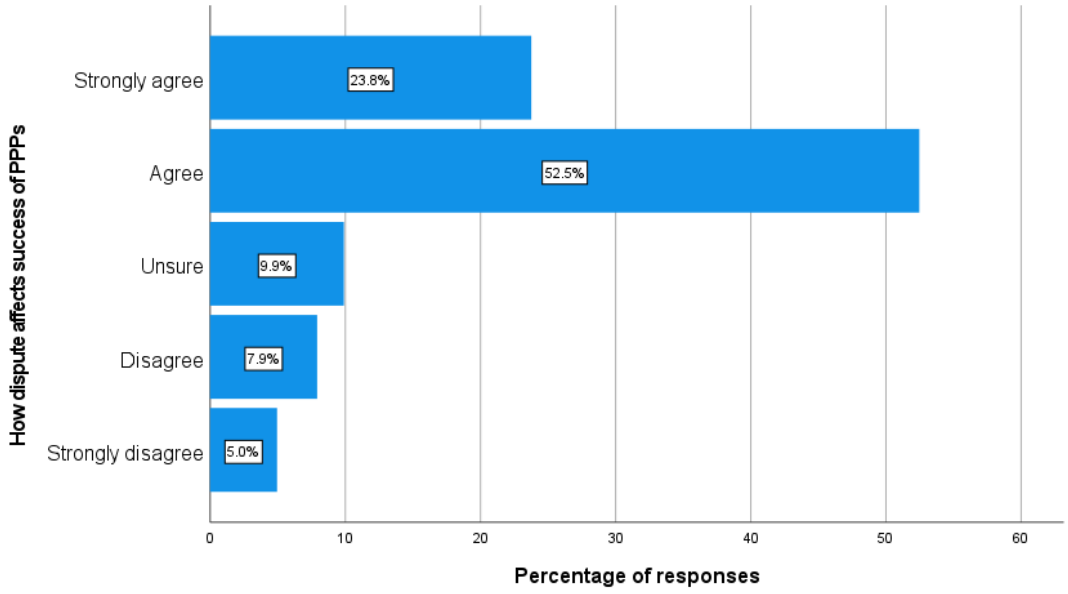

Figure 4.9: Survey respondents' degree of agreement on dispute affecting the success of infrastructure PPPs

Furthermore, the role of effective DR in successful delivery of infrastructure PPP projects was investigated and the data revealed that over 85% of respondents agreed that effective DR is crucial to the success of infrastructure PPP projects (Figure 4.10).

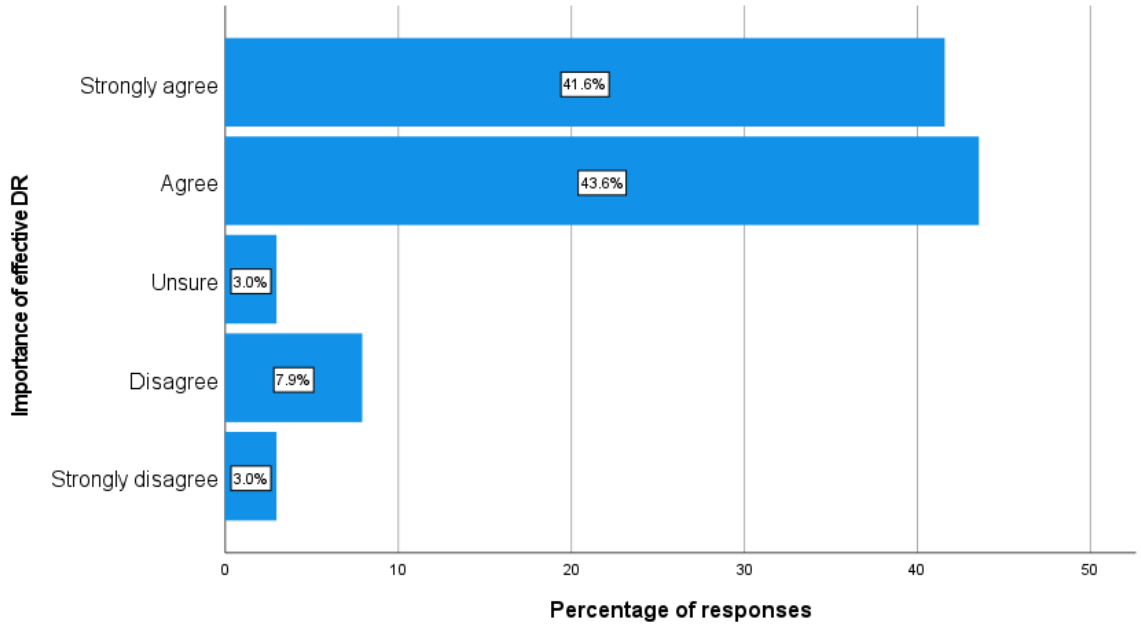

Figure 4.10: Respondents' degree of agreement on the importance of effective DR

4.3.6. Formulation of DR systems for infrastructure PPP projects

A further inquiry was made into the parties responsible for formulating DR systems for infrastructure PPP projects and when this is done. The results indicated that for the

infrastructure PPP projects which the respondents were involved in, 77.2% of the DR systems were formulated during the contracting period of the infrastructure PPP project (Figure 4.11). This reinforced findings from literature that DR processes are usually stipulated in PPP agreements and formulated as a tender requirement (Harisankar and Sreeparvathy 2013). However, it was also reported that infrastructure PPP parties occasionally agree on an ad hoc DR procedure during the construction phase – having agreed not to use the DR process stipulated in the contract documents. It was further reported that in some instances, DR systems were established during the D&C period. This was mostly emphasised by respondents who had undertaken projects as part of a sub-contractor under the D&C contract.

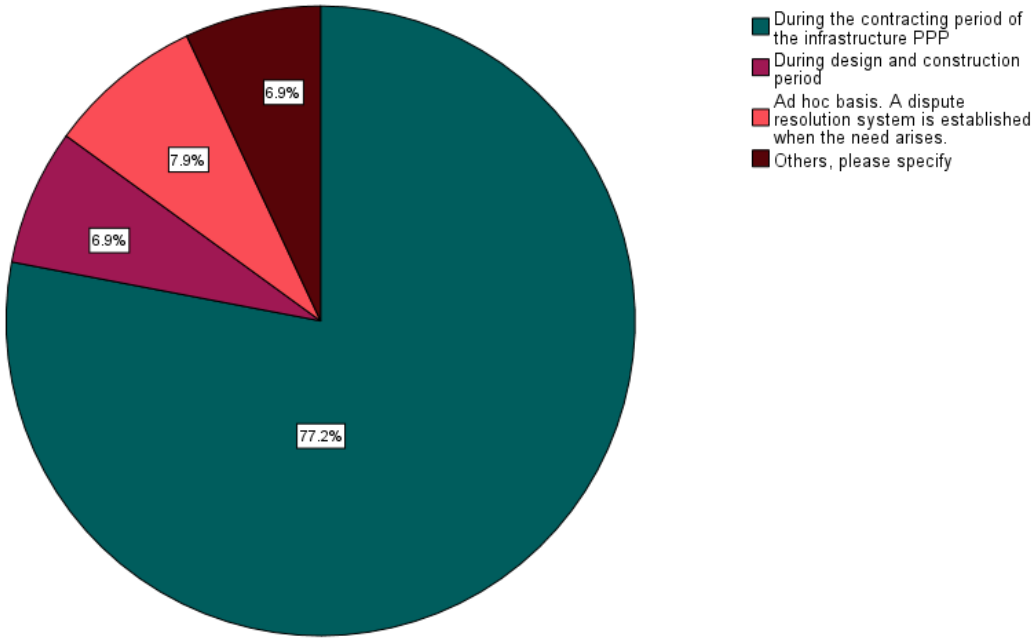

Figure 4.11: Project stage at which DR systems are usually formulated

Regarding the party that is usually responsible for initiating a DR system for any given infrastructure PPP project, most of the respondents pointed to the public partner – representing 42.6% (Figure 4.12). This included both the public agency responsible for contracting the project (29.7%) and the public entity that manages the project post-procurement (12.9%). Some respondents clarified that for contracts between the SPV consortium and private sector entities within the PPP project, the DR systems were formulated by the SPV (17.8%).

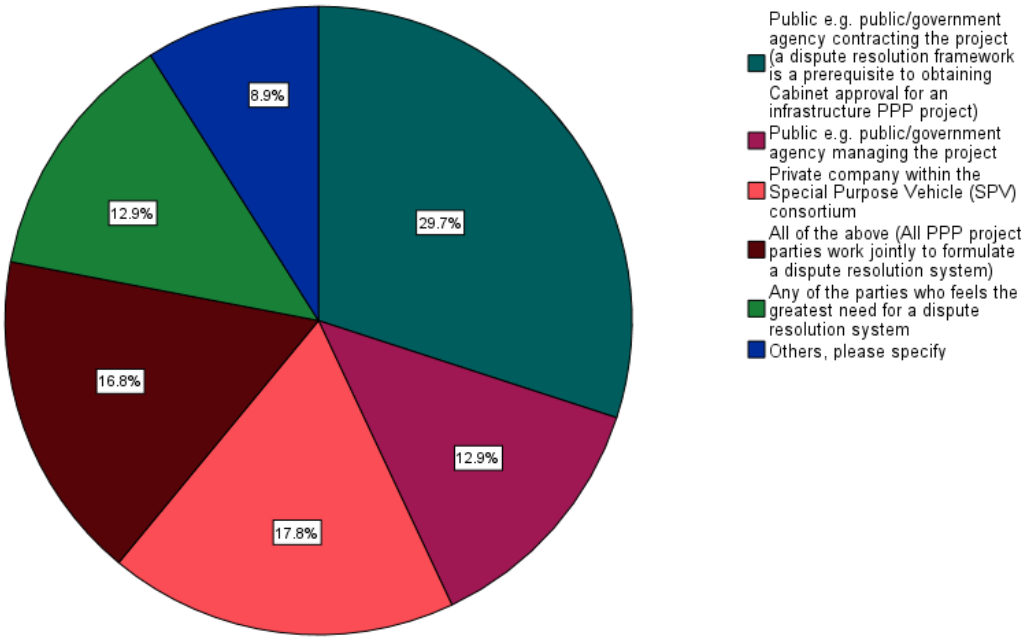

Figure 4.12: Party that is usually responsible for initiating DR systems

4.3.7. DR techniques for infrastructure PPP projects

The frequency (Table 4.4) as well as average duration (Table 4.5) of the DR techniques commonly applied on infrastructure PPP projects were investigated using descriptive statistics.

Using descriptive statistics, the characteristics of the data were investigated based on a central tendency measure of mean, and a dispersion measure of standard deviation. The mean values represented the averages of the responses whereas standard deviation was the degree of variation from the mean. The relative importance and rankings of the variables were determined using mean significance analysis. If two variables had the same mean, the variable with a smaller standard deviation was ranked above the one with a larger one (Wang and Yuan 2011).

Table 4.4: Ranking of frequency of usage for DR techniques

DR techniques	Mean	Standard deviation	Ranking
Dispute boards	3.01	1.075	1
Adjudication	3.01	1.129	2
Litigation	2.91	1.091	3
Arbitration	2.55	1.164	4
Expert determination	2.42	1.002	5
Mediation	2.37	1.024	6
Negotiation	1.47	0.818	7

On average, infrastructure PPP practitioners reported that dispute boards and adjudication were the most frequently used techniques, followed by litigation, arbitration, expert determination, and mediation. Finally, negotiation was ranked as the least commonly used DR technique in infrastructure PPPs. Both dispute boards and adjudication had the same mean but dispute boards were ranked as the most frequently used DR technique because they had a lower standard deviation.

Table 4.5: Average duration of DR process per DR technique

DR techniques	Mean	Standard deviation	Average duration	Ranking (longest to shortest duration)
Litigation	3.65	1.791	1 – 5 years	1
Arbitration	3.48	1.549	1 – 3 years	2
Dispute boards	2.27	1.418	4 – 12 months	3
Expert determination	2.10	1.201	4 – 12 months	4
Mediation	2.01	1.220	4 – 12 months	5
Adjudication	1.88	1.332	0 – 12 months	6
Negotiation	1.88	1.166	0 – 6 months	7

On duration of the DR techniques, litigation was reported to take the longest period from start to completion of the DR process. This was followed by arbitration, dispute boards, expert determination, mediation, adjudication, and negotiation.

4.3.8. Degree of satisfaction with current DR practice for infrastructure PPPs

The infrastructure PPP practitioners rated their degree of satisfaction with the DR practice that is commonly used for infrastructure PPP projects (Figure 4.13). Although 41.3% of the practitioners expressed their dissatisfaction with the DR processes, 27.2% expressed uncertainty of their level of satisfaction and 31.5% reported that they were satisfied with the DR processes.

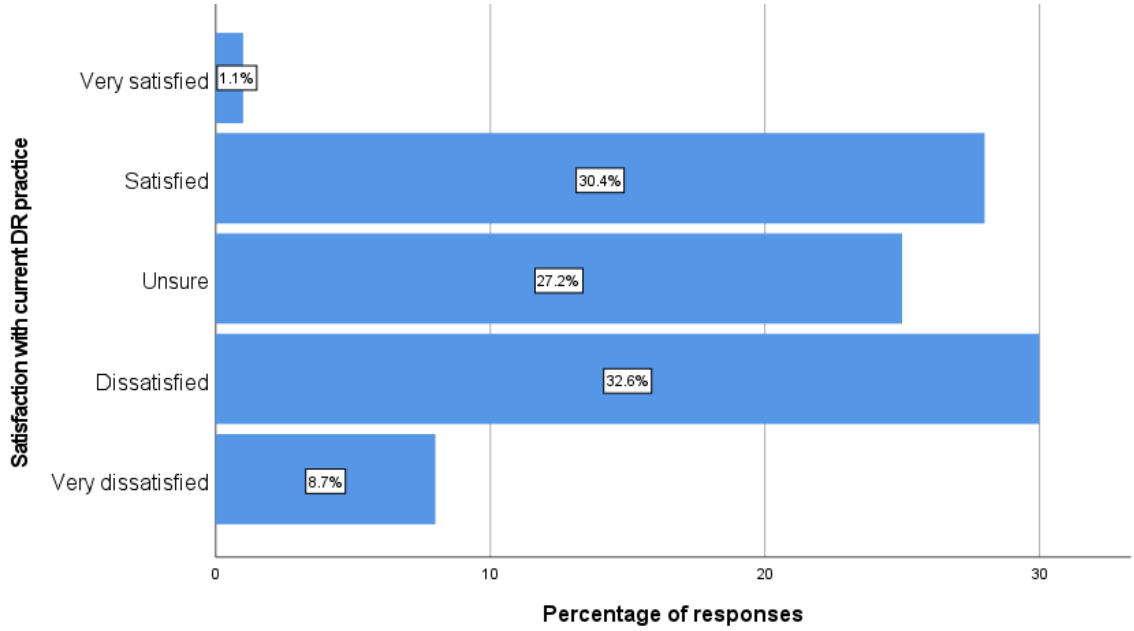

Figure 4.13: Degree of satisfaction with current DR practice for infrastructure PPPs

4.3.9. Sources of disputes in infrastructure PPP projects

The sources of disputes were ranked based on their means and standard deviations using the rationale described in Section 4.3.7 of this thesis. Additionally, the one-sample t test was conducted to determine the critical sources of disputes.

One-sample t-tests are usually used to establish if the mean of a given sample is different from a theorised mean. For this test, a significance level (α) of 0.05 was used (Osei-Kyei et al. 2019), this implied that there was 95% degree of certainty that the returned result was not because of chance and that the probability of wrongly rejecting the null hypothesis was 5% and that of rightfully accepting a null hypothesis was 95%. The null hypothesis (H_0: $\mu \leq \mu_0$; the population mean is equal to the proposed one) was tested against the alternative hypothesis (H_1: $\mu > \mu_0$; the population mean is not equal to the proposed one). The null hypothesis was rejected for any given factor if the calculated t value of the factor was greater than the critical t value from the distribution table of critical t values (Appendix 8) at n-1 degrees of freedom (df) – where n is the sample size. This suggested that a factor was critical and significant (Olomolaiye, Proverbs and Ahadzie 2008). In formulating the questionnaire survey, the factors that were included in the Likert-style questions were those deemed as important during the literature review process.

Thus, the aim of the one sample T test was to distinguish factors which respondents marked as "strongly agree" and "agree" from the rest of the factors. According to the scale, these were represented by ratings above 3 in the statistical data. Therefore, μ_0 was set as 3.

The t values were computed using the One Sample T Test in SPSS. The results are summarised in Table 4.6.

Table 4.6: Ranking of sources of dispute in infrastructure PPPs

Source of dispute	Mean	Std. deviation	Ranking	t-value
Contractual issues	3.84	1.367	1	21.679
Improper risk allocation	3.76	1.428	2	16.737
Issues related to attitudes and behaviour of project parties	3.59	1.494	3	11.079
Unforeseen events such as change in demand arising from economic fluctuations, natural disasters, disease outbreaks, war, among others	3.52	1.502	4	9.507
Issues related to inherent set-up of infrastructure PPPs e.g., long-term duration of projects, multiple stakeholders with differing organisational culture, among others	3.48	1.502	5	8.515
Issues related to competence of project parties	2.41	1.494	6	7.248
Governance issues	2.28	1.450	7	5.076

Contractual issues ranked highest in causing disputes in infrastructure PPP projects while governance issues ranked lowest. The one-sample t test confirmed that all sources of disputes that were listed in the questionnaire survey were important and critical considering that the computed t values were greater than 1.984 (from Appendix 8). This was not surprising because all these sources of disputes had been extracted from literature and also represented in the focus group discussions. This finding therefore confirmed what was documented in literature on sources of disputes in infrastructure PPP projects (Chan et al. 2011; Cheung and Chan 2011; Osei-Kyei and Chan 2017b).

4.3.10. Importance of a joint DR system for infrastructure PPP projects

For this research, a joint DR system was hypothesised as one that is jointly developed by all infrastructure PPP project parties for application in dispute situations that relate to all the parties

on a given project. It could be made project-specific for each project. Practitioners' thoughts on the usefulness of such a system were sought.

The top four important aspects of using a joint DR system were noted as (Table 4.7): (i) accommodating the interests of multiple stakeholders on the infrastructure PPP projects; (ii) relationship management over the long duration of infrastructure PPPs; (iii) enhancing communication amongst infrastructure PPP project parties; and (iv) integrating differing organisational culture and dispute resolution practices of different project parties.

The bottom three reasons – faster DR, cost reduction, and the irrelevance of a joint DR system, were marked as not significant based on their t-values as explained in Section 4.3.9 of this thesis. The insignificance of the final reason ("A joint dispute resolution system is not necessary for infrastructure PPP projects") further confirmed that the practitioners regarded a joint DR system as an important component of the DR process for infrastructure PPP projects in Australia.

Table 4.7: Ranking of importance of hypothesised joint DR system for infrastructure PPPs

Importance of a joint DR system	Mean	Std. deviation	Ranking	t-value
A joint dispute resolution system accommodates the interests of multiple stakeholders on the infrastructure PPP project	3.76	1.001	1	7.650
A joint dispute resolution system helps with relationship management over the long duration of infrastructure PPPs	3.71	1.117	2	6.416
A joint dispute resolution system enhances communication amongst infrastructure PPP project parties	3.45	1.196	3	3.745
A joint dispute resolution system integrates differing organisational culture and dispute resolution practice of different project parties	3.43	1.169	4	3.660
Disputes are managed faster with a joint dispute resolution system	3.22	1.188	5	1.842
The cost of dispute resolution is significantly reduced when a joint dispute resolution system is in place	3.05	1.108	6	0.449
A joint dispute resolution system is not necessary for infrastructure PPP projects	2.64	1.230	7	-2.913

Several infrastructure PPP practitioners provided additional comments on their thoughts on the use of a joint DR system for infrastructure PPPs. A few practitioners highlighted that the unified DR system could be a source of disputes if it is not properly drafted. A summary of other remarks on joint DR systems are presented below as offered on the questionnaire survey by the respondents under "Additional thoughts".

Some respondents noted that even though the only party in a PPP with capacity to fund changes and increased costs is the government procuring the project, they should not be drawn into all downstream discussions, unless there is a clear issue in dispute between the SPV and Government such as a risk-related disputes. They further argued that PPP investors should be competent to procure and manage their contractors, including their disputes, without the need to look to upstream reimbursement. However, they concluded by stating that the government could step in and resolve a problem from time to time.

Other respondents noted that joint DR may assist early and collaborative resolution of disputes. They further submitted that given the lengthy and complex contractual arrangements of infrastructure PPPs, any form of mutual DR system is vital for both public and private sector success. One respondent testified as below:

"*In one of the projects I was involved with, there was a dispute board and it was very effective. No dispute made it to arbitration or the courts*"

Another respondent submitted:

"I had three parties to manage; bringing all parties together once every two weeks for half a day seemed to work. We did not have any disputes."

Some respondents reported that the best dispute system on any large project is a DAB. They explained that a DAB may help with avoiding multiparty disputes which may be hard to resolve such as situations of multiparty court litigation. They recommended that if the asset is still under

construction, a joint DR system may help to save parties from insolvency failure and preserve the project.

On the role of behaviour and attitudes of the infrastructure PPP parties during implementation of the joint DR system, the infrastructure PPP practitioners commented that while systems are helpful, personalities of the people involved can influence the performance of the systems and may affect costs when a dispute arises. Other practitioners argued that shared interests and trust are key as expressed below.

"*Each of the above needs to be considered in light of the relative sophistication of the parties to the dispute, as well as the attitudes each party brings. Joint dispute will not assist where one or more parties refuses to place any trust in the other parties*."

On whether a joint DR system could accommodate the interests of all stakeholders, one infrastructure PPP practitioner reported that it is completely unrealistic to expect a DR system to accommodate the interests of all stakeholders on many projects. They explained that most disputes arise out of claims that are sum-zero and that many government actors in Australia happily pay more when they consider themselves liable to do so. They further explained that disputes during design and construction arise most commonly where a contractor risk eventuates, but the contractor does not want to suffer the financial consequence of crystallisation of that risk. So, either the State must pay more than it bargained for in a competitive tender process to get the same scope, or it must stand its ground and hold the contractor to their bargain. In such situations, the interests of the contractor are fixed. They want more money and/or an extension of time. Perversely, though, the interests of the government are nebulous and fragmented. At the same time, Treasury (and generations of taxpayers), the Auditor General and anyone interested in good governance will generally want the government to get what they bargained for in a competitive tender process and the relevant Minister is likely to want to deliver the infrastructure on time and with no bad press. The

delivery agency will want to deliver but might be less sensitive to bad press and be only as budget sensitive as it has to be, in light of the funding that is available for delays, variations and other claims.

Other practitioners recommended that for the joint DR system to work, a clear understanding should be established of how success is defined from the project's viewpoint. One infrastructure PPP practitioner expounded that whereas success for the funder is completing the work as cheaply and quick as possible, success to a contractor is being paid the amount they were contracted for. When a dispute arises, these two definitions of success, to some extent, are incompatible. Another practitioner recommended that efforts should be channelled towards driving negative behaviours across the contractual divide. In another practitioner's opinion, a joint DR system must ultimately protect the long-term interests of the government or ultimate owner of the asset and the taxpayers must receive genuine value for money from the infrastructure PPP.

Some practitioners argued that joint DR systems would help with managing linked claims as explaining that it is essential not to have fragmented disputes in different forums between the Principal and Head Contractor (upstream) and the Head Contractor and subcontractor (downstream), that cover the same factual issues. They however, advised that for the DR to be truly back-to-back, a Linked Claim and Linked Proceedings type clause would be required.

One respondent shared that their experience with linked claims in the PPP context was that they are fraught with complexity and end up creating significantly more issues, particularly for the downstream parties. Another explained that the typical system on most PPP involves a pass-through regime where all parties are bound by the decision at the top level; this kind of regime always gives rise to problems and is at risk of being declared void under security of payment legislation as offending against pay when paid prohibitions. To this, other respondents added that a joint dispute mechanism would reduce the likelihood of certain risks not being passed

through properly given the back-to-back contractual framework for PPPs – i.e. construction risks agreed with State are passed through the SPV to the contractor. This agreed with another respondent's submission who stated that:

"*A dispute board type approach – which I think is where this leads, is strongly preferable to the opaque linked claims system, with linked disputes winding up in a secretive arbitration or negotiation between Project Co and State, and all other participants being tied to whatever is agreed by those parties.*"

While many of the infrastructure PPP practitioners agreed that communication with relevant stakeholders is necessary, one practitioner emphasised that communication by any process does not work elaborating that face-to-face communication should be recommended because letter writing only leads to anger among the parties. Another practitioner argued that the joint DR system would only enhance communication at the point where there is an issue, and party needs to activate next steps because DR clauses are rarely considered until they are needed.

On the suitable stage of the project at which the joint DR system should be developed, some practitioners advised that the agreed joint DR system should be developed and made available to the project parties in the early stages of the project, preferably in advance. They added that the joint DR system should be part of the project induction process for middle and senior management.

Finally, one respondent commented that a joint DR system was not necessarily going to improve relationship management without other measures being put in place such as requirements to collaborate or at least cooperate in dealing with 'disputes' as defined. They added that the effectiveness of such a system would be influenced by the manner in which the subordinate documents are structured to encourage those behaviours. Another respondent argued that a joint DR system might result in the much-needed pressure points that exist in the gaps between infrastructure PPP stakeholders not being available, thereby inadvertently

reducing the chance of achieving economically rational outcomes in the face of uninformed public/media pressure. They elaborated this by saying that one of the purposes of the PPP model is to leverage the competitive dynamic between various stakeholders in order to create an environment in which market forces influence the achievement of commercially rational outcomes. Sometimes, this involves leveraging pressure being brought on one stakeholder by its financiers in order to achieve settlement, in circumstances where the stakeholder would otherwise be incentivised to hold out longer for a windfall gain (relative to merit of arguments). Sometimes it involves facilitating the creation of a wedge between two otherwise partially aligned parties e.g. SPV and D&C Contractor. These are legitimate pressures points that can be necessary to achieve rational commercial outcomes, particularly in circumstances where the subject matter of the infrastructure PPP project itself brings pressure on the project proponent that is independent of other project stakeholders and merits of arguments. For instance, State/Territory governments will always feel pressure from the public and media to resolve disputes irrespective of the merits.

4.3.11. Behavioural tendencies during DR in infrastructure PPPs

An understanding of the DR environment of infrastructure PPPs was established as shown in Table 4.8.

Table 4.8: DR environment in infrastructure PPPs

DR environment in infrastructure PPPs	Mean	Std. deviation	Ranking	t value
Interaction aimed towards managing the dispute between the PPP parties is moderated by an external party	3.27	1.145	1	2.294
The PPP parties in dispute have constant interaction throughout the dispute resolution process	3.23	1.174	2	1.980
Both PPP parties downplay each other's concerns	3.12	1.262	3	0.960
One of the PPP parties ignores the needs and viewpoints of the other party	3.00	1.244	4	0.000
Each PPP party gives up a need in exchange for a favour from the other party	2.73	1.051	5	-2.499

DR environment in infrastructure PPPs	Mean	Std. deviation	Ranking	t value
One PPP party gives up a need in exchange for a favour from the other PPP party	2.68	1.021	6	-3.066
Only one of the PPP parties openly exchanges information and works towards an amicable solution	2.23	1.033	7	-7.331
Both PPP parties tend to be disinterested in the dispute situation and subsequently ignore it	2.04	0.919	8	-10.338
One of the PPP parties is obedient and generous towards the needs and demands of the other party	1.92	0.949	9	-11.284

On the basis of the computed t-values, only "interaction aimed towards managing the dispute between the PPP parties is moderated by an external party", was a significant characteristic of the behaviour environment. This is because it had a computed t-value greater than 1.984 (Appendix 8). The tendency of having an external party who moderates interaction aimed towards managing dispute among parties is typical of both integrative and compromising DR dimensions.

To further understand the behavioural environment of DR in infrastructure PPPs, respondents were tasked with rating their actions during a dispute situation as summarised in Table 4.9.

Table 4.9: Own actions during a dispute situation

Code	Own behavioural actions during dispute	Mean	Std. deviation	Ranking	t-value
Own Beh_1	I obliged to the other party's demands	3.26	1.318	1	1.915
Own Beh_2	I was aggressive in the DR process	3.22	1.523	2	1.459
Own Beh_3	I was competitive	2.37	1.263	3	-4.958
Own Beh_4	I strongly pursued my own interests/goals	2.26	1.416	4	-5.206
Own Beh_5	I was tough during the DR process	2.22	1.060	5	-7.240
Own Beh_6	I was accommodative	2.13	1.100	6	-7.809
Own Beh_7	I was collaborative	2.04	1.148	7	-8.271
Own Beh_8	I was cooperative	1.93	0.955	8	-11.104
Own Beh_9	I bargained hard with the other party	1.89	1.034	9	-10.646
Own Beh_10	I was approachable	1.64	0.933	10	-14.394

The behavioural action associated with respondents' own actions that was ranked the highest was "I obliged to the other party's demands". This behavioural action falls under the distributive

dimension of DCT as presented in the conceptual framework in Section 2.8 of this thesis. All the responses received on respondents' own behaviour had t-values less than the critical value (Appendix 8). Consequently, the null hypothesis was not rejected for this set of responses. This implies that the responses to this question were all considered as not being significant and critical. To better understand the influence of own behaviour on approach to DR, the above results were analysed from a different angle using correlation analysis, with management style as the other variable.

Given that DR is often handled as a project management aspect, it was thought that the management style would have an influence on project parties' DR approach. Therefore, respondents' management styles were examined (Table 4.10).

Table 4.10: Ranking of management styles

Code	Management style	Mean	Std. deviation	Ranking	t-value
Mgt_1	I believe that every situation has two sides to it and therefore try to consider both sides before I decide	3.98	1.074	1	9.026
Mgt_2	I am open to different points of view	3.92	1.032	2	8.808
Mgt_3	I consider myself to be open-minded	3.90	1.060	3	8.387
Mgt_4	When I disagree with someone, I try to consider their point of view	3.90	1.108	4	8.026
Mgt_5	Diversity of opinion and background is valuable to building my case	3.78	1.145	5	6.708
Mgt_6	I try to consider how someone might feel before I disagree with them	3.30	1.245	6	2.352
Mgt_7	I sometimes have difficulty seeing things through the other party's point of view	2.34	1.093	7	-6.007
Mgt_8	I perceive people who disagree with me as wrong	2.11	0.895	8	-9.815
Mgt_9	When I am certain that I am right about something, I do not waste time listening to other people's points of view	1.96	0.861	9	-11.973
Mgt_10	I decide the course of action to be taken during dispute resolution and disregard other people's input	1.93	0.876	10	-12.103
Mgt_11	I have experienced that people who are very different from us (me and/or the party I am affiliated to) are usually dangerous	1.77	0.928	11	-13.166

Code	Management style	Mean	Std. deviation	Ranking	t-value
Mgt_12	I prefer waiting on someone else's suggestion on how the dispute will be resolved rather than formulating one myself	1.76	0.975	12	-12.646
Mgt_13	I prefer thinking about the short-term impact of disputes rather than the long-term impact	1.72	0.906	13	-13.942
Mgt_14	It is enough that the project gets completed, I do not care how the disputes are managed	1.65	0.921	14	-14.484

Based on the computed t-values, the most significant management styles were Mgt_1 to Mgt_6. It was observed that all the top ranked / critical / significant management styles alluded to positive management styles. In order to rule out the possibility of non-transparent reporting that can sometimes be associated with self-administered questionnaires (Burns et al. 2008), the relationship between own actions during disputes and the most significant management styles was analysed using correlation analysis.

There are two commonly used methods for establishing linear relationships between variables – Spearman rank-order correlation (usually referred to as Spearman's correlation) and Pearson product-moment correlation (usually referred to as Pearson's correlation). While Spearman's correlation can be used for rank-ordered or ordinal level variables, Pearson's correlation is suitable for raw data variables (Pallant 2016). Therefore, Pearson's correlation analysis was done using SPSS software. Table 4.11 shows the Pearson's r values from this analysis as obtained from SPSS.

Table 4.11: Results of correlation between own behaviour and management style

	Own Beh_2	Own Beh_4	Own Beh_9	Own Beh_3	Own Beh_8	Own Beh_5	Own Beh_10	Own Beh_6	Own Beh_7	Own Beh_1
Mgt_2	0.386**	0.254*	0.320**	0.260**	0.151	0.281**	0.066	0.128	0.151	0.387**
Mgt_5	0.384**	0.169	0.283**	0.250*	0.098	0.195	0.059	0.114	0.031	0.223*
Mgt_3	0.372**	0.210*	0.225*	0.228*	0.145	0.241*	0.109	0.162	0.105	0.410**
Mgt_6	0.318**	0.056	0.170	0.192	0.070	0.207*	-0.130	-0.052	-0.095	0.198
Mgt_1	0.362**	0.132	0.230*	0.226*	0.199*	0.348**	0.065	0.142	0.093	0.331**
Mgt_4	0.313**	0.135	0.224*	0.256*	0.256*	0.222*	0.124	0.189	0.182	0.286**

	Own Beh_2	Own Beh_4	Own Beh_9	Own Beh_3	Own Beh_8	Own Beh_5	Own Beh_10	Own Beh_6	Own Beh_7	Own Beh_1
**correlation is significant at the 0.01 level (2-tailed) *correlation is significant at the 0.05 level (2-tailed)										

Pearson's r values can vary typically ranging between +1 and -1; +1 signifies a perfect positive correlation whereas -1 implies a perfect negative correlation. An r value of 0 means that no linear correlation exists. The correlation analysis showed that some management styles significantly correlated with some "own behavioural actions". However, there were management styles that had a weak correlation at the level of significance tested and these have not been marked with asterisks (*) in Table 4.11.

The management styles that had statistically significant association with different DR behavioural patterns are outlined in Table 4.12.

Table 4.12: Behavioural tendencies associated with the significant management styles

Management style	Own behavioural actions during dispute
Mgt_1: I believe that every situation has two sides to it and therefore try to consider both sides before I decide	Own Beh_1: I obliged to the other party's demands
	Own Beh_2: I was aggressive in the DR process
	Own Beh_3: I was competitive
	Own Beh_5: I was tough during the DR process
	Own Beh_8: I was cooperative
	Own Beh_9: I bargained hard with the other party
Mgt_2: I am open to different points of view	Own Beh_1: I obliged to the other party's demands
	Own Beh_2: I was aggressive in the DR process
	Own Beh_3: I was competitive
	Own Beh_4: I strongly pursued my own interests/goals
	Own Beh_5: I was tough during the DR process
	Own Beh_9: I bargained hard with the other party
Mgt_3: I consider myself to be open-minded	Own Beh_1: I obliged to the other party's demands
	Own Beh_2: I was aggressive in the DR process
	Own Beh_3: I was competitive
	Own Beh_4: I strongly pursued my own interests/goals
	Own Beh_5: I was tough during the DR process
	Own Beh_9: I bargained hard with the other party
Mgt_4: When I disagree with someone, I try to consider their point of view	Own Beh_1: I obliged to the other party's demands
	Own Beh_2: I was aggressive in the DR process

Management style	Own behavioural actions during dispute
	Own Beh_3: I was competitive
	Own Beh_5: I was tough during the DR process
	Own Beh_8: I was cooperative
	Own Beh_9: I bargained hard with the other party
Mgt_5: Diversity of opinion and background is valuable to building my case	Own Beh_1: I obliged to the other party's demands
	Own Beh_2: I was aggressive in the DR process
	Own Beh_3: I was competitive
	Own Beh_9: I bargained hard with the other party
Mgt_6: I try to consider how someone might feel before I disagree with them	Own Beh_2: I was aggressive in the DR process
	Own Beh_5: I was tough during the DR process

The correlation analysis yielded some surprising findings by revealing that some "negative" behavioural tendencies can be associated with seemingly "positive" management styles. For instance, it was surprising that Mgt_6 (I try to consider how someone might feel before I disagree with them) was characteristic of respondents with behavioural tendencies Own Beh_2 (I was aggressive in the DR process) and Own Beh_5 (I was tough during the DR process). Similarly, although it was not surprising that Mgt_3 (I consider myself to be open-minded) was characteristic of the behavioural orientation of Own Beh_1 (I obliged to the other party's demands), its association with Own Beh_4 (I strongly pursued my own interests/goals) and Own Beh_9 (I bargained hard with the other party) was surprising.

The respondents' perception of the behaviour of the parties on the opposing side of disputes was also investigated as summarised in Table 4.13.

Table 4.13: Other parties' actions during a dispute situation

Code	Other party's actions during dispute	Mean	Std. deviation	Ranking	t-value
Other Beh_1	The other party obliged to my demands or those of the party I was affiliated to	3.35	1.371	1	2.506
Other Beh_2	The other party was accommodative	2.93	1.270	2	-0.557
Other Beh_3	The other party was collaborative	2.86	1.316	3	-1.075
Other Beh_4	The other party was cooperative	2.59	1.323	4	-3.055
Other Beh_5	The other party was approachable	2.31	1.230	5	-5.583

Code	Other party's actions during dispute	Mean	Std. deviation	Ranking	t-value
Other Beh_6	The other party was aggressive during the dispute resolution process	2.08	1.172	6	-7.754
Other Beh_7	The other party was competitive	1.93	1.086	7	-9.762
Other Beh_8	The other party was tough during the dispute resolution process	1.73	0.868	8	-14.429
Other Beh_9	The other party bargained hard with me or the party I was affiliated to	1.66	0.930	9	-14.230
Other Beh_10	The other party pursued their own interests/goals strongly	1.51	0.864	10	-17.060

Of the respondent's ratings of other parties' actions during disputes, only the behavioural tendency Other Beh_1 (The other party obliged to my demands or those of the party I was affiliated to) was significant on the basis of the computed t values.

The behaviour of project parties was further analysed using qualitative data from the interviews as discussed in Section 4.4.3 of this thesis.

4.3.12. DR issues in infrastructure PPPs

DR issues were ranked as presented in Table 4.14. The survey results showed that the most critical DR issue in infrastructure PPPs was "political interference in delivery of the infrastructure PPP project" based on the mean ranking. This was initially surprising but was substantiated by literature on projects such as the East-West Link project – an 18 km toll way in Victoria, Australia (VAGO 2015), and on the Sydney Light Rail in a less direct case of political interference (Mwakabole, Gurmu and Tivendale 2019). Issue_16 (interests of the general public not adequately addressed and represented) was ranked by practitioners as the least critical despite literature suggesting it as an issue that significantly affects DR in infrastructure PPPs (Phibbs 2008; Geary 2020; He et al. 2020). This was further investigated in the in-depth interviews as presented in Section 4.4.5 of this thesis.

Table 4.14: Ranking of DR issues in infrastructure PPPs

Code	DR issues in infrastructure PPPs	Mean	Std. deviation	Ranking	t-value
Issue_1	Political interference in delivery of the infrastructure PPP project	3.47	1.281	1	3.585
Issue_2	Poor collaboration	3.45	1.323	2	3.377
Issue_3	Inadequate information sharing	3.29	1.264	3	2.260
Issue_4	Lack of flexibility around exploring dispute resolution options outside the dispute resolution stipulations in the contract	3.28	1.337	4	2.051
Issue_5	Lack of a unified DR system specifically designed for each infrastructure PPP project	3.27	1.246	5	2.119
Issue_6	Absence of monitoring and evaluation systems for the efficacy of DR processes	3.25	1.095	6	2.236
Issue_7	Inadequate capacity in DR by the staff involved in the infrastructure PPP project	3.16	1.234	7	1.241
Issue_8	Multiple roles of government i.e. as partner and regulator of the PPP	3.14	1.242	8	1.145
Issue_9	Lack of streamlined DR systems	3.13	1.280	9	1.031
Issue_10	Overlapping responsibilities between project parties	3.11	1.180	10	0.946
Issue_11	Inefficiency of applied DR systems/processes	3.07	1.148	11	0.619
Issue_12	Unclear guidelines on who is responsible for oversight of the public partner's actions	3.05	1.245	12	0.408
Issue_13	Exclusion of behaviour of project parties in the DR process	2.93	1.069	13	-0.669
Issue_14	Lack of public involvement in the decision-making process for the infrastructure PPPs	2.58	1.206	14	-3.451
Issue_15	Interference from the general public during delivery of the infrastructure PPP project	2.45	1.094	15	-4.944
Issue_16	Interests of the general public not adequately addressed and represented	2.45	1.173	16	-4.589

Of the 16 issues presented, 6 of them were critical on the basis of their computed t values. These critical issues included "political interference in delivery of the infrastructure PPP project", "poor collaboration", "inadequate information sharing", "lack of flexibility around exploring dispute resolution options outside the dispute resolution stipulations in the contract", and "absence of monitoring and evaluation systems for the efficacy of DR processes". Similar to

the findings from the focus group discussions, "poor collaboration" was ranked among the top two DR issues, and "absence of monitoring and evaluation" was ranked sixth by both the focus group participants (refer to Section 4.2.4 of this thesis) and questionnaire survey respondents.

4.3.13. Recommended DR practice for infrastructure PPPs

Similar to the DR issues, the rating of recommended DR practice in infrastructure PPPs amongst Australian infrastructure PPP practitioners was established using means and standard deviations (Table 4.15). Additionally, critical recommended DR practice was determined from the computed t-values.

Table 4.15: Ranking of recommended DR practice for infrastructure PPPs

Code	Recommended DR practice	Mean	Std. deviation	Ranking	t-value
RP_1	Exploring solutions that are acceptable to all project parties in dispute	4.01	1.261	1	7.853
RP_2	Understanding each infrastructure PPP project partners' obligations	3.97	1.380	2	6.878
RP_3	Understanding each infrastructure PPP project partners' objectives	3.90	1.349	3	6.505
RP_4	Transparency and open communication among project parties	3.83	1.351	4	6.045
RP_5	Proactive identification of anticipated DR-related issues for the entire infrastructure PPP project cycle at the beginning of the project	3.69	1.439	5	4.682
RP_6	Involving the private sector in early stages (e.g. formulation) of the infrastructure PPP project	3.68	1.252	6	5.297
RP_7	Establishing relationships among dispute resolution issues	3.67	1.311	7	4.982
RP_8	Applying a dispute resolution system that has been specifically developed for the infrastructure PPP project	3.60	1.326	8	4.465
RP_9	Constant monitoring and evaluation of dispute resolution interventions for different dispute situations	3.57	1.304	9	4.305
RP_10	Understanding and incorporating behavioural tendencies and attitudes of infrastructure PPP project parties in dispute situations	3.34	1.263	10	2.666

Code	Recommended DR practice	Mean	Std. deviation	Ranking	t-value
RP_11	Applying a dispute resolution system that has been developed for all infrastructure PPP projects	2.94	1.212	11	-0.505
RP_12	Identifying an interest/need of the other party in dispute and offering it to them in exchange for freedom to pursue one's own interests	2.89	1.230	12	-0.913
RP_13	Incorporating the opinion of the general public during project formulation	2.45	1.247	13	-4.338
RP_14	Incorporating the opinion of the general public during project delivery	2.34	1.168	14	-5.504
RP_15	Allowing the project party with more power and influence on the project to drive the course of dispute resolution	1.93	1.088	15	-9.661
RP_16	One of the parties in dispute adhering to the demands of the other party	1.86	1.062	16	-10.471
RP_17	Maintaining peace by ignoring dispute	1.56	0.927	17	-15.195

Of the recommended practices, only the first 10 in ranking were deemed as critical on the basis of their computed t values (>1.984). The mean ranking of recommended DR practice confirmed that "exploring solutions that are acceptable to all project parties in dispute" was the most critical recommended DR practice. This made it apparent that practitioners are interested in a win-win collaborative approach that is centred around mutual satisfaction of all project parties (Musenero, Baroudi and Gunawan 2021). This DR practice is characteristic of the integrative dimension of DCT as shown in the conceptual framework (Section 2.8 of this thesis). Other critical DR practices included "understanding each infrastructure PPP project partners' obligations", "Understanding each infrastructure PPP project partners' objectives", "transparency and open communication among project parties", "proactive identification of anticipated DR-related issues for the entire infrastructure PPP project cycle at the beginning of the project", "involving the private sector in early stages (e.g. formulation) of the infrastructure PPP project", "establishing relationships among dispute resolution issues", "applying a dispute resolution system that has been specifically developed for the infrastructure PPP project", "constant monitoring and evaluation of dispute resolution interventions for different dispute

situations", and "understanding and incorporating behavioural tendencies and attitudes of infrastructure PPP project parties in dispute situations". The acknowledgement of the last two DR practices as critical by the practitioners supports the conceptual framework developed for this research as discussed in Section 2.8 of this thesis.

Additionally, the criticality of RP_4 (transparency and open communication among project parties) confirmed what was documented in literature about the importance of effective and open communication in PPP projects (Tang and Shen 2013).

Given that the DR process that is usually followed for infrastructure PPPs is prescribed in contract documents and national PPP guidelines as standard approach (Harisankar and Sreeparvathy 2013; Department of Infrastructure and Regional Development 2015), it was surprising that infrastructure PPP practitioners did not think it was critical that a DR system that has been developed for all infrastructure PPP projects should be applied on all PPP projects. Instead, practitioners reported that it is critical that a DR system that has been specifically developed for any given infrastructure PPP project should be applied. This emphasised the inefficiency of current DR practice and the need for a more streamlined DR approach for infrastructure PPPs (Siddiquee 2011; De Schepper, Dooms and Haezendonck 2014). Finally, it was established that infrastructure PPP practitioners are intent on not ignoring disputes given that the practice of "maintaining peace by ignoring dispute" was ranked lowest.

The non-critical recommended DR practices were not progressed to subsequent analysis stages.

4.3.14. Relationship between critical DR issues and recommended DR practice

With the assumption that the critical recommended DR practice would be key in addressing the DR issues, the relationship between critical DR issues and critical recommended DR practice was investigated using Pearson's correlation (Table 4.16).

Table 4.16: Correlation between critical DR issues and critical recommended DR practice

	Issue_5	**Issue_2**	**Issue_4**	**Issue_1**	**Issue_3**	**Issue_6**
RP_5	0.462**	0.443**	0.302**	0.387**	0.307**	0.508**
RP_9	0.518**	0.368**	0.316**	0.386**	0.421**	0.533**
RP_7	0.420**	0.389**	0.305**	0.401**	0.363**	0.431**
RP_3	0.475**	0.429**	0.376**	0.306**	0.335**	0.521**
RP_2	0.439**	0.326**	0.294**	0.357**	0.388**	0.426**
RP_1	0.412**	0.382**	0.384**	0.402**	0.500**	0.570**
RP_4	0.448**	0.457**	0.380**	0.293**	0.452**	0.567**
RP_6	0.485**	0.410**	0.349**	0.390**	0.431**	0.565**
RP_8	0.601**	0.377**	0.412**	0.376**	0.298**	0.545**
RP_10	0.537**	0.520**	0.389**	0.541**	0.486**	0.595**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

All the recommended DR practices correlated with the DR issues, suggesting that they were all relevant for addressing the critical DR issues that were identified. Pallant (2016) advises against direct interpretation of statistical correlation as causation. With that in mind, the results above were supported by qualitative data discussed in Section 4.4 of this thesis.

4.3.15. Success factors for DR in infrastructure PPPs

Success factors were ranked on the basis of their means (Table 4.17) and the critical ones were established based on their t values.

Table 4.17: Ranking of DR success factors for infrastructure PPPs

Code	**DR success factors**	**Mean**	**Std. deviation**	**Ranking**	**t-value**
SF_1	Neutrality of the mediator	4.11	1.360	1	8.029
SF_2	Flexibility of PPP project parties	3.89	1.221	2	7.102
SF_3	Confidence in the dispute resolution system	3.85	1.281	3	6.532
SF_4	Fairness by all parties	3.76	1.405	4	5.303
SF_5	Confidence of the infrastructure PPP project parties	3.72	1.237	5	5.692
SF_6	Speed of dispute resolution	3.71	1.297	6	5.351
SF_7	Privacy of the dispute matter from the media and/or public	3.59	1.366	7	4.260
SF_8	Non-adversarial approach to managing dispute	3.27	1.365	8	1.944

Code	DR success factors	Mean	Std. deviation	Ranking	t-value
SF_9	Neutrality of the infrastructure PPP project parties	2.89	1.329	9	-0.845

Of the success factors, factors SF_1 to SF_7 were confirmed as critical. The need for flexibility of PPP project parties (SF_2), confidence in the DR system (SF_3), and keeping the dispute as a private matter from the media and the general public (SF_7) were also mentioned as contributory factors to the success of DR processes in infrastructure PPPs during the interviews conducted as part of this research. Therefore, their ranking as critical was confirmed by the findings from the interviews.

Although SF_8 (non-adversarial approach to managing dispute) was derived from literature as an important element of DR in infrastructure PPPs, survey respondents did not find it critical. However, it was noted that its t-value (1.944) was marginally lower than the critical t-value (1.984).

4.3.16. Comparison of views of the public sector and those of the private sector

Non-parametric statistical tests were undertaken to examine whether the mean significance of each factor was the same between public and private sector respondents. The Mann-Whitney U test was used for assessing differences in rankings of selected variables between the two groups. Similar to the t-test, a significance level of 0.05 was used and the null hypothesis was that there was no significant difference between the responses from both groups. Partial eta squared (η^2) – Equation 3.1, was used to measure effect size as a function of the Z value (computed in SPSS) and sample size (N).

$$\eta^2 = \frac{Z^2}{N-1} \qquad \text{Equation 4.1}$$

Effect size ≤ 0.1 signified minimal effect, one between 0.3 and 0.5 signified medium effect, and that above 0.5 signified a large effect (Cohen 1977).

The Mann-Whitney U test was applied for DR issues, recommended practice and success factors. The objective of the comparison was to assess the effect that any difference in opinion between the two groups had on the variation of the findings as well as examine the statistical significance of differences in opinion between the two groups. Difference in opinion of public and private sector practitioners was sought for DR issues, recommended practice and success factors because they were considered important parameters for streamlining DR improvements in infrastructure PPP projects.

a) Comparison for critical DR issues

The mean values and standard deviations (std. dev) of critical DR issues were computed separately for the public and private sector and their ranking of the critical DR issues was compared (Table 4.18).

Table 4.18: Comparison for public and private sector critical DR issues

Code	Public				Private				Asymp. Sig. (2-tailed)	Effect size
	Mean	Std. dev	Rank	Mean rank	Mean	Std. dev	Rank	Mean rank		
Issue_1	3.56	1.502	1	50.63	3.47	1.140	1	45.52	0.389	0.008
Issue_2	3.37	1.471	2	46.41	3.52	1.223	2	47.94	0.793	0.001
Issue_3	3.00	1.468	4	40.98	3.44	1.111	3	49.46	0.144	0.023
Issue_4	2.96	1.506	6	41.85	3.43	1.209	4	49.78	0.183	0.019
Issue_5	3.04	1.344	5	42.85	3.42	1.143	5	49.37	0.259	0.014
Issue_6	3.22	1.251	3	47.44	3.33	0.966	6	46.82	0.913	0.000

While the ranking of the top two critical issues was the same for both the private and public sector, it was found that respondents from the public sector ranked Issue_6 (absence of monitoring and evaluation systems for the efficacy of DR processes) much higher than the private sector did. Also, it was observed that the public sector rated Issue_4 (lack of flexibility around exploring DR options outside the DR stipulations in the contract) as the least critical of the issues – whereas the private sector ranked it as the fourth most critical DR issue. This agreed with the findings from the focus group discussions where a private sector practitioner

representing infrastructure PPP contractors and subcontractors highlighted that lack of flexibility around DR options makes effective DR impractical (Section 4.2.4 of this thesis).

b) Comparison for critical recommended DR practice

Similar to the critical DR issues, differences in public and private sector opinion were examined for critical recommended DR practice (Table 4.19).

Table 4.19: Comparison for public and private sector critical recommended DR practice

Code	Public				Private				Asymp. Sig. (2-tailed)	Effect size
	Mean	Std. dev	Ranking	Mean rank	Mean	Std. dev	Ranking	Mean rank		
RP_1	4.07	1.299	1	48.93	4.09	1.063	2	46.21	0.617	0.003
RP_2	3.85	1.610	2	46.22	4.14	1.108	1	47.32	0.847	0.000
RP_3	3.81	1.594	3	48.59	4.03	1.067	3	46.35	0.693	0.002
RP_4	3.70	1.589	5	46.04	3.98	1.074	4	47.39	0.808	0.001
RP_5	3.63	1.471	7	44.50	3.80	1.303	5	48.02	0.542	0.004
RP_6	3.67	1.271	6	46.63	3.79	1.103	6	47.15	0.926	0.000
RP_7	3.70	1.436	4	48.06	3.76	1.124	8	46.57	0.798	0.001
RP_8	3.48	1.477	8	44.70	3.79	1.103	6	47.94	0.578	0.003
RP_9	3.41	1.421	9	43.28	3.74	1.114	9	48.52	0.357	0.009
RP_10	3.26	1.318	10	45.07	3.47	1.126	10	47.79	0.638	0.002

It was noted that while public sector practitioners rated RP_1 (exploring solutions that are acceptable to all project parties in dispute) as the most critical recommended DR practice, private sector practitioners rated RP_2 (understanding each infrastructure PPP project partners' obligations) as the most critical one. The rating of the bottom two critical recommended DR practices – RP_9 (constant monitoring and evaluation of dispute resolution interventions for different dispute situations) and RP_10 (understanding and incorporating behavioural tendencies and attitudes of infrastructure PPP project parties in dispute situations), was the same for both public and private sector practitioners.

c) Comparison for critical success factors

Both public and private sector practitioners ranked SF_1 (neutrality of the mediator) as the number one critical success factor for DR in infrastructure PPPs (Table 4.20). This was critical

not just for mediation but for also other DR processes that involve third party moderation such as dispute boards. It was also observed that speed of DR (SF_6) was more important to the public sector than it was to the private sector. Conversely, the private sector ranked SF_4 (fairness by all parties) higher than the public sector did.

Table 4.20: Comparison for public and private sector DR critical success factors

Code	Public				Private				Asymp. Sig. (2-tailed)	Effect size
	Mean	Std. dev	Ranking	Mean rank	Mean	Std. dev	Ranking	Mean rank		
SF_1	4.15	1.460	1	48.09	4.21	1.144	1	46.55	0.782	0.001
SF_2	3.78	1.396	3	45.52	4.03	0.944	2	47.61	0.702	0.002
SF_3	3.70	1.489	5	44.56	4.03	1.007	3	48.00	0.535	0.004
SF_4	3.44	1.577	7	40.15	4.00	1.164	4	49.80	0.098	0.030
SF_5	3.74	1.457	4	49.41	3.82	0.975	5	46.02	0.551	0.004
SF_6	3.81	1.272	2	48.17	3.77	1.174	6	46.52	0.770	0.001
SF_7	3.52	1.477	6	45.70	3.73	1.197	7	47.53	0.748	0.001

For all the three comparisons presented above, the effect size was less than 0.1 implying that difference in opinion of public and private sector practitioners had minimal effect on variation of the findings. Additionally, the asymptotic significance (Asymp. Sig) for all the variables was above the significance level of 0.05 implying that no statistically significant difference between the responses of public and private sector practitioners could be detected with this dataset.

4.3.17. Factor analysis

Factor analysis is a statistical method that analyses correlation between different observations and suggests the number of theoretical constructs that underlie the observations. Factor analysis was undertaken as a means of summarising the data by identifying relationships that could not be easily deduced from previous analysis techniques (Hair et al. 2009). There are two key types of factor analysis – exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA is often used for scale development whereas CFA is appropriate when the data patterns are being measured against a well-developed theory (Hurley et al. 1997). Therefore, EFA was undertaken for this study.

Prior to commencing factor analysis, the data was checked against certain criteria to confirm its suitability for the analysis. Pallant (2016) proposed that such suitability checks can be based on the criteria of strength of relationships and sample size. For sample size, literature suggests that a minimum of 100 should be achieved (Hair et al. 2009). This criterion was met in the current study. Following this, the inter-correlation strength was checked using the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity in SPSS.

In computing these values in SPSS, the principal components factor extraction method was used and the number of factors retained was based on an Eigenvalue of 1. Several factor extraction methods are embedded in SPSS namely: - image factoring, alpha factoring, principal axis factoring, maximum likelihood, generalised least squares, weighted least squares and principal components methods. Gaskin and Happell (2014) recommended that selection of the appropriate method should be based on how familiar the researcher is with the method, availability of empirical evidence that the method will yield satisfactory outcomes, and the research objectives, among other considerations. In line with this, the principal components method was selected as the most suitable (Hair et al. 2009). For choosing the number of factors to be retained, the Scree test, Kaiser's criterion and parallel analysis were explored. Kaiser's criterion, which retains factors with an Eigenvalue greater than 1, yielded the best results.

For data to pass the suitability test for factor analysis, Kaiser (1974) recommended that the KMO should be greater than or equal to 0.5. To justify factorability, the results from the Bartlett's test of sphericity should be lower than 0.05 (Pallant 2016). For success factors and recommended DR practice, the KMO measure of sampling adequacy and the Bartlett's test of sphericity were determined as 0.890 and 0.000 respectively. These were within acceptable range.

For purposes of factor analysis, critical recommended DR practices were combined with critical success factors for DR (Table 4.21) since they both related to desirable game-changing DR practice in infrastructure PPPs.

Table 4.21: Component matrix for desirable DR practice

Code	Factor	Component 1
RP_5	Proactive identification of anticipated DR-related issues for the entire infrastructure PPP project cycle at the beginning of the project	0.772
RP_9	Constant monitoring and evaluation of dispute resolution interventions for different dispute situations	0.860
RP_7	Establishing relationships among dispute resolution issues	0.843
RP_3	Understanding each infrastructure PPP project partners' objectives	0.867
RP_2	Understanding each infrastructure PPP project partners' obligations	0.798
RP_10	Understanding and incorporating behavioural tendencies and attitudes of infrastructure PPP project parties in dispute situations	0.773
RP_1	Exploring solutions that are acceptable to all project parties in dispute	0.844
RP_4	Transparency and open communication among project parties	0.813
RP_6	Involving the private sector in early stages (e.g. formulation) of the infrastructure PPP project	0.829
RP_8	Applying a dispute resolution system that has been specifically developed for the infrastructure PPP project	0.814
SF_1	Neutrality of the mediator	0.822
SF_2	Flexibility of PPP project parties	0.868
SF_3	Confidence in the dispute resolution system	0.833
SF_4	Fairness by all parties	0.767
SF_5	Confidence of the infrastructure PPP project parties	0.858
SF_6	Speed of dispute resolution	0.792
SF_7	Privacy of the dispute matter from the media and/or public	0.708
Extraction Method: Principal Component Analysis. One component extracted.		

The results from factor analysis showed that only one component – labelled as integrated DR, was extracted. Therefore, the solution could not be rotated. The extraction of only one component suggested that the critical recommended practice and critical success factors obtained from the analysis fit within one theoretical construct. Therefore, they were all relevant to resolving disputes in infrastructure PPP projects.

4.4. Qualitative Data from Semi-structured Interviews

In total, 18 infrastructure PPP practitioners with experience across Australia were interviewed. The interviews were highly interactive between the researcher and the interviewees. Audio recordings of the interviews were made from which transcriptions were obtained. The recordings were complemented with hand-written notes which also served as back-up in case the recordings failed to play. Table 4.22 presents summary data on the infrastructure PPP practitioners who were interviewed as part of this research project.

Table 4.22: Basic information on interview participants

Participant	Sector (including both current and previous involvement in infrastructure PPPs)	Years of relevant experience	Mode of interview
IP1	• Public (government) • Engineering and project management	15 years	Online via Zoom video
IP2	• Public – policy • Academia	More than 40 years	Telephone
IP3	• Private – legal advisory to private partner entities on several occasions i.e. SPV, D&C contractor, financiers and subcontractors • Public – transaction advisor to government • Both – part of DAB • Visiting academic	40 years	Face to face
IP4	• Private – legal representative to SPV, private equity, debt financiers, and contractors • Public – negotiating on behalf of government • Academia • [earlier career] Engineering and project management	30 years	Online via Zoom video
IP5	• Private – legal representative to SPV, contractors and sub-contractors • Public – negotiating on behalf of government	12 years	Online via Zoom video
IP6	• Private – legal representative to SPV, contractors and sub-contractors • Public – negotiating on behalf of government	12 years	Online via Zoom video
IP7	• Private – legal representative to SPV, contractors and sub-contractors • Public – negotiating on behalf of government	10 years	Online via Zoom video

Participant	Sector (including both current and previous involvement in infrastructure PPPs)	Years of relevant experience	Mode of interview
IP8	• Public (policy and regulation)	10 years	Face to face
IP9	• Private – project manager subcontractor under D&C contract	Over 20 years	Face to face
IP10	• Both – mediation between public and private partner	Over 30 years	Face to face
IP11	• Public (as project director)	More than 20 years	Online via Zoom video
IP12	• Private – representing SPV (financiers) • DRBF member	More than 40 years	Online via Zoom video
IP13	• Private – legal representative to subcontractors, subconsultants and head contractors	12 years	Online via Zoom video
IP14	• Public and Private – financial advisory • Academia	More than 12 years	Online via Zoom video
IP15	• Private (legal counsel to D&C contractor) • Transaction advisor contracted by public partner of PPP	More than 20 years	Online via Zoom video
IP16	• Private – SPV, private equity, debt financing • Academia • [Previous experience] Public – negotiating on behalf of government	More than 40 years	Online via Zoom video
IP17	• Public – programs director • [Previous experience] Private – representing D&C contractor under SPV	More than 30 years	Online via Zoom video
IP18	• Private – SPV, private equity, debt financing • Engineering and project management experience	More than 30 years	Face to face

The interview participants were a good representation of the key parties of infrastructure PPPs i.e. the public partner (government), SPV, equity, financiers, PPP legal and technical advisors, independent reviewers, contractors and sub-contractors. All interviewees had vast experience on different infrastructure PPP projects across Australia.

4.4.1. Existing guidelines for resolving dispute in infrastructure PPP projects

IP3 and IP18 explained that unlike traditional contracts, DR processes for infrastructure PPPs are usually multi-layered and complex owing to the multiple contracts between different sets

of parties involved in the projects. Besides the upstream PPP agreement between the government and private company (SPV), there are several tiers of contracts such as those between the SPV and the head D&C contractor, the SPV and equity investors, the SPV and debt financiers (through loan agreements), the SPV and the O&M contractor, and the head D&C or O&M contractor and sub-contractors. IP3 reported that in most instances, the head D&C contractor is a joint venture between two or more companies in which case there are different contracts governing the joint venture operations among the companies. The head contractor companies usually subcontract several contractors and consultants in separate contractual arrangements. It was confirmed by IP9, IP3, IP18 and IP16 that all the above listed contracts typically have their own DR provisions which differ in most cases. This adds to the complexity of DR in infrastructure PPPs.

IP3 further explained that when a dispute arises among downstream parties but has to be escalated to the upstream parties, typical infrastructure PPP contractual clauses usually mandate the downstream DR processes to be halted to allow the upstream DR process to proceed. In most cases, downstream parties are theoretically bound by the outcome of the upstream DR process. For example, a dispute managed through the DR process between the government and SPV is theoretically binding to the head contractor. Similarly, a subcontractor or subconsultant is theoretically bound by a decision made by the DR process between the head contractor and the SPV or equity investors. IP3 and IP5 highlighted that the SPV would typically minimise their gap risk by ensuring that the settlement paid to a downstream party following any given dispute does not exceed the amount they received in the upstream DR process.

In line with the findings from literature review, all the interview participants confirmed that guidelines for resolving disputes in infrastructure PPPs are usually standard stipulations in PPP contracts (Harisankar and Sreeparvathy 2013) set by the government or the representative they appoint to do so. However, IP3 and IP14 expounded that different infrastructure PPP contracts usually specify different levels of DR procedures to be followed. This was elaborated by IP4,

IP6, IP7, IP13, IP14, IP15 and IP17 who commented that DR procedures in general tend to be recommended in the order of executive level negotiation, expert determination, mediation, arbitration, and finally litigation as the last option where dispute cannot be managed by preceding processes. These procedures were similar to those reported by the focus group participants (Section 4.2.2 of this thesis). IP6 and IP14 noted that in their experience, the vast majority of disputes in infrastructure PPPs are resolved without progressing to either arbitration or litigation. In contrast, Table 4.4 shows reasonable frequency of these techniques considering that arbitration ranked as the fourth commonly used DR technique, and litigation was the third. IP3, IP8, IP9, IP10, IP12, IP14 and IP15 reported that on some infrastructure PPP projects, a dispute board is constituted to facilitate some of the DR processes preceding arbitration. IP16 who had experience working for both the public and private partner for the numerous infrastructure PPP projects they had been involved in, elaborated that progression to subsequent DR processes may be guided by the amount of money attached to the dispute as demonstrated below.

The first thing we had to do was have an expert determination and an expert would be able to resolve the dispute if the amount in dispute was less than $2 million, and in that case the expert could make a binding decision. If it was more than $2 million, you could appeal that up to an arbitrator and take it off to another form.

IP1, IP13 and IP16 observed that good project management approaches play a role in integrating teams and managing conflicts, especially given that infrastructure PPPs are often big complex projects involving multiple stakeholders. IP13, a private sector practitioner with experience in representing contractors, subcontractors and subconsultants, remarked as below.

I think that really good project managers know how to get the parties to knock their heads together and, you know, think about it before they get into a real dispute. You know, they might get a claim and talk about it with questions like: What are you doing here? What's the basis of

this claim? What's this all about? And get down to the nitty gritty and they might, you know, acknowledge, to themselves that there's some merit to this. And then they might go and talk to the principal and say this is what I think should be done.

IP10, IP11 and IP13 reported that elaborateness and unambiguity of DR provisions varies from contract to contract depending on the Principal (usually government entity) who oversaw their development. IP4 submitted that most of the DR provisions are clear, elaborate and unambiguous. However, IP13, IP15, IP14, IP16 and IP17 argued that the DR guidelines are not adequate for the variable range of disputes that are encountered on infrastructure PPP projects. Moreover, IP16 reported that amicable DR processes tend to have limited strength over adversarial ones highlighting that DR mechanisms that were initially intended to foster a collaborative approach to disputes eventually took an adversarial one on some occasions.

I don't think the dispute resolution process was fit for purpose because automatically everything ended up in large and complex arbitration, and the original idea of arbitration was that it was a simple process where experts could sit down and look at information quite quickly. What now happens is that all those arbitrations are run by retired judge and it looks exactly like the court process. But it doesn't have any protection support process and so it failed in its purpose to get to quick, useful decisions.

IP14 and IP16 partly attributed this to the differing drivers or motivators for the various parties. They further reported that for the government, the key motivation is to get the project to start delivering a social service (such as a road, water supply, railways, etc) as soon as possible, whereas the drivers for the SPV are generally around protecting the finances they have sourced from equity and debt and making a return on investment. On the other hand, they reported that the D&C contractor’s motivation is to deliver a profitable construction project. These varying motivations stir the parties towards different directions when a dispute arises as put forth by Ng, Wong and Wong (2012) and Shrestha et al. (2017).

4.4.2. Sources of disputes

IP15 stated that in many instances, disputes in infrastructure PPPs occur when a party realises that they have lost money or are at the verge of losing it, elaborating that it usually starts with a claim being raised and its rejection triggers a dispute as expressed below.

Disputes don't just go to the dispute resolution process, they start as a claim, a claim gets rejected. You have this building up for multiple issues that are emerging through the project and you're trying to drive commercial processes that might resolve them. By the time you've got to a mediation or litigation process, the size of the claim is enormous and the commercial drivers of those parties have become really significant.

IP3, IP4, IP17 and IP18 asserted that 90% of disputes in infrastructure PPPs happen during the duration of the D&C contract – either in relation to claims raised by the head D&C contractor or one of the subcontractors. They elaborated that these claims are often associated with cost overruns, project delays, and issues related to risk allocation / sharing. In some cases, the contractor takes risk that they are unclear about and end up under-pricing it. As a result, the project is not completed on time and on budget. IP3 added that this is partly fuelled by the difference in perspective on project implementation between the individuals who bid for the project and those who implement it.

In the O&M stage, IP16 reported that disputes arise from difference in opinion between the operator and the government on how the operations are progressing subsequently leading to the government taking abatements, sometimes in excess.

IP11, IP16 and IP17 confirmed that under-pricing of risks by the private parties is a source of disputes in infrastructure PPPs. Equally, IP3, IP4, IP9, IP14 and IP15 reported that unbalanced risk allocation makes it nearly impossible for disputes to be avoided or resolved amicably. They further argued that it is impractical to price risks with a high level of uncertainty or those for which sufficient information is not available at the time of bidding. Such risks were named as

those related to site conditions, quantity and location of utility connections, among others. In response to this, IP13 called for the adoption of a more balanced approach to risk sharing that does not position the government in a more privileged position over the private parties of infrastructure PPP contracts. They added that this could involve embedding principles of collaborative contracting in infrastructure PPP delivery. However, IP14, a practitioner with experience working for both the public and private partner as well as PPP teaching and research, emphasised that although this would improve the dispute environment to a great extent, it would not automatically make disagreements or disputes disappear as expressed below.

So even in the case of including more collaborative contracting principles, there's still going to be the potential for disputes and disagreements to arise, disagreement will not disappear.

More generally, the motivation to adopt the PPP project delivery model was pointed out as a source of disputes on some projects. IP15 and IP17 remarked that before embarking on the PPP delivery model for any given project, the government needs to assess if it is the best project delivery model for the specific circumstances. IP17 advised that where the motivation for a PPP is to source private sector capital, it was better for the government to borrow money instead of committing citizens to a 30-40 year debt. This would also be cheaper as the cost of borrowing for the government is generally lower than that of the private sector. IP17 further noted that choosing the PPP delivery model with the motivation of risk transfer to the private sector was not a plausible motivation because when the private sector fails to manage risks assigned to them, the responsibility reverts to the government – which agreed with the findings of Clifton and Duffield (2006). This was experienced on a transport project in NSW that IP17 worked on. IP17 further advised that emphasis on long-term commitment of the project parties is important when choosing the PPP delivery model for its long-term transfer of design and operation obligations to the private sector. IP17, with support from IP16, emphasised that for this to succeed, the private sector would need to have the mentality that they are designing and operating a project for multiple decades and any specifications made would therefore be on that

basis. IP16 cited that in one of the hospital infrastructure PPPs in Australia, an O&M contractor once sought to change the type of tap handles because their proposed type was cheaper but this was rejected because the tap handles they were proposing required more frequent replacement than the ones that had been originally specified.

Furthermore, IP3 and IP16 cited political interference as a source of disputes on some infrastructure PPPs. This agreed with the findings from the questionnaire survey where political interference was ranked as the most critical DR issue for infrastructure PPP projects (Table 4.14). Both IP3 and IP16 gave examples where change of government in the State of Victoria has in the past threatened the progression of PPP projects as the new governments declared that the projects would be cancelled. On one of the projects, for example, the SPV demanded for a termination payment in line with the "termination for convenience" clause to cover for the work completed by the D&C contractor, repay debt including interest, and reimburse equity to the equity investors including projected profits. Although some compromise was made on paying for projected profits, the government paid large sums of money as an out-of-court settlement to the SPV.

4.4.3. Behavioural antecedents of infrastructure PPP parties during dispute

IP6, IP11 and IP15 reported that at the onset of the infrastructure PPP project, the spirit of collaboration and cooperation is quite high amongst the individuals. IP4 added that in reviewing contracts at negotiation stage, any clauses that seemingly disadvantage any of the parties are called out and removed or revised. This is synonymous with the integrating style of DCT – Figure 2.2. IP11, an infrastructure PPP project director for a government organisation, explained this by saying that collaboration is expected at this point as any form of unreasonable behaviour can be priced by the private company or the other private entities in the PPP, in future assignments.

If the government is unreasonable and they win, the risk of the government's unreasonable behaviour is priced into the SPV's bid the next time the government procures a contract. This would make project delivery more expensive.

IP3, IP6, IP9 and IP16 added that as the project progresses and several conflicts and disputes begin to appear, the level of collaboration and cooperation reduces. IP6 added that for disputes involving the public sector and the private sector, the public sector will initially attempt to understand the difficulties that are being presented by the private sector with the hope of finding some middle ground without compromising the underlying principles within the contract. However, IP3 observed that sometimes the public sector administration is reluctant to make any compromise and they get entrenched in the argument that the terms of the contract cannot be changed. IP14 and IP16 remarked that this is backed by the perception that any form of lenience or compromise, may result in the government being scrutinised by the Auditor General. IP2, IP9 and IP13 also reported a similar change in level of cooperation when disputes arise between the different entities within the private company (SPV). In this case, they reported the main behavioural antecedent as being characterised by the dominating style, which often resulted in the parties in dispute reaching a deadlock after several back-to-back attempts to resolve the dispute. IP8 added that rather than each party trying to understand the position of the other party, they become fixed on their own position and the public sector side is usually reluctant to shift from the contracted position both in terms of price and risk allocation. IP13, a private sector legal practitioner with experience in representing contractors, subcontractors and consultants, narrated one of the incidents related to this as below:

I sat in a dispute resolution meeting and I was just silently sitting there taking notes for the client because the client realised that the other side had their lawyers there and so they said come and sit in; we'll have you there in the background to take notes and give us a nudge if we're going to say anything we shouldn't say. This tells you about how the dispute resolution process was going.

IP9 reported that on a few occasions, they obliged to the demands of the party with a stronger bargaining position. This in some way agreed with the questionnaire survey findings where obliging was ranked as the most common behavioural tendency among infrastructure PPP practitioners during dispute (Table 4.9 of this thesis). Obliging style is part of the distributive DCT dimension presented in the conceptual framework in Section 2.8 of this thesis). It usually manifests with the dominating style of DCT. Dominating style is usually used when an unfavourable decision by a party could potentially make the dominating party lose their political prominence, commercial prowess or money (Rahim 2002). Therefore, the dominating party ignores the expectations or needs of other parties. IP3 and IP12 observed that obliging is normally influenced by the need to preserve relationships with the motivation of not harming future opportunities for work from the government (for the case of the SPV) or the head contractor (for the case of sub-contractors) bearing in mind that future infrastructure PPP projects are in the pipeline. However, it was reported that the obliging style is not always the response to the dominating style. IP5 and IP17 reported that on some occasions, the parties in dispute reached a stalemate because each of them had a strong case in favour of their interests. IP16 observed that this resulted in lengthy DR processes because the parties were fixed on their win sets.

IP6, IP7, IP16 and IP15 submitted that in some instances, the compromising style was reported especially when the bargaining positions were equally strong. IP16 described that for disputes involving the public sector and the private sector, the public sector is seen to depend on the private sector parties to deliver the project – usually an essential service to the wider community and delivering it would boost the government's political prominence. As such, governments do not generally want to be involved with projects that appear to be possibly troubled. IP14, a finance advisory practitioner with experience representing both the public and private sector on infrastructure PPP projects, commented that while the private sector has a stronger position in terms of project delivery, they are reliant on the public sector party for payments whether

directly or through enacting toll-related policies that could impact recovery of their investment. With this degree of reliance on each other, the parties may reach a compromise especially where the integrating or dominating styles of DCT have been ineffective (Rahim 2002).

IP15 commented that as more issues arise on the project, it becomes evident that the level of trust among the parties in dispute is low – with some parties deliberately hoarding information from others. IP2 noted that big disputes are usually resolved when there is commercial trust between the parties involved in the dispute. These could be government and SPV, or SPV and head D&C contractor, or D&C contractor and a subcontractor, among others. IP2 added that democratic trust between the government and the citizens also plays a major role in resolution of disputes that appear in the media thereby attracting the attention of the general public. Public outcry was reported by IP3, IP17, IP8 and IP12 to sometimes influence the bargaining position of the government especially when there is an upcoming election. This finding was not evident in the results from the questionnaire survey discussed in Section 4.3 of this thesis.

The infrastructure PPP practitioners interviewed in this study did not report any behaviour related to the use of the avoiding style of DCT during DR.

4.4.4. DR issues for infrastructure PPPs

One of the DR-related issues that was conveyed by IP3, IP4, IP5, IP6, IP7, IP9, IP13 and IP15 was the dissimilarity of DR provisions specified in the different contracts that are typically found in major infrastructure PPP projects. IP13 clarified that the expectation is that the DR provisions specified in the upstream contract between the government and SPV are cascaded down to the contract between the SPV and head contractor, which are in turn stepped down to the contract between the head contractor and sub-contractors. However, this is not the case as the more downstream DR processes were reported to be more adversarial than the upstream one between the government and the SPV. IP13 added that this not only prolonged DR processes

but also strained efforts towards aligning the varying interests of the different infrastructure PPP parties.

Another DR issue that was reported on infrastructure PPP projects by IP2, IP3, IP6, IP9, IP10, IP11, IP13, IP15, IP16 and IP17 was the parties' reluctance to share information. They reported that parties in dispute do not often openly share information with one another because it could potentially compromise their bargaining position. IP10 and IP11 added that although most contracts are generally structured to demand a fair degree of information disclosure from the private sector to the government, the private parties sometimes withhold information as a way of safeguarding their bargaining positions. IP2, IP9 and IP14 also commented that the public partner sometimes holds back information from the other parties of the PPP contract.

IP13 and IP6 noted that in most infrastructure PPP DR provisions, the time allocated for issuing notices of dispute is so short that parties are not allowed enough time to assess the situations and ready themselves for subsequent processes better. IP13 added that the short timeframe is particularly inappropriate for disputes involving parties at multiple tiers and the notices have to be passed downstream and back upstream through numerous intermediaries. On some occasions, parties unwillingly and prematurely submitted these notices in the spirit of not wanting to be time-barred as expressed by IP13, a private sector legal representative to contractors, subcontractors and subconsultants.

The time provisions in some contracts are not very well thought-through either. It seems to me that sometimes people put in a notice of dispute because they will be time barred if they don't. And not all contracts are like that, but a lot are. And I see that it is resulting in things going to dispute resolution either before the parties are ready or people having dispute resolution meetings when there's not necessarily actually a dispute. So, imagine for example, a contractor makes a claim and the principal responds to the contractor with a "no" giving them 10 business days to notify if they disagree with the assessment. If they don't do that, they fail on the time

requirements stipulated in the contract or it means that they accept the determination by the Principal.

IP13 observed that once a notice of dispute is submitted, the issue automatically becomes a dispute even if that was not the intended course. They added that this not only increases the number of disputes on projects but also hampers dispute avoidance endeavours. While IP4, IP11 and IP12 acknowledged the merit in resolving disputes fairly promptly on infrastructure PPP projects, IP6, IP9, IP12 and IP13 argued that the current timeframes appear to serve the interests of the people assessing claims, mostly the government entities and head contractors, and not more downstream parties such as sub-contractors.

Additionally, IP16 noted that disputes tend to be resolved over prolonged periods of time as described below.

And by the way [on one of the projects], we are still in arbitration and it is estimated that the arbitration process might end after 7 years.

Also, IP15 observed that the DR processes currently applied on infrastructure PPP projects are poor at preventing conflicts from advancing into disputes and the DR processes only come to life after the issues have escalated to disputes. While conflicts may be inevitable, disputes can be avoided on most occasions (Fenn, Lowe and Speck 1997). In other words, the DR provisions at present mostly focus on reactive DR as opposed to proactive DR. IP15, a legal practitioner with experience working for both the private and public infrastructure PPP partner, commented:

The problem with every single legal mechanism, whether it's mediation, arbitration or litigation is that as good as they are, they are poor at actually bringing parties together to avoid disputes and the whole contractual system is very poor at that, so there's always tension.

Also, IP3, IP12, IP13 and IP14 reported that little attention is paid to DR clauses when contracts are being drafted at the beginning of the projects. This was in part related to the contract parties

not wanting to kick off project commencement with a pessimistic approach that predicts dispute as early as project formulation or pre-contract stage. IP14 noted that when contracts are drafted with generic DR clauses, there is no inquiry into the practicality of the specifications and insight into their appropriateness is only drawn when a dispute arises – in which case it is too late. None-the-less, most of the infrastructure PPP practitioners that were interviewed in this study reported that the DR mechanisms that are often specified for infrastructure PPP projects are acceptable. However, DR processes underperform on the time specifications within which a dispute should be progressed.

Furthermore, IP3 and IP9 remarked that infrastructure PPP projects do not have adequate internal monitoring and evaluation systems to facilitate continuous DR improvement for both projects and infrastructure PPP practice in general. This agreed with the findings by Currie and Teague (2015). IP3 and IP14 remarked that although the Gateway Review processes exist as ongoing and completion reviews for PPP contracts, some details of lessons that could have potentially been learnt are not normally documented especially when things go wrong because the parties involved are not usually willing to talk about what happened.

Additionally, IP3, IP10, IP12, IP17 observed that PPP set-ups with “thin” SPV arrangements tend to spend a lot of time during decision-making compared to “thick” SPV arrangements. In the context of this research, “thin” SPVs are those that are set up to coordinate different entities within the private company with hardly any inhouse capacity or capabilities that would facilitate decision making. “Thin” SPVs are colloquially described as “letterboxes” because most of the information they receive relating to any given dispute is passed onto another PPP party to address and the response is processed back through them to the government once it is ready. This process was reported as time-consuming and inefficient. On the other hand, “thick” SPVs own real assets and resources and have inhouse capacity to make most of the decisions. IP17, a programs director representing the public partner on major infrastructure PPP projects with

previous experience working for the private partner (SPV and D&C contractor), noted that "thick" SPVs tend to have a much better relationship with the government.

4.4.5. Initial formulation of recommended DR practices for infrastructure PPPs

A sense of recommended DR practice was sought from the infrastructure PPP practitioners interviewed in this study as summarised in this section.

Firstly, IP2, IP3, IP4, IP9, IP14 and IP15 recommended the adoption of more balanced risk allocation and sharing for infrastructure PPPs. IP2 and IP3 remarked that most infrastructure PPP contracts seem to be structured as risk-allocated contracts of fixed price. Some scholars and practitioners have argued that the infrastructure PPP model needs to adopt an alliance-type approach to contracts (Forward 2006). In alliancing, all parties would agree to work together towards achieving the project outcome without taking any legal action against one another. IP3 noted that although disagreements would still arise, the problem-solving culture of the project teams would be skewed towards amicable DR techniques, and not adversarial ones.

Secondly, to address the issue of communication that was raised by IP2, IP3, IP6, IP9, IP10, IP11, IP13, IP15, IP16 and IP17, each infrastructure PPP project could benefit from a communication platform set up specifically for the project. This would not only be for information sharing among relevant parties but also act a repository for monitoring and evaluation endeavours for the performance of DR or other management practices that were applied on any form of disagreement, conflict or dispute encountered on the projects. This would go a long way in improving future DR endeavours on both the project for which it was set up and other projects where similar situations might be encountered.

Thirdly, for issues involving parties at different tiers – for example a claim raised by a sub-contractor to the head contractor who in turn passes it to the government through the SPV, the time provisions for issuing notices of dispute could be adjusted from the common average of 5 – 10 business days to a varied number of days. IP13 commented that this time provision could

be up to 180 days depending on the nature of the issue at hand. 180 days were selected because they were the upper bound of the average time that is usually spent on negotiation (Table 4.5 of this thesis). For linked claims, a 5 – 10-day stipulation, for example, would allow each party approximately 1.5 days to assess the matter and issue a notice of dispute which is not enough. More flexibility around the time requirement would allow all the involved parties enough time to give their notices downstream or upstream as required. This was corroborated by the questionnaire survey findings where respondents from the private sector highlighted rigid DR processes as one of the major issues affecting DR in infrastructure PPPs (Section 4.3.16 of this thesis).

Also, IP1, IP3, IP7, IP11, IP15, IP13, IP16 and IP14 emphasised the need to have the right people with not only a good understanding of the technicalities and complexities surrounding the dispute at hand but also with the authority to commit a position on behalf of the parties they are representing in the dispute. IP16 remarked that common practice is for lawyers to prepare contracts with an array of DR mechanisms but election of people who should be involved in the DR process is left to the parties when disputes arise. This was expressed as below:

In order to go to arbitration, you have to choose an arbitrator and we have been through that process four times and we have never agreed on an arbitrator. We had to have the Institute of Arbitrators to appoint someone before us to arbitrate. For every dispute that arose, we had to choose an arbitrator.

IP15 remarked that infrastructure PPP disputes making it to the media and dragging the general public into them is usually a symptom of a bigger underlying issue. This was corroborated by IP3, IP8, IP11, IP10, IP14 and IP17. IP17 observed that on some occasions, parties allowed disputes to leak to the general public because public outcry would put pressure on the government to make an acceptable settlement. IP11 argued that situations that are likely to upset the general public should be managed proactively so that they do not go wrong. At the same

time, IP3 reasoned that even though not party to any of the PPP contracts on any given infrastructure PPP project, the general public in Australia usually have an opportunity to voice their requirements in the planning approval process. In the event that the planning process was not done properly in accordance with the legislation governing planning approvals, a member of the general public can go to court and have the planning approval nullified so that a new process can be undertaken. IP17 maintained that disputes involving the general public and trade unions are hard to resolve citing that in the past, such disputes have been managed through avoidance. IP10 and IP4 concluded that whilst it is important to encourage transparency to the extent possible, it is recommended that the media and general public's involvement as active players in the project is limited on infrastructure PPP projects. This is somehow aligned with the results from the questionnaire survey where respondents ranked the issue of "interests of the general public not adequately addressed and represented" as the least critical (Section 4.3.12 of this thesis).

Furthermore, IP17 observed that thick SPV arrangements are more effective at maintaining good working relationships with government counterparts compared to thin SPVs which tend to operate as letterboxes. They added that thick SPVs foster faster decision-making for dispute involving multiple project parties.

IP3, IP4, IP6, IP7, IP12 and IP10 emphasised the importance of a mechanism for collaborative management of conflicts and resolution of disputes. In the present study, this was hypothesised as a joint DR system that would be collectively developed by all infrastructure PPP project parties for application in dispute situations that relate to all of the parties on a given project. IP3, IP9, IP10 and IP12 explained that such a joint arrangement would be particularly useful for disputes arising from linked (or pass-through) claims. IP3 voiced that at present, clauses for managing linked claims demand for suspension of the downstream DR process whilst the upstream one is ongoing. Once an agreement is reached in the upstream DR process, the downstream parties are expected to abide by it. IP9 and IP13 noted that whilst this arrangement

is working favourably for the upstream parties – government (public party) and the SPV, it is constraining to contractors and sub-contractors in several ways. Firstly, in terms of unfairness of the DR outcome as the SPV usually tries to minimise their gap risk by forcing the settlement from the government onto the contractor or subcontractors. Secondly, the contractors and subcontractors are often unable to voice their interests in the DR processes between the government and the SPV. IP4, IP5, IP6 and IP7 argued that given that the contractors do not have direct contractual relationships with the public partner, separate DR procedures are more appropriate within the constraints of their contractual agreements – even for disputes that affect them and have to be passed to the government through the SPV. However, IP9, IP13, IP10 and IP3 maintained that a joint forum would go a long way in proactively managing disputes and conflicts in infrastructure PPP projects. This agreed with the recommendations by the focus group participants as discussed in Section 4.2.5 of this thesis.

IP1 also stressed the importance of effective team and project management in minimising disputes on projects by highlighting that ever since they introduced a more robust program and project delivery approach for their mega infrastructure projects, issues on projects have been addressed in a timely manner before they progress to disputes. This was corroborated by IP8, IP9, IP13, IP14, IP16 and IP17. IP13 discouraged adversarial project management tendencies that do not proactively deal with conflicts and do not consider issues on their merit.

Project managers who just reject everything without considering its merits, obviously result in a greater number of disputes. But equally, project managers who treat themselves like advocates for the contractor – of which there are some around, can equally create a difficulty in that they don't stop the contractors from pursuing claims that are not appropriate. Or maybe they perhaps encourage them.

4.5. Lessons for Successful DR in Infrastructure PPPs

This section presents insights on DR and conflict management practices that were applied on some infrastructure PPP projects with the view of providing a broader understanding of what worked and what did not yield the desired results in real project settings. At the request of the research participants, the projects have been de-identified.

A key lesson for successful DR that was drawn from the interviews was that as part of collaborative DR, it is important that infrastructure PPP parties allow other parties time to propose a workable solution before triggering a formal dispute when an issue that could potentially result into a dispute arises. IP11 reported that on an infrastructure PPP project in Victoria, an independent reviewer was retained on the project to assess whether works were progressing well and on schedule and advise if any delays were foreseen. On one occasion, the independent reviewer reported that particular milestones had not been met within the anticipated period and the project could potentially be delayed by a total of 3 months. Rather than demand for liquidated damages which could have triggered a dispute, the public partner sat back and waited on the SPV to propose a solution for how the delay would be fixed. While this required patience on the government's side, the SPV was allowed time to propose creative ways in which they would make up for the delay and ensure that the project was commissioned within the slated period. This was because the government had committed to delivering the public service to the general public on a specific date without fail. In their proposal, the D&C contractor proposed that the facility be opened in three phases – to which the government agreed. In the end, one third of the facility was completed earlier than planned, one third was completed on time and only one third was completed outside the expected delivery period. This reduced the D&C contractor's liquidated damages by almost a third. In addition, the staged opening provided the O&M contractor early access to the facility, which accorded them more time to check the functionality of systems before commercial acceptance date. Also, time and money were not spent on resolving what could have been a costly dispute on the project.

Also, while many infrastructure PPP settings capitalise on most of the risk being transferred to the private sector, it is vital that when a dispute that is fixed on ownership of risks arises, the project parties do not take an adversarial approach especially the government – considering that risk is never fully transferred to the private sector. IP17 provided insights on how risk is never fully transferred using an example of a transport project in NSW. On this project, 95% of risks were transferred to the D&C contractor. When the contractor started losing money, they made a public outcry in the media. Because there was an upcoming election, the government agreed to a settlement with the contractor. This strengthened the view that for as long as the government is the owner of the infrastructure PPP project, they always retain the risk if things go wrong.

Furthermore, when disputes involving parties that do not have contractual arrangements within the PPP arise, a human approach should be used despite the absence of contractual DR provisions to guide the process. IP17 demonstrated this with a political dispute that arose between the NSW government and trade unions over the relevance of a guard on a moving train during the operation phase of a PPP project. While the government labelled the train guards' wages an unnecessary expense, the trade unions insisted that guards ensured safety on and around the train. When the divergent industrial views of the trade unions failed to merge with the government's political ones, the government opted for a new metro system which could operate without guards and drivers. In retrospect, building a new driverless metro not only cost taxpayers a lot of money but also did not look out for the safety concerns of the general public. IP17 added that in the same state, trains that were purchased under a PPP arrangement have been in storage for almost two years because the union movement rejected them. This was because the train operators did not think that the trains were safe despite them being manufactured to the specifications set by Transport for NSW, and the SPV and manufacturer confirming that they met the safety standards. IP17 and IP8 noted that the dispute is being

managed politically and the people of NSW continue to suffer train delays and trip cancellations almost on a weekly basis.

4.6. Summary of Aggregated Empirical Findings

This chapter presents a summary of the empirical results from the research study. For data quality and validation purposes, three different data collection processes were undertaken with different sets of individuals. The summarising and triangulation of collated data from the focus group discussions, questionnaire surveys and semi-structured interviews yielded important findings as discussed in this section.

The participants in all three empirical data collection processes had a wealth of experience in infrastructure PPPs spanning different stages i.e. project formulation, pre-contract negotiation and financial closure, D&C, O&M phases, insolvency processes, and contract reviews on liquidation. And, some participants were invited into the PPP projects only after disputes arose at variable stages of the projects. There was a good representation of policy, legal, engineering, academic, and project management professionals.

To get a general sense of infrastructure PPP practitioners' impression of the significance of this research, the questionnaire survey was used to probe a number of aspects. It was established that 75% of respondents agreed that disputes significantly affect the success of infrastructure PPP projects, and over 85% of respondents agreed that effective DR is crucial to the success of infrastructure PPP projects. Also, about 40% of the practitioners expressed their dissatisfaction with the current DR processes, 27.2% expressed uncertainty of their level of satisfaction and 31.5% reported that they were satisfied with the DR processes.

Additionally, a comparison of public and private sector views on critical DR issues, critical recommended DR practice, and critical success factors was made. Overall, the results showed no statistically significant difference between the responses of public and private sector practitioners. The few differences in opinion of public and private sector practitioners had

minimal effect on variation of the findings. Among other findings, one of the differences in opinion was that speed of DR was more important to the public sector than it was to the private sector practitioners.

A summary of other key findings from the empirical data collection processes is presented below.

4.6.1. Summary findings for current DR practice

Participants from all three data collection processes described the DR environment of PPP projects as more complex than that of "traditional" infrastructure delivery contracts owing to the multiple parties involved in the PPP projects, each with differing DR provisions in their respective contracts. Participants from the focus group and semi-structured interviews agreed that among other reasons, PPPs are becoming less popular because their implementation is usually based on rigid price contracts for which contractors are required to accurately predict what will happen in 20 – 30 years. This is not only impossible but also fuels many disputes that are experienced in the infrastructure PPP project environment.

Additionally, there was consensus among all the focus group participants that DR planning in infrastructure PPPs is inadequate at project level. Also, both focus group and interview participants agreed that little attention is paid to the depth of DR provisions at contracting stage. This was partly attributed to the competitive nature of most PPP bidding processes in Australia. Consequently, the last thing a bidder wants to be seen doing is overly scrutinising DR clauses as that could imply that they are predicting disputes on the project.

Furthermore, it was confirmed that guidelines for resolving disputes in infrastructure PPPs are usually standard stipulations in PPP contracts by the government or the representative they appoint to do so. This agreed with findings from literature that DR processes are usually stipulated in PPP agreements and formulated as a tender requirement (Harisankar and Sreeparvathy 2013; Osei-Kyei et al. 2019). For contracts between the SPV consortium and the

entities within them, the DR systems are usually formulated by the SPV. The research participants reported that different infrastructure PPP contracts usually specify different levels of DR procedures to be followed. In most cases, however, DR procedures tend to be recommended in the order of executive level negotiation, expert determination, mediation, arbitration, and finally litigation as the final option if disputes cannot be resolved by preceding processes. On some projects, dispute boards are constituted.

PPP practitioners reported that dispute boards and adjudication were the most frequently used techniques, followed by litigation, arbitration, expert determination, and mediation. Negotiation was ranked as the least commonly used DR technique in infrastructure PPPs. On duration of the DR techniques, litigation was reported to take the longest period of time, followed by arbitration, dispute boards, expert determination, mediation, adjudication, and negotiation. This agreed with the findings of Marques (2018) and Ridley-Duff and Bennett (2011).

Finally, the order of progression of DR processes and respective timelines were reported to be inadequately elaborated in the DR provisions and some interview participants argued that the DR guidelines are not adequate for the variable range of disputes that is encountered on infrastructure PPP projects.

4.6.2. Summary findings for behavioural antecedents during dispute

From the questionnaire survey data, it was determined that the only statistically significant behavioural tendency in relation to the DR environment of infrastructure PPPs was that an external party usually moderates interaction among the project parties that is aimed towards managing disputes. This behaviour is typical of both integrative and compromising DR dimensions of DCT (Tsai and Chi 2009) as presented in the conceptual framework in Section 2.8 of this thesis.

The above did not significantly differ from the findings from the semi-structured interviews where participants reported that in the early stages of projects or when issues are first

encountered, infrastructure PPP project parties work more collaboratively and cooperatively – a characteristic of the integrative DR dimension of DCT (Rahim 2001). However, as the projects progress, the collaboration gradually deteriorates and each party is inclined towards asserting their contractual rights when disputes arise. This is sometimes characterised by an adversarial approach that is focussed on enforcing the terms of the project agreement. In some cases, public entities ensured compliance by withholding funds and strongly emphasising contractual clauses. On some occasions, the party with a stronger bargaining position adopted the dominating DR style of DCT and that in a weaker bargaining position adopting the obliging DR style of DCT in the spirit of not ruining future opportunities to work with the other party. However, sometimes parties reached a stalemate because each of them had a strong case in favour of their interests. This behaviour is all typical of the distributive DR dimension of DCT (Özkalp, Sungur and Özdemir 2009). The scenario of equal bargaining positions sometimes resulted in the compromising DR dimension of DCT (Boonsathorn 2007).

4.6.3. Summary findings for sources of disputes

More generally, disputes were reported to arise from risk-related issues. While the questionnaire surveys revealed "improper risk allocation" as a critical source of disputes, the semi-structured interviews suggested "unbalanced risk allocation" and "under-pricing of risk". Focus group discussions, on the other hand, reported "unclear risk allocation", and "parties taking on too much risk". This was all in line with literature (Chung, Hensher and Rose 2010; Chan et al. 2015).

Other critical sources of disputes as determined from the questionnaire survey included contractual issues; issues related to attitudes and behaviour of project parties; unforeseen events such as change in demand arising from economic fluctuations, natural disasters, disease outbreaks, war, among others; issues related to inherent set-up of infrastructure PPPs; issues related to competence of project parties; and governance issues.

In addition to these, the semi-structured interviews reported differing opinion among parties of the PPP, the motivation for adopting the PPP project delivery model, and political interference. The focus group discussions found other sources of disputes as: under-pricing the project, breakdown of commercial relationships, exposure of SPV to liabilities that they cannot pass on to either the government or contractors, failure to resolve issues in a timely manner, and disagreement on the parties responsible for different scopes of work.

4.6.4. Summary findings for DR issues in infrastructure PPPs

Both qualitative and quantitative research processes reported inadequate information sharing, poor communication, and inadequate monitoring and evaluation systems to facilitate continuous DR improvement, as the main issues affecting DR in infrastructure PPPs. In addition to these, the focus group discussions and questionnaire surveys identified poor collaboration. All these issues were also identified by Musenero, Baroudi and Gunawan (2023).

Furthermore, it was established from the semi-structured interviews that there is dissimilarity of DR provisions specified in the different contracts that are typically found in major infrastructure PPP projects. Also, the time allocated for issuing notices of dispute in most infrastructure PPP DR provisions was reported as being so short that sometimes parties prematurely or unwillingly issued notices of dispute. Moreover, “thin” SPV arrangements were noted to have longer decision-making timelines during DR than “thick” SPV arrangements.

Additional issues that were noted from the focus group discussions included: unclear guidelines on who is responsible for oversight of the public partner’s actions, inefficacy of applied conflict management and DR systems / processes, and absence of elaborate DR guidelines. These agreed with the findings of Currie and Teague (2015).

From the questionnaire surveys, the following critical issues were established: political interference in delivery of the infrastructure PPP project, lack of flexibility around exploring

DR options outside the DR stipulations in the contract, and lack of a unified DR system specifically designed for each infrastructure PPP project.

4.6.5. Summary of critical success factors for DR

The following critical success factors were established for DR in infrastructure PPPs: neutrality of the mediator, flexibility of PPP project parties, confidence in the DR system, fairness by all parties, confidence of the infrastructure PPP project parties, speed of DR, and privacy of the dispute matter from the media and/or public.

4.6.6. Summary of recommended DR practices

The following DR practices were recommended as the most critical by the survey participants: exploring solutions that are acceptable to all project parties in dispute, understanding each infrastructure PPP project partners' obligations, understanding each infrastructure PPP project partners' objectives, transparency and open communication among project parties, proactive identification of anticipated DR-related issues for the entire infrastructure PPP project cycle at the beginning of the project, involving the private sector in early stages (e.g. formulation) of the infrastructure PPP project, establishing relationships among dispute resolution issues, applying a dispute resolution system that has been specifically developed for the infrastructure PPP project, constant monitoring and evaluation of dispute resolution interventions for different dispute situations, and understanding and incorporating behavioural tendencies and attitudes of infrastructure PPP project parties in dispute situations.

As a step towards improving DR in infrastructure PPPs, participants from all three sets of the data collection processes suggested that the best way to manage disputes in infrastructure PPPs is to avoid them using collaborative and joint means of conflict management and dispute resolution. In the present study, such means were hypothesised as a joint DR system. The top four advantages of using a joint DR system were noted as: (i) accommodating the interests of multiple stakeholders on the infrastructure PPP project; (ii) relationship management over the

long duration of infrastructure PPPs; (iii) enhancing communication amongst infrastructure PPP project parties; and (iv) integrating differing organisational culture and dispute resolution practice of different project parties.

Additionally, the surveys established recommended practices as adoption of more balanced risk allocation and sharing for infrastructure PPPs, setting up a communication platform specifically for each project, increasing time provisions for issuing notices of dispute from the common 5 – 10 business days to up to 180 days depending on the nature of the issue at hand, involving the right people in the DR process, and having thick SPVs in the project set-up.

Through correlation analysis, it was found that all the recommended DR practices correlated with the critical DR issues that were identified during this study, suggesting that they were all relevant for addressing the issues.

CHAPTER 5 DISPUTE RESOLUTION FRAMEWORK FOR INFRASTRUCTURE PPPs

Dispute resolution (DR) in infrastructure PPPs is a complex undertaking which often involves multiple parties with different contractual arrangements as described in Section 4.4.1 of this thesis and illustrated in Figure 5.2 of this thesis. In most cases, the clauses specifying the DR processes that should be followed when disputes arise are different for each individual contract. This research proposed a framework for constructive resolution of disputes in infrastructure PPP projects and is discussed in this chapter.

The framework was developed as an extension to the theoretical framework presented in Section 2.8 guided by the principles of DCT for behavioural tendencies during dispute, and based on the research findings in CHAPTER 4 of this thesis. A summary of the findings has been presented in Section 4.6 of this thesis. Through learnings from the perspectives of Australian infrastructure PPP practitioners on various aspects including but not limited to sources of disputes, success factors and recommended practices for DR, issues affecting DR practice as well as behavioural orientations of infrastructure PPP project parties during disputes, this framework proposes stepwise guidance for constructive DR in infrastructure PPPs. Additionally, the empirical framework took into consideration more project parties involved in PPP projects than the conceptual one did. While the conceptual framework's central focus was the government and SPV, the empirical framework included more parties such as contractors, equity investors, debt financiers and the general public. Also, the conceptual framework distinctly presented proactive and reactive DR interventions compared to the conceptual framework that bundled up all interventions. This distinction particularly facilitates the addressing of issues and conflicts before they culminate into disputes, in infrastructure PPP projects.

5.1. The Complex DR Environment for Infrastructure PPPs

Unlike "traditional" infrastructure delivery contracts where there is one contract between the government and a contractor or a consultant, the DR environment of PPP projects involves multiple parties with differing DR provisions in their respective contracts. For a typical infrastructure PPP project in Australia, there is an upstream PPP agreement between the government and SPV. Then, there are contractual arrangements between the SPV and the head D&C and O&M contractors. The contractors can be sole companies or joint ventures involving two or more different companies – in which case separate contractual arrangements will be in place to govern the joint venture operations. At the same time, the SPV is accountable to equity investors and debt financiers from whom money has been sourced to pay the head contractors the agreed prices for delivering the project. Typically, the SPV – under their loan agreements with the debt financiers, will among other things agree not to amend contractual prices as that could potentially jeopardise their ability to repay the loan or make any settlements with the contractors for any significant disputes unless the debt financiers and/or equity investors agree to them. In essence, the debt financiers do not want the SPV to compromise their ability to repay the debt. Also, the SPV is mindful of any losses that could put the equity investors' money at stake. Therefore, if the D&C contractor for instance wants the agreed price to be increased, the claim raised may not be addressed by the SPV without involving the debt financiers and equity investors or even the government on some occasions. Furthermore, the head contractors normally engage a series of sub-contractors in separate contractual arrangements to deliver different components of the project. All the above listed contracts typically have their own DR provisions which differ in most cases.

It is not uncommon for a sub-contractor to raise a claim to a contractor, and that claim has to be passed on to the government through the SPV. By virtue of the absence of a contractual arrangement between the sub-contractor and the government, they cannot raise the claim to the government directly. Instead, they have to raise the claim to the contractor, who in turn raises

it to the SPV, who then raises it with the government. This type of claim is usually called a linked or pass-through claim. If a dispute arises from such a claim, it is not practical for parallel DR processes to simultaneously occur, within the framework of the separate contractual arrangements, for the same dispute. Therefore, common DR practice for disputes arising from linked claims in Australia at present is that downstream DR processes (e.g. between a contractor and sub-contractor, or between a contractor and the SPV) are suspended while the upstream DR process between the government and the SPV is in progress. The downstream parties are theoretically bound by the outcome of the upstream DR process. The SPV would typically minimise their gap risk by ensuring that any settlement made to a downstream party is not more than the one received from the upstream DR process.

Over the long-term duration of the PPP project, the different formal business contracts interact with the informal social "contracts" steering approach to disputes in the braiding of the two contracts.

Also, the government is constantly under pressure from the general public, union movements or civil society organisations. This results in disputes on some occasions. Different from the previously described parties to the PPP project, this pressure does not mount through any contractual arrangements but is rather created by government responsibility to deliver an acceptable and beneficial service to the general public.

5.2. Understanding the Nature and Sources of Dispute

As documented in the conceptual framework (Section 2.8 of this thesis), this step firstly establishes an understanding of the nature of the dispute by establishing key information on the dispute. Such information may include but not be limited to the parties involved in the dispute, the interdependence of the dispute with other disputes that have been previously experienced on the project, understanding any political motivations behind the dispute, whether the parties agree on what is at stake, or whether the dispute is a tactic to buy time. Understanding the nature

of dispute helps to frame the right environment for constructive DR on infrastructure PPPs. For instance, this present study established that politically motivated disputes are usually driven by pursuit for political popularity from electorates. An understanding of this situation by the SPV could help structure the way dispute is approached in a more collaborative manner that is in the interest of the project and all parties involved.

While it is impossible to predict all disputes that will be encountered on a project, an awareness of the potential sources of disputes on a project can enhance preparedness for the dispute situations if or when they arise. This research provided practitioners' perspectives of typical sources of dispute that are encountered on infrastructure PPP projects. Critical sources of disputes were found to be: contractual issues; improper risk allocation; issues related to attitudes and behaviour of project parties; unforeseen events such as change in demand arising from economic fluctuations, natural disasters, disease outbreaks, war, among others; issues related to inherent set-up of infrastructure PPPs such as long-term duration of projects, multiple stakeholders with differing organisational culture, among others; issues related to competence of project parties; and governance issues. Other sources of disputes in infrastructure PPP projects were found to be under-pricing of risk and unbalanced risk allocation, differing opinion among project parties, the motivation for adopting the PPP project delivery model, and political interference.

5.3. Attitude and Behaviour Considerations

As discussed in the conceptual framework presented in Section 2.8 of this thesis, the approach to DR in infrastructure PPPs can take the form of any of the three dimensions depicted by the dual concern theory (DCT) namely: – integrative, distributive or compromising. Assessing behaviour and attitudes of project parties can help inform efforts that are aimed at moderating aggressive attitudes and behaviour as project parties work towards more collaborative ways of successfully delivering the infrastructure PPP project (Musenero, Baroudi and Gunawan 2021).

Behaviour and attitude considerations in DR may involve, among other aspects, understanding the different bargaining positions of each party involved in the dispute, whether and how parties can be influenced towards more collaborative behaviour, the relative power of the parties involved in dispute, whether the dispute is forward-looking (towards acceptable future behaviour) or is focused on apportioning blame, or whether any of the parties involved in the dispute are attempting to seek publicity from the dispute. Behavioural backdrops of the parties can be assessed based on our understanding from this research as discussed in Sections 4.3.11 and 4.4.3 of this thesis. In this study, the main behavioural orientations for infrastructure PPP parties in dispute were found to be dominating, integrating, obliging and compromising as depicted by DCT (Section 2.4.4 of this thesis).

It was also observed that in the early stages of infrastructure PPP projects, the spirit of collaboration and cooperation among the project parties is high. This is typical of the integrative DR dimension of DCT. However, this gradually deteriorates as the projects progress. Subsequently, each project party resorts to asserting their contractual rights when disputes arise. This is sometimes characterised by an adversarial approach that is focussed on enforcing the terms of the project agreement. In some cases, public entities ensure compliance by withholding funds and strongly emphasise contractual clauses. On some occasions, the party with a stronger bargaining position adopts the dominating style and that in a weaker bargaining position adopts the obliging style in the spirit of not ruining future opportunities to work with the other party. However, sometimes parties reach a stalemate because each of them has a strong case in favour of their interests. This behaviour is all typical of the distributive DR dimension of DCT (Tsai and Chi 2009). The scenario of equal bargaining positions sometimes resulted in the compromising dimension of DCT (Özkalp, Sungur and Özdemir 2009). Alternatively, public entities could choose to be more intent on adopting a co-operative approach with the private entities and work with them as partners for the benefit of the general public.

Finally, a key aspect to managing disputes in infrastructure PPPs is for the public and private entities to appreciate that their primary obligation is to deliver a public service, as opposed to their own individual interests. To achieve this, trust must be established – democratic trust between the government and the general public, and commercial trust between the government and the SPV including other private organisations involved in the project.

5.4. Proactive DR

Most of the interview and focus group participants of this study emphasised that the key to resolving disputes in infrastructure PPPs is to address issues proactively before they advance into disputes. This has been termed as proactive DR in this framework and some guidelines on approaching it are provided below based on the data obtained from this research.

5.4.1. Considerations in selecting the PPP model

The motivation behind choosing the PPP model over other delivery models was cited as a source of disputes on some infrastructure PPP projects especially between the public partner and SPV. This was said to be an issue where projects that were not viable for delivery through the PPP model were delivered as PPPs, resulting in several issues on the projects. There is therefore a need for the government to reassess the broader drivers of choosing the PPP model for any given project during the procurement options analysis (Department of Infrastructure and Regional Development 2008). Rather than formulating projects with the mindset that the PPP model is the best option, objective criteria that is not only suitable for the circumstances of the projects but also considers the numerous priorities of the public procurer should be used for evaluating all possible project delivery options.

While most governments tend to prioritise risk transfer and cost certainty for such projects, care should be taken to ensure that these two priorities are not assigned too much weight during the procurement options analysis. The focus should move merely from transferring risks to the private sector or utilising private sector capital, to ensuring that the most appropriate model is

selected for the long-term nature of the projects. A recommended approach is for the public procurer to recognise that a real partnership in the PPP project environment is more effective than a zero-sum game in which most of the risks are bundled onto the other party and that party "loses" when the risks materialise.

Moreover, the common infrastructure PPP delivery model was reported as being characterised by unbalanced risk allocation with fixed contract prices lasting multiple decades. This was reported as one of the reasons why its popularity is diminishing in some countries. Therefore, there is a need to rethink the way risk transfer is handled in infrastructure PPPs and the idea that PPPs should be chosen over other delivery models because they allow for most of the risk to be transferred to the private sector.

5.4.2. PPP project structuring and DR provisions

Once the PPP project model has been selected as the most suitable means of delivering a given project, attention should be paid to structuring the PPP contract and DR provisions that will be stipulated in the different contracts within the infrastructure PPP project set-up. This would help minimise disputes that are generally associated with the way contracts are structured. There was an appeal from the practitioners that participated in this research for a need for an authority to oversee the actions of the government / public partner in the PPP project.

In terms of PPP contracts structuring, infrastructure PPP practitioners called for balanced risk allocation on infrastructure PPP projects and more sharing of risks that are related to uncertain events between the government and the private parties on the PPP project.

Where possible, thick SPVs should be used as opposed to thin SPVs because of their ability to foster better working relationships with government counterparts in addition to quicker decision making during DR.

Infrastructure PPP practitioners reported that DR provisions for these projects are often formulated as an after-thought, without consideration of practicality of the recommended DR

processes for any given dispute situation encountered on the infrastructure PPP projects. Elements of the DR provisions that would enhance their practicality include: the time allocated for issuing a notice of dispute bearing in mind that some claims particularly linked ones require more time for review by all parties involved at each level; the time allocated for each DR process, including clear time-bound stipulations within which a dispute can progress to the subsequent DR process; and specifying the right set of individuals to represent each party when an issue arises. These individuals should understand the technicality and context of the dispute as well as have the corporate authority to make decisions on behalf of the parties they represent. For each of the DR processes proposed in the DR provisions, the minimum requirements for the best-suited representatives for each party should be specified. It is recommended that the team of representatives have combined skills of engineering, finance, corporate administration and legal aspects.

Bearing in mind that no single stipulated DR process will fully be adequate for all dispute encountered on any single infrastructure PPP project, some flexibility in the DR provisions would allow for customised DR processes to be applied depending on the specific dispute. For instance, linked (pass-through) claims would be accorded a longer notice of dispute than claims that do not have to be passed through several parties in the infrastructure PPP project set-up. While the time allocation for issuing notices of dispute could vary depending on the type of dispute, there was consensus from infrastructure PPP practitioners that the 5 – 10-day timeframe that is usually specified is not sufficient. As a fair balance between resolving issues quickly and encouraging more collaborative problem-solving on infrastructure PPP projects, this period should be a minimum of one month and could stretch between 3 and 6 months for linked claims requiring decision-making from multiple entities within the PPP arrangement. Six months were selected as the maximum period that can be allowed from the time an issue arises to the time by which a formal dispute should be issued because it was the upper bound of the average time that is usually spent on negotiation (Table 4.5 of this thesis). While this may sound like a lot of

time, it is much shorter than the time that is usually spent on arbitration or litigation and the possible collaborative problem-solving would cost less in addition to preserving relationships.

Additionally, DR provisions in the different contracts within each PPP project should ideally be set up so that they are cascaded from the upstream contract between the government and SPV to downstream contracts such as the contracts between the SPV and the head D&C contractor, the SPV and equity investors, the SPV and debt financiers (through loan agreements), the SPV and the O&M contractor; and the head D&C or O&M contractor and sub-contractors as well as joint venture agreements between any parties.

5.4.3. Communication, information sharing and coordination

From the onset of the project, communication channels across the entire infrastructure PPP project interface should be clear. In respect to emerging issues that could potentially grow into disputes, the project should be structured in such a way that all project parties know who to approach when specific issues arise.

Also, infrastructure PPPs are often complex projects requiring numerous engineering systems and processes to be integrated. Thus, continuous communication facilitated by a joint communication and information sharing platform would allow effective coordination and integration of parties' efforts across the entire PPP project cycle.

The information and knowledge sharing platform would be accessible to all parties in the infrastructure PPP project. In addition to acting as a central repository for sharing information affecting project delivery, the platform would increase the parties' awareness of one another's problem-solving orientation. Consequently, the parties would relate in more stable and predictable ways thereby encouraging more informal approaches to DR which are often characterised by better collaboration (Steijn, Klijn and Edelenbos 2011).

Furthermore, a joint information and knowledge sharing platform would expose any issues that could potentially cause delays on the project and allow parties to act ahead of time. This would

also stop manipulative behavioural tendencies where some parties hold onto vital information in favour of their claims.

Finally, in acknowledgement of the overarching need for the government to provide the general public with accurate information regarding the construction or operation status of PPP projects, the joint information and knowledge sharing platform would house information that can easily be retrieved to draft high-level briefs which can be shared with the general public when needed.

5.4.4. Minimising escalation of issues into disputes

As a means of collaborative management of conflicts and proactive resolution of disputes, a joint DR forum (PPP Board) for collectively handling issues among all infrastructure PPP project parties is recommended. This forum would bring together all parties of the project to discuss matters on a regular basis and flag any potential issues before they get out of hand. The deliberations from this forum would be recorded in the communication, information sharing, and coordination platform discussed in Section 5.4.3 of this thesis. This would help to guide future discussions. In addition to facilitating early management of issues, the PPP Board would also be helpful in ensuring balanced representation for disputes arising from linked (or pass-through) claims in addition to significantly reducing the time spent on decision-making.

Presently, such joint DR forums commonly manifest on infrastructure PPP projects as dispute boards and common disputes deeds. However, common arrangements sometimes exclude most of the project parties. Preferably, a joint platform set up for proactive DR on a project should bring together not just the government agency and the SPV but also contractors and subcontractors, independent engineers and reviewers and all other parties involved in the delivery of the project. Where the project is concerned about the costs of maintaining the joint DR forum for the entire duration of the PPP project lifecycle, it can be set up for the D&C phase of the project given that it was found that 90% of disputes on infrastructure PPPs occur during the D&C phase.

Also, a rational project management approach is essential in proactive resolution of disputes in infrastructure PPPs. Ideally, project managers should review all claims on the basis of their merits and address issues in a timely manner before they escalate to disputes.

5.5. Reactive DR

Sometimes, issues arising on a project may escalate into disputes despite application of proactive techniques. As a first step, it is recommended that creative problem-solving is pursued where possible. In implementing the DR processes stipulated in the contracts, it is important that interventions are aligned with relevant proactive arrangements discussed in Section 5.4 of this thesis. For disputes arising among parties with contractual obligations in the PPP project, the reactive DR procedure summarised in Figure 5.1 is recommended. The timeframes that are proposed for each DR process are based on the results of average duration for each DR process as determined through the quantitative data collection undertaken for this research.

5.5.1. Scope for creative problem-solving

DR processes should be designed in such a way that before parties formally progress an issue into a dispute, creative means of collaboratively resolving the issue are explored where possible. This requires enough time to be allocated for parties to propose a workable solution to an issue before triggering a formal dispute. This can be handled at the level of contract / project managers with consultation from senior executives of the respective parties affected by the issue. Proposed time allocation has been discussed in Section 5.4.2 of this thesis.

5.5.2. Reactive DR interventions

When an issue advances into a dispute, it is recommended that parties pursue amicable DR techniques before considering adversarial ones. Besides, the integrative behavioural dimension of DCT that is characteristic of interactions among infrastructure PPP parties at the onset of the project, and when issues and disagreements are first encountered, would enable these amicable DR approaches. This may be facilitated by the PPP Board that would have been constituted to

minimise escalation of issues into disputes as discussed in Section 5.4.4 of this thesis. This forum would also facilitate negotiation and mediation among executives of the parties involved in the dispute. Earlier involvement of the PPP Board in proactive DR (early detection and management of issues) would ensure continuity of the DR process backed by the PPP Board's prior knowledge of the matter being disputed. Therefore, it is recommended that the same composition of the PPP Board used in the step described in Section 5.4.4 of this thesis is used for this reactive DR stage.

As parties move towards compromising behaviour – focussing on distribution of benefits, expert determination and adjudication can be used to facilitate DR. Based on the data obtained in this research, it is proposed that a DR outcome from expert determination or adjudication is reached within 8 months. The ruling from either of these DR processes can be binding, interim-binding or non-binding. If the outcome is not binding, the DR processes can proceed to arbitration or litigation.

When the level of co-operation further diminishes and parties get into the distributive DR behavioural orientation, arbitration can be undertaken for a maximum of 2 years. If the dispute is not resolved within this period, court proceedings may be undertaken for a maximum of 3 years as the very last DR option. The ruling by court is final and binding.

The nature of outcome for each reactive DR intervention – binding, interim-binding and non-binding, was guided by the information that was provided by the infrastructure PPP practitioners who participated in this research on DR practice in infrastructure PPPs. This information was reconciled with the literature presented in Section 4.2.2 of this thesis. This was done to ensure that the nature of solutions presented in this research do not vastly deviate from the current legal backdrop for infrastructure PPP practice in most countries.

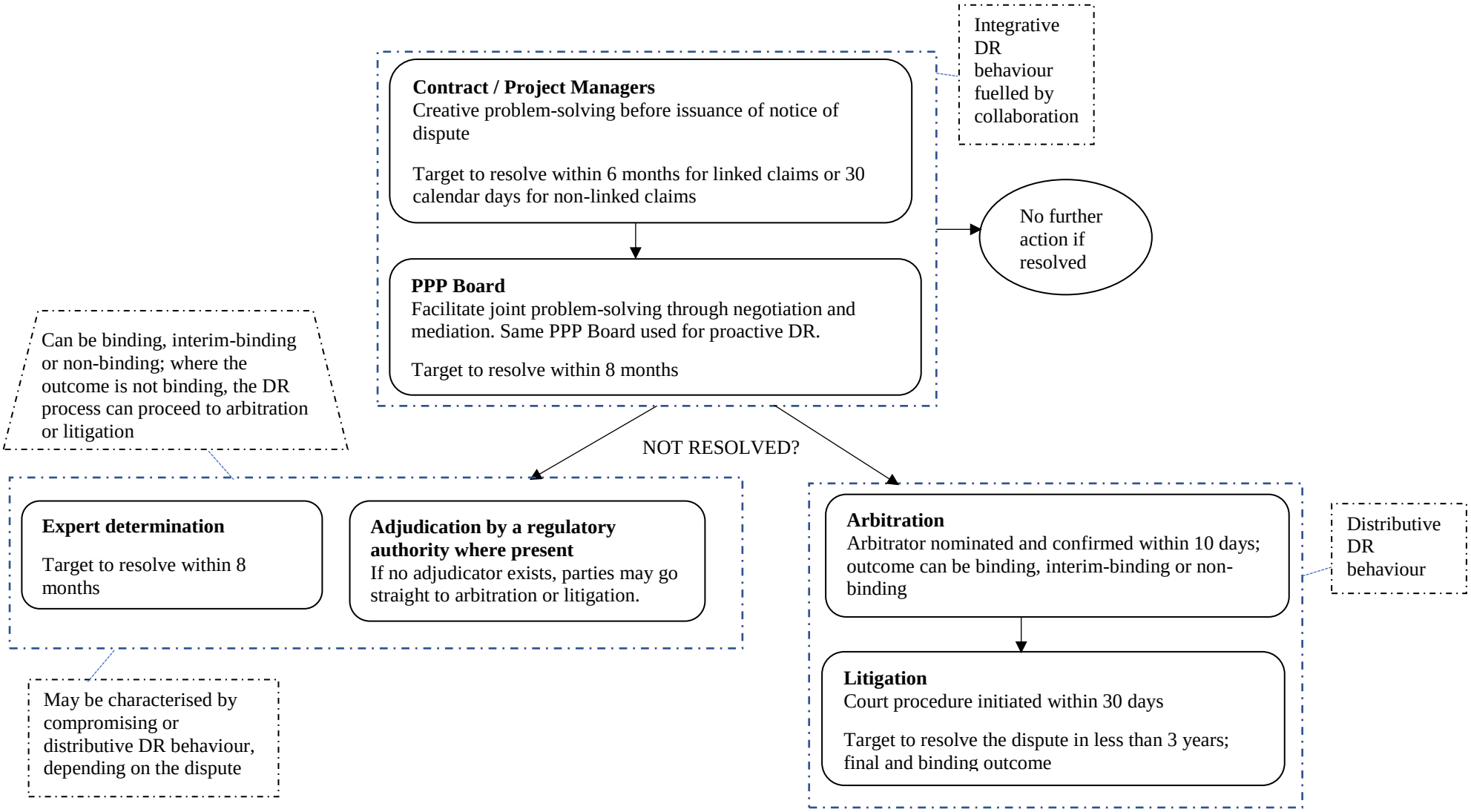

Figure 5.1: Proposed steps for reactive DR

Finally, for disputes involving parties that do not have contractual arrangements within the PPP such as union movements or the users of the infrastructure project, a human approach is recommended despite the absence of contractual DR provisions to guide the process. While there is a temptation to focus on the cost of their demands, it is recommended that decisions on whether to meet the demands of such groups should consider the social aspects of the dispute. For instance, for the train guard scenario described in Section 4.5 of this thesis, there is no price that can be tagged to a criminal incident affecting helpless passengers on board, which could have been mitigated by a train guard. All infrastructure PPP parties should always be mindful of the overarching responsibility to deliver a service that meets the needs of the general public.

5.6. Monitoring and Evaluation

Finally, the monitoring and evaluation aspect of DR would help to gather an understanding of how DR processes that were previously applied performed in the dispute situations. This would not only help with highlighting how DR provisions stipulated in PPP contracts perform in practice but also to identify misjudgements or errors that could have been made during the DR processes.

Cognisant of how complex some disputes can be in infrastructure PPPs, the purpose of the monitoring and evaluation would not be to hold the project or the project teams to a standard of faultlessness but rather to document any missteps, their causes and forge a way of avoiding them in future disputes on either the same project or other infrastructure PPP projects. The communication, information sharing, and coordination platform discussed in Section 5.4.3 of this thesis, can be used as a repository for such information.

The dispute resolution framework is summarised in Figure 5.2. Similar to the conceptual framework, this framework starts with recognising the importance of understanding the sources and nature of disputes in infrastructure PPPs and behavioural aspects of DR. It then discusses DR interventions from both proactive and reactive angles. Finally, the framework encourages

active monitoring and evaluation of DR processes. The framework can be customised to individual project settings to develop a specific DR system for each project as needed.

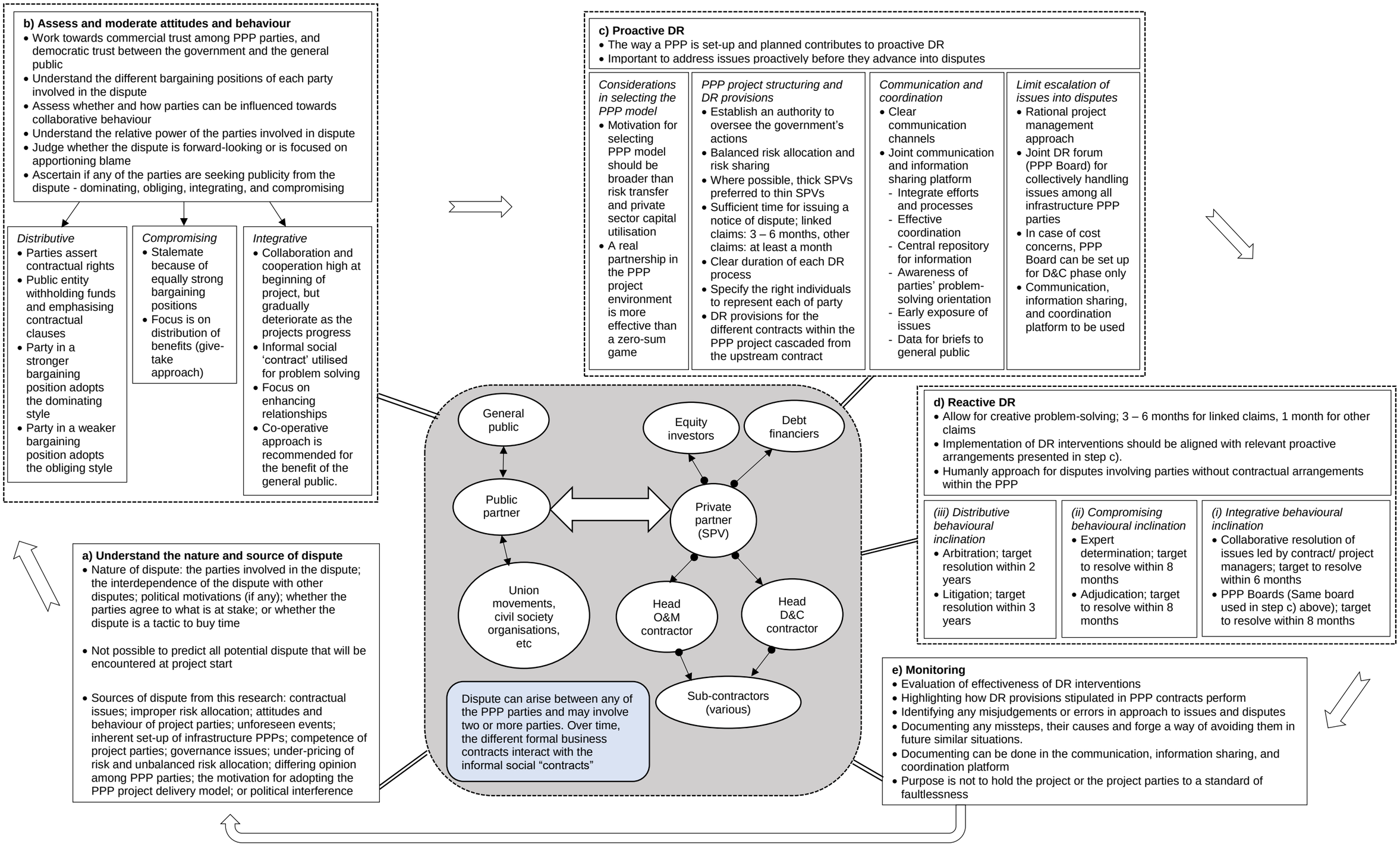

Figure 5.2: Framework for constructive DR in infrastructure PPPs

The empirical framework developed in Figure 5.2 provides a guide for resolution of disputes in infrastructure PPP projects, with an awareness of how behavioural orientations of project parties during dispute influences their DR approaches. The bottom line of the framework is to encourage constructive DR that addresses the concerns of all infrastructure PPP project parties (Zhang and Chen 2013).

The framework can be applied on both social and economic infrastructure PPP projects to manage conflicts and resolve disputes arising among any of the parties involved in the projects. It can be applied for disputes arising between subcontractors and contractors, contractors and contractors, contractors and the SPV, the SPV and the government, the government and the [general] public, among other possible combinations of parties who may be involved in any given dispute.

The framework proposes proactive DR measures to inform the procurement options analysis – the process that leads to the decision on whether a project should be delivered using the PPP model, the structuring of PPP projects including their DR provisions, communication, information sharing and coordination plans, as well as interventions for addressing issues proactively before they advance into disputes. This is backed by an understanding of the sources of each individual [potential] dispute. Furthermore, the framework emphasises the importance of establishing an understanding of the behavioural orientations of project parties and teams. For issues that escalate into disputes despite application of proactive DR techniques, the appropriate reactive DR response is selected based on the behavioural inclinations of the parties involved in the dispute. Once a DR intervention has been applied, its performance is monitored and evaluated and lessons learnt are documented in the communication, information sharing and coordination platform established for the project. In the event that the dispute is not resolved by the applied DR interventions, a re-assessment of the sources of the dispute is done and subsequent stages of the framework are repeated until the dispute is resolved.

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

6.1. General Conclusions

This chapter presents the general conclusions from this study and a demonstration of how the objectives of this research were achieved. It also outlines the theoretical and practical contributions of this research, wider application and limitations of the research, and recommendations for future research in the area of DR for infrastructure PPP projects.

This thesis discussed various aspects relevant to DR in infrastructure PPPs. Firstly, a literature review was undertaken with information sourced on the concept of PPPs, their associated challenges and benefits, and their application in the infrastructure sector. A discussion on the general principles of conflict and key conflict theories including the dual concern theory (DCT) was also presented. The research then narrowed down to DR in infrastructure PPP projects. Additionally, literature was gathered on sources of disputes, current DR practices, critical DR issues in infrastructure PPPs, behavioural tendencies of infrastructure PPP project parties during dispute, among others. Subsequently, knowledge gaps in the literature were identified and a conceptual framework for this study was developed. Among other findings, the literature reviewed as part of this research emphasised the benefits of effective DR towards the success of infrastructure PPP projects. It also highlighted that DR in infrastructure PPPs has hardly been researched in the past, despite several researchers emphasising the importance of DR to the success of these projects.

Through a transformative mixed design approach involving qualitative and quantitative research designs, focus group discussions, a questionnaire survey and semi-structured interviews were used to collect empirical data. The data was analysed using NVivo (for qualitative data) and IBM SPSS software (for quantitative data). Among other key findings from the empirical data, it was established that many of the respondents agreed that disputes significantly affect the success of infrastructure PPP projects, and that effective DR is crucial

to the success of infrastructure PPP projects. Additionally, nearly half of the practitioners expressed their dissatisfaction with the current DR processes.

On the DR environment and current DR practice, it was established that the DR environment for infrastructure PPP projects often involves multiple parties each with differing DR provisions in their respective contracts. It was also reported that insufficient DR planning is done at project level or when a dispute arises during project execution, and little attention is paid to the depth of DR provisions at contracting stage. This was partly attributed to the competitive nature of most PPP bidding processes in Australia and bidders not wanting to be seen as overly critical of DR clauses as this could imply that they were predicting disputation on the project. Furthermore, it was confirmed that guidelines for resolving disputes in infrastructure PPPs are usually standard stipulations in PPP contracts by the government or the representative they appoint to do so. For contracts between the SPV consortium and the entities within them, the DR systems are usually formulated by the SPV. The research participants reported that DR procedures are usually recommended in the order of executive level negotiation, expert determination, mediation, arbitration, and finally litigation. On some occasions, dispute boards are constituted. PPP practitioners reported that dispute boards and adjudication were the most frequently used techniques, followed by litigation, arbitration, expert determination, mediation, and negotiation. On the duration of DR, litigation was reported to take the longest period of time, followed by arbitration, dispute boards, expert determination, mediation, adjudication, and negotiation. Some interview participants argued that the current DR guidelines are not adequate for the variable range of disputes encountered on infrastructure PPP projects.

The behavioural inclinations of project parties were described as collaborative and co-operative in the early stages of projects or when issues are first encountered. This is a characteristic of the integrative DR dimension of DCT. However, as the projects progress, the level of collaboration gradually deteriorates and each party is inclined towards asserting their contractual rights when disputes arise. Subsequently, the party with a stronger bargaining

position adopts the dominating style and the one in a weaker bargaining position adopts the obliging style in the spirit of not ruining future opportunities to work with the other party. This behaviour is all typical of the distributive DR dimension of DCT. On some occasions, parties reach a stalemate because each of them has a strong case in favour of their interests. The scenario of equal bargaining positions results in the compromising dimension of DCT.

Sources of disputes in infrastructure PPP projects were more generally reported to be associated with risk-related issues. This included improper risk allocation, unbalanced risk allocation, under-pricing of risk, unclear risk allocation, and parties taking on too much risk. The critical sources of disputes as determined from the quantitative component of this study included contractual issues, issues related to attitudes and behaviour of project parties, unforeseen events, issues related to inherent set-up of infrastructure PPPs, issues related to competence of project parties, and governance issues. Other sources of disputes were reported as differing opinions among project parties, the motivation for adopting the PPP project delivery model, political interference, under-pricing of projects, breakdown of commercial relationships, exposure of SPV to liabilities that they cannot pass on to either the government or contractor, failure to resolve issues in a timely manner, and disagreement on the parties responsible for different scopes of work.

Most of the practitioners from all three sets of data collection stages for this research identified DR issues as inadequate information sharing, poor communication, and inadequate monitoring and evaluation systems to facilitate continuous DR improvement. Other DR issues included poor collaboration, dissimilarity of DR provisions specified in the different contracts that are typically found in major infrastructure PPP projects, unclear guidelines on who is responsible for oversight of the public partner's actions, inefficacy of applied conflict management and DR systems / processes, and absence of elaborate DR guidelines. Also, the time allocated for issuing notices of dispute in most infrastructure PPP DR provisions was reported as being so short that sometimes issues prematurely progress into disputes. Moreover, "thin" SPV arrangements were

noted to have longer decision-making timelines during DR than "thick" SPV arrangements. The quantitative component of this research established the critical DR issues as: political interference in delivery of the infrastructure PPP project, lack of flexibility around exploring DR options outside the DR stipulations in the contract, and lack of a unified DR system specifically designed for each infrastructure PPP project.

Furthermore, critical recommended DR practices were established as: exploring solutions that are acceptable to all project parties in dispute, understanding each infrastructure PPP project partners' obligations, understanding each infrastructure PPP project partners' objectives, transparency and open communication among project parties, proactive identification of anticipated DR-related issues for the entire infrastructure PPP project cycle at the beginning of the project, involving the private sector in early stages of the infrastructure PPP project, establishing relationships among dispute resolution issues, applying a dispute resolution system that has been specifically developed for the infrastructure PPP project, constant monitoring and evaluation of dispute resolution interventions for different dispute situations, and understanding and incorporating behavioural tendencies and attitudes of infrastructure PPP project parties in dispute situations. Other recommended DR practice as obtained from the qualitative component of this research was: adoption of more balanced risk allocation and sharing for infrastructure PPPs, setting up a communication platform specifically for each project, increasing time provisions for issuing notices of dispute, involving the right people in the DR process, and having thick SPVs in the project set-up. As a step towards improving DR in infrastructure PPPs, it was suggested that collaborative and joint means of conflict management and dispute resolution are adopted for infrastructure PPP projects. The top four advantages of using a joint DR system were noted as accommodating the interests of multiple stakeholders on the infrastructure PPP project, relationship management over the long duration of infrastructure PPPs, enhancing communication amongst infrastructure PPP project parties, integrating differing organisational culture and dispute resolution practice of different project parties.

All the critical recommended DR practices correlated with the critical DR issues that were identified during this study. This suggested that they were all relevant for addressing the issues.

The following critical success factors were established for DR in infrastructure PPPs: neutrality of the mediator, flexibility of PPP project parties, confidence in the DR system, fairness by all parties, confidence of the infrastructure PPP project parties, speed of DR, and privacy of the dispute matter from the media and/or public.

To understand the applicability of the findings of this research to both infrastructure PPP practitioners in the public and private sector, a comparison of public and private sector views on critical DR issues, critical recommended DR practice, and critical success factors was made. The results showed no statistically significant difference between the responses of public and private sector practitioners, and the few differences in opinion of public and private sector practitioners had minimal effect on variation of the findings. Among other findings, one of the differences in opinion was that speed of DR was more important to the public sector than it was to the private sector.

Finally, an empirical DR framework was developed from this study. Building on the conceptual framework, the empirical framework recognised the importance of understanding the sources and nature of disputes in infrastructure PPPs as well as behavioural aspects of DR as established from the research findings. It then recommended DR interventions from both proactive and reactive angles. Finally, the framework encouraged active monitoring and evaluation of DR processes to enhance inbuilt learning capabilities with respect to DR processes. The framework can be customised to individual project settings to develop a specific DR system for each project as needed.

6.2. Achievement of Research Objectives

The aim of this study was to develop a framework for constructive DR in infrastructure PPPs that incorporates attitudes and behaviour of PPP parties. To achieve this aim, five objectives

were established. The objectives of this research were closely aligned with the research questions. Therefore, by achieving the research objectives, the research questions were answered. The subsequent sections demonstrate how each of the research objectives was achieved.

Objective one: To investigate sources of disputes and critical issues in DR in infrastructure PPPs. The sources of disputes were investigated through literature review as documented in Section 2.6.2 of this thesis. Among other findings, the literature review revealed that disputes in infrastructure PPP projects often arise from unfair risk allocation, lack of a clear understanding of the parties' roles and responsibilities, unexpected tariff changes, excessive contract variations, political interference, ambiguous goals and objectives, inadequate compensation to displaced persons, unreliable service delivery, and delay in rectifying defects during service delivery. These were confirmed by empirical findings from focus group discussions, questionnaire surveys and semi-structured interviews as discussed in Sections 4.2.3, 4.3.9, and 4.4.2 of this thesis respectively. The empirical findings showed that sources of disputes in infrastructure PPP projects include unbalanced risk allocation, under-pricing of risks, attitudes and behaviour of project parties, unforeseen events, the set-up of infrastructure PPP projects, incompetence of project parties, political interference, under-pricing of projects, breakdown of commercial relationships, among others.

Similarly, the issues affecting DR in infrastructure PPPs as documented in literature were presented in Section 2.6.4 of this thesis. Among other issues, these included the public partner's oversight-related issues, regulatory framework and legal issues, poor collaboration, inadequate monitoring and evaluation, unsuitability of hypothetical DR scenarios, exclusion of behaviour and attitudes of project parties, inadequate communication plan, among others. These were confirmed in the focus group and semi-structured interviews as described in Sections 4.2.4 and 4.4.4 of this thesis. The quantitative component of this research exposed the critical DR issues as presented in Section 4.3.12 of this thesis. Some of the issues revealed through the empirical

data collection processes included: inadequate information sharing, poor communication, inadequate monitoring and evaluation systems, poor collaboration, dissimilarity of DR provisions specified in the different contracts that are typically found in major infrastructure PPP projects, unclear guidelines on oversight responsibilities of the public partner's actions, inefficacy of applied DR systems, lack of flexibility around exploring DR options outside the contract DR stipulations, among others.

Objective two: To assess current DR practices and understand behavioural orientations of partners in infrastructure PPPs. An understanding of current DR practices for infrastructure PPP projects, including their effectiveness was scrutinised from the perspectives of focus group participants (Section 4.2.2 of this thesis), survey respondents (Sections 4.3.7 of this thesis) as well as interview participants (Section 4.4.1 of this thesis). Among other findings, the results confirmed that dispute boards and adjudication were the most frequently used DR techniques in infrastructure PPP projects, followed by litigation, arbitration, expert determination, and mediation. Negotiation was ranked as the least commonly used DR technique in infrastructure PPPs. On duration of the DR techniques, litigation was reported to take the longest period of time, followed by arbitration, dispute boards, expert determination, mediation, adjudication, and finally negotiation. Also, the order of progression of DR processes and respective timelines were reported to be inadequately elaborated in the DR provisions and some practitioners noted that the DR guidelines are not adequate for the variable range of disputes encountered on infrastructure PPP projects.

Current DR practices for infrastructure PPPs were also discussed in the literature review (Section 2.6.3 of this thesis) where it was found that the order of application of DR techniques is usually as follows: (1) negotiations between the parties' senior executives or their nominated representatives; (2) mediation by an agreed unbiased party; (3) independent expert or panel review (or dispute board); (4) arbitration; and (5) litigation.

Using the dual concern theory as a theoretical lens, the behavioural orientations of PPP project parties during dispute were established in Section 2.5 of this thesis. Three main behavioural predispositions – distributive, integrative, and compromising, were found to characterise the DR environment of infrastructure PPP projects, as explained by DCT. This formed the basis of the first journal article that was published under this research project, as listed in the preliminary sections of this thesis. Interview participants and survey respondents confirmed this understanding in infrastructure PPP practice as shown in Sections 4.4.3 and 4.3.11 of this thesis respectively. Among other insights, it was reported from the empirical data collection processes that in the early stages of infrastructure PPP projects or when issues are first encountered, project parties work more collaboratively and cooperatively – a characteristic of the integrative DR dimension of DCT. However, as the projects progress, the collaboration gradually deteriorates and each party is inclined towards asserting their contractual rights in a move towards distributive DR.

Objective three: To establish a relationship between critical issues in DR and DR practice. Having gathered information on the current DR practices and critical issues associated with them, a relationship between the two aspects was established in Section 2.6.4 of this thesis. Among other findings, it was found that public partner's oversight-related issues affect negotiation, regulatory framework and legal issues affect all DR technique, inadequate monitoring and evaluation affects all DR techniques, and poor collaboration affects litigation, negotiation, and arbitration. This formed the basis of the second journal article that was published under this research project, as listed in the preliminary sections of this thesis.

A relationship between critical DR issues and critical recommended DR practice was also investigated using correlation analysis in Section 4.3.14 of this thesis. The correlation analysis showed that all the recommended DR practices correlated with the DR issues, suggesting that they were all relevant for addressing the critical DR issues that were identified.

The critical success factors to successful DR in infrastructure PPPs were determined from the questionnaire survey results (Section 4.3.15 of this thesis). These included: neutrality of the mediator, flexibility of PPP project parties, confidence in the DR system, fairness by all parties, confidence of the infrastructure PPP project parties, speed of DR, and privacy of the dispute matter from the media and/or public.

Objective four: To investigate and propose recommended practices for constructive DR in infrastructure PPPs. Through focus group discussions and interviews, infrastructure PPP practitioners proposed DR practices that should be adopted or sustained for infrastructure PPP projects. These were presented in Sections 4.2.5 and 4.4.5 of this thesis. The critical recommended practices were obtained from the survey data, and these have been reported in Section 4.3.13 of this thesis. Among other recommendations, infrastructure PPP practitioners suggested collaborative and joint means of DR. In addition, it was recommended that solutions that are acceptable to all project parties are explored, transparency and open communication are maintained, the performance of DR interventions is monitored and evaluated, and behavioural tendencies and attitudes of infrastructure PPP project parties in dispute situations are understood and incorporated, among others.

Objective five: To develop a framework for constructive DR in infrastructure PPPs. An empirical framework addressing both proactive and reactive aspects of DR in infrastructure PPPs was developed as discussed in Chapter 5 and summarised in Figure 5.2 of this thesis. Among other key elements, the framework proposes DR-related aspects that are relevant to the procurement options analysis and structuring of PPP projects including their DR provisions. Additionally, it provides for communication, information sharing and coordination plans, and recommendations for addressing issues before they progress into disputes. The framework also emphasises the importance of incorporating the behavioural inclinations of parties affected by dispute, in the DR process. This is done by selecting the appropriate DR method based on the

behavioural responses of the parties involved in the dispute. Finally, monitoring and evaluation of the applied DR intervention is done.

6.3. Contribution to Knowledge and Application of Research Results

Overall, this research responds to the need for more constructive DR processes in infrastructure PPP projects through improvements that are inspired by an evidence-based understanding of the issues embedded in current DR practices.

The research has both theoretical and practical contributions as discussed below. These contributions support the bridging of the knowledge gaps discussed in Section 2.7 of this thesis.

6.3.1. Theoretical contribution of the research

The research provides researchers with a better understanding of the occurrence of disputes and its resolution within the unique context of infrastructure PPPs by making use of a recognised theory – DCT. This was achieved through an examination of how concepts that are pre-specified in theory are experienced in the real-world environment of infrastructure PPPs.

Also, the research presents a set of issues affecting DR in infrastructure PPP projects as well as recommended DR practice for these projects. This adds to the infrastructure PPP body of knowledge.

A conceptual framework for DR in infrastructure PPP projects was also proposed. This framework can serve as an integrated DR framework in academia.

Furthermore, as discussed in Section 3.4.2 of this thesis, DR-related research that is specific to Australia has hardly been published, compared with the international context. By focussing on Australia for empirical data collection, this research added to the theoretical body of knowledge of DR from the Australian context.

6.3.2. Practical contribution of the research

The research provided clarity to infrastructure PPP practitioners on the gaps in current DR practice for infrastructure PPP projects.

Also, the research presented critical success factors for constructive DR which will guide decision-making amongst infrastructure PPP project parties when dealing with disputes.

Finally, the empirical framework developed as part of this research provides a comprehensive guide to DR in infrastructure PPPs, based on an application of DR best practices which were recommended by the practitioners that participated in this research. This framework can be used as a reference when an issue arises on any given infrastructure PPP project. Moreover, it can be customised for specific infrastructure PPP project situations to formulate individual DR systems and processes for the project.

6.4. Wider implication to infrastructure PPP practice

The key findings from this research represent insights from various public and private sector practitioners across Australia, on several aspects that are relevant to DR practice in infrastructure PPPs. Together with the DR framework, it is hoped that these can shape the way disputes and conflicts are handled on infrastructure PPP projects in Australia. Additionally, the findings can inform DR practice in other established infrastructure PPP markets whose way of implementing PPPs relates with that of Australia. Emerging PPP markets can adopt some of the findings from this research as a pathway for good practice.

6.5. Limitations

The use of DCT in DR in infrastructure PPPs needs to be undertaken with full awareness that DCT does not consider situations where the parties in dispute resort to attacking tendencies by deliberately seeking to harm themselves and/or destroying other parties. However, such situations are hardly typical of the infrastructure PPP project environment.

Furthermore, the DR environment of infrastructure PPPs is complex and it may involve many parties as described in Section 5.1 of this thesis. While all effort was made to ensure that the research participants in the empirical data collection processes were highly experienced in infrastructure PPP DR and that all relevant parties to typical infrastructure PPP arrangements in Australia were represented, it is possible that the findings of this data may not be free of expert misjudgement or bias given that they were drawn from experts' recount of their particular experience on projects.

Also, the participants in the empirical data collection phases of this research were all practitioners from Australia. While the results from this research can be extended to other established PPP markets and scaled to emerging PPP markets, their application on PPP markets outside Australia should bear in mind any differences in the infrastructure PPP delivery mechanism that may exist between those PPP markets and Australia.

Lastly, given the sensitivity of DR in PPP projects, it cannot be ruled out that some of the research participants may have been reluctant to fully disclose different aspects surrounding DR on the infrastructure PPP projects they were involved in. However, it is hoped that this limitation had minimal effect on the research findings in general because participants were assured of the rigorous confidentiality protocols that this research employed prior to their involvement. These protocols were communicated in the Participant Information Sheet and verbally – for the qualitative empirical data component of the research.

6.6. Recommendations for Further Research

This study investigated DR in infrastructure PPPs, a topic which has not been adequately explored in the past. While the research generated many useful insights on several aspects that are relevant to the subject, more research could be conducted to illuminate the different ways in which specific disputes were addressed on different infrastructure PPP projects with the view

of understanding the approaches that worked best under different technical, political and economic constraints.

Additionally, as discussed in Section 5.4.1 of this thesis, selection of the PPP model over other project delivery models should not only be motivated by risk transfer to the private sector or private sector capital utilisation, but also ensure that the most appropriate model is selected for the long-term nature of the project and risk allocation is handled accordingly. It is recommended that empirical research is undertaken to understand the optimum weighting that should be assigned to the different criteria, including but not limited to risk transfer and private capital utilisation, during the procurement options analysis.

Furthermore, many practitioners reported that sources of disputes in infrastructure PPP projects are more generally associated with risk-related issues. Future research efforts can be invested in investigating the best risk allocation model that would minimise occurrence of disputes on infrastructure PPP projects. This could take the form of a practical toolkit or a management framework based on empirical data.

Finally, this research proposed a joint DR system to foster proactive and reactive DR among infrastructure PPP parties. This joint DR system would bring together all parties involved in the delivery of the infrastructure PPP project on one DR forum. More research is recommended to confirm the safeguards for ensuring DR success with such a system when some of the participants in the joint DR processes do not have direct contractual relationships.

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APPENDICES

Appendix 1: Topics/questions for the focus group discussions

Background information on participants

1. Verbally share with other participants:

    - Your name:
    - Current position and organisation:
    - Details of one infrastructure PPP project you have participated in (preferably in Australia – if none, a project elsewhere is okay):
        - Project name
        - Your role on the project
        - Stage of the project you were involved in (formulation, design, construction, operation and maintenance, all stages, etc.)

Performance of current CM practices in infrastructure PPP projects

2. Using verbal open discussion with other participants, discuss:

    - Practices used to plan for conflict management (CM)
    - Practices used to manage conflict
    - How behaviour of project parties is incorporated in the CM process
    - How effective the current CM practice is
    - How the efficiency of the CM practice(s) is monitored and evaluated

Nature of conflict in infrastructure PPPs

3. In the Zoom chat window, list:

    - Four main causes of conflict in infrastructure PPPs
    - Two escalators of conflict

Discuss your responses with other participants

Conflict management (CM) issues in infrastructure PPPs

4. In the Zoom chat window, rank the following CM-related issues encountered in infrastructure PPPs (from most to least prevalent):

    - Absence of elaborate CM guidelines;
    - Poor collaboration;
    - Unclear guidelines on who is responsible for oversight of the public partner's actions;
    - Inefficacy of applied CM systems/processes;
    - Unclear communication channels;
    - Absence of monitoring and evaluation;
    - Lack of transparency; and Gov't not being transparent with the private partner on certain issues
    - Exclusion of behaviour of project parties in the CM process

Share with other participants the rationale behind your ranking

5. Are there other CM-related issues not included in the list above?

Suggested improvements to CM in infrastructure PPP projects

6. Via open verbal discussion with other participants, suggest:

    - Improvements to the current CM practice in infrastructure PPP projects

Appendix 2: Semi-structured interview questions and topics

Section 1: Background

The section is aimed at identifying the respondent's involvement in infrastructure PPP projects to guide contextualisation of their responses.

Describe your participation in infrastructure PPPs, and your involvement in dispute resolution (DR) in infrastructure PPPs.

a) Your name
b) Academic qualifications
c) Current position and organisation
d) Number of years of experience on infrastructure PPPs
e) Types of PPPs you have been involved in
f) Value of PPPs you have been involved in
g) Previous / current role(s) in relation to infrastructure PPPs
h) Brief description of your involvement in DR

Section 2: Current DR practice in infrastructure PPPs

The aim of this section is to assess current DR practices and understand behavioural orientations of partners in infrastructure PPPs during dispute situations. In responding to the questions below, please feel free to reflect on a past infrastructure PPP project you participated in.

1) What guidelines are used for resolving disputes in infrastructure PPP projects throughout the project life cycle?
   a) Are they adequate for the variable range of dispute encountered on infrastructure PPPs?
   b) Are they elaborate and unambiguous?

2) How is a DR approach selected and implemented for any single dispute situation on an infrastructure PPP project?
   a) Are there contract document stipulations?
   b) Is it arranged via the contract document plus team management recommendations/response?
   c) How are the views/interests of the different project parties incorporated in the DR process for infrastructure PPPs?
   d) What is the level of cooperation amongst infrastructure PPP project parties during the DR process?
   e) Does unequal power distribution between the public and private partner impact the DR process in infrastructure PPPs? If yes, how?
   f) To what extent does the Government willingly and openly engage in dispute processes?

3) In your opinion, how effective would a joint DR system work on infrastructure PPPs? A joint dispute resolution system is hypothesised as one that is jointly developed by all infrastructure PPP project

parties for application in dispute situations that relate to all the parties on a given project. It could be made project-specific for each project.

a) What safeguards would need to be in place to make it work?

Section 3: Critical issues in DR in infrastructure PPPs

The aim of this section is to investigate the critical issues in DR in infrastructure PPPs.

What issues affect the effectiveness of DR processes in infrastructure PPP projects? Effectiveness can be measured by time taken to resolve the dispute, satisfaction of the parties, smooth continuation of the project after the dispute has been resolved.

Section 4: Improvement to DR practice in infrastructure PPPs

The section is aimed at gathering feedback from experts on ways to improve the current DR practice in infrastructure PPPs.

1) What improvements to the current DR practices in infrastructure PPPs can be recommended to alleviate DR-related issues?
2) How can the concerns of the general public be better incorporated/managed?

Section 5: Additional thoughts

Kindly share any additional thoughts on DR in infrastructure PPP projects that may not have been covered in this interview

Appendix 3: Questionnaire Survey

Introduction

This questionnaire survey is part of the data collection process for a research project that is investigating dispute resolution in infrastructure public-private partnership (PPP) projects.

The questionnaire will take you approximately 15 minutes to complete. Submission of responses to this questionnaire signifies that you fully consent to participating in this research.

The closing date of this survey is 30th September 2022.

This questionnaire survey is designed for individuals with experience in infrastructure PPPs and some involvement in dispute resolution at any stage of the infrastructure PPP project lifecycle.

A Participant Information Sheet has been provided in the preamble of this survey.

This survey can be accessed from a computer or mobile device. In the event that you are not able to complete the survey in one sitting, you can come back at any time to edit or finish it on the same device through which it was previously accessed. Please note that the device cookies should not have been cleared.

In the context of this survey, the following definitions will apply in relation to dispute resolution in infrastructure PPPs.

Dispute: A dispute is considered as a form of conflict that necessities resolution. Conflict can be defined as divergence of interests and/or priorities of two or more parties during execution of a project.

Dispute resolution: Dispute resolution is the process of resolving a dispute or conflict between different parties.

Dispute resolution issue: Any matter, concern or problem that has the potential of affecting constructive dispute resolution in the infrastructure PPP project environment.

Joint dispute resolution system: A joint dispute resolution system is hypothesised as one that is jointly developed by all infrastructure PPP project parties for application in dispute situations that relate to all of the parties on a given project. It could be made project-specific for each project.

Participant Information Sheet – Survey

PROJECT TITLE: Development of an integrated framework for constructive dispute resolution in infrastructure public-private partnership projects

HUMAN RESEARCH ETHICS COMMITTEE (HREC) APPROVAL NUMBER: H-2020-230

PRINCIPAL INVESTIGATOR: Dr. Sam Baroudi

STUDENT RESEARCHER: Ms. Leah Musenero

STUDENT'S DEGREE: PhD (Professions)

Dear Participant,

You are invited to participate in the research project described below.

What is the project about?
This research project is about developing a framework for constructive dispute resolution in infrastructure public-private partnership projects. The framework will embed the influence of behaviour and attitudes of project parties in the dispute resolution process. Additionally, the project will investigate the following aspects of infrastructure public-private partnership projects:

- sources of dispute and critical issues in dispute resolution;
- current dispute resolution practices and behavioural orientations of project partners; relationship between critical issues in dispute resolution and current dispute resolution practices in order to explore critical success factors and barriers for dispute resolution processes in infrastructure PPPs; and
- recommended practice for constructive dispute resolution.
  It is anticipated that the findings will better researchers' understanding of dispute and its resolution within the unique context of infrastructure PPPs in relation to existing theory. Furthermore, a set of dispute resolution guidelines will be developed for infrastructure PPP practitioners. The project will focus on infrastructure PPP projects in Australia.

Who is undertaking the project?
This project is being conducted by Ms. Leah Musenero. This research will form the basis for the degree of Doctor of Philosophy at the University of Adelaide under the supervision of Dr. Sam Baroudi and Assoc. Prof. Indra Gunawan. The project is funded by Adelaide Scholarships International.

Why am I being invited to participate?
You are being invited because you are knowledgeable and experienced in infrastructure PPP projects and have had some degree of involvement in dispute resolution in infrastructure PPPs.

What am I being invited to do?
You are being invited to participate in an online questionnaire survey conducted by Ms. Leah Musenero. The questionnaire survey will involve selecting your most appropriate response based on a Likert scale rating on the importance of dispute resolution in infrastructure PPP projects, behavioural tendencies of infrastructure PPP project parties in dispute situations, dispute resolution issues in infrastructure PPPs, and best practice for constructive dispute resolution in infrastructure PPPs. There will also be a field for sharing additional thoughts on dispute resolution in infrastructure PPPs. No personal information will be collected or revealed to any third party.

How much time will my involvement in the project take?
Approximately 15 minutes.

Are there any risks associated with participating in this project?
You may experience some discomfort when reflecting on situations of dispute that have caused you stress in the past or those that were not resolved well. Additionally, you will give up your time to

participate in the questionnaire surveys. To minimise discomfort associated with sharing past events, you will not be coerced to share any information; the data collection process will operate on voluntary information-sharing basis. Also, anonymity and confidentiality of your information will be maintained throughout the research process in order to promote your peace of mind. You will be regularly reminded of your rights of withdrawal from the research process should you have any concerns related to your participation. Adverse events will be immediately reported to the University of Adelaide's HREC Secretariat.

What are the potential benefits of the research project?
It is anticipated that the findings will better researchers' understanding of dispute and its resolution within the unique context of infrastructure PPPs in relation to existing theory. Furthermore, a set of dispute resolution guidelines will be developed for infrastructure PPP practitioners.

Can I withdraw from the project?
Participation in this study is completely voluntary. Survey data will be collected in a non-identifiable manner. Therefore, you can withdraw from the study at any time up until you submit your survey responses.

What will happen to my information?
The questionnaire survey will be anonymous. Data collected may be included in the PhD thesis and possibly journal articles, book chapters, news articles, conference presentations, and websites under this PhD project. You will not be identified in the publications. Summary feedback of the research findings will be provided to participants at the end of the research project upon request. The research data will be retained by the University of Adelaide for a minimum period of 5 years from the date of publication of the research, after which it will be deleted and destroyed. Prior to being destroyed, the data will be accessible to Ms. Leah Musenero, Dr. Sam Baroudi and Assoc. Prof. Indra Gunawan. During this period, the data may be used by the researchers (named above) to publish papers related to the research project. Your information will only be used as described herein and will only be disclosed according to the consent provided, except as required by law.

Who do I contact if I have questions about the project?
Questions about the project should be directed to:
Dr. Sam Baroudi (primary contact)
Senior Lecturer
sam.baroudi@adelaide.edu.au, +61 8 8313 0977

Ms. Leah Musenero
PhD Researcher
leah.musenero@adelaide.edu.au

Assoc. Prof. Indra Gunawan
Associate Professor
indra.gunawan@adelaide.edu.au, +61 8 8313 3255

What if I have a complaint or any concerns?
The study has been approved by the Human Research Ethics Committee at the University of Adelaide (approval number H-2020-230). This research project will be conducted according to the NHMRC National Statement on Ethical Conduct in Human Research 2007 (Updated 2018). If you have questions or problems associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should consult the Principal Investigator. If you wish to speak with an independent person regarding concerns or a complaint, the University's policy on research involving human participants, or your rights as a participant, please contact the Human

Research Ethics Committee's Secretariat on: Phone: +61 8 8313 6028, Email: hrec@adelaide.edu.au; Post: Level 4, Rundle Mall Plaza, 50 Rundle Mall, ADELAIDE SA 5000.

Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

If I want to participate, what do I do?
If you would like to participate in the research, kindly contact any of the three members of the research team by email.

Yours sincerely,

Dr. Sam Baroudi (primary contact)
Ms. Leah Musenero
Assoc. Prof. Indra Gunawan

Please click 'next' to access the survey questions. Submission of your responses is considered as consent to participate and that you have read and understood the above information.

- ○ Next
- ○ Opt out

Section 1: Background Information

1. How many years of specific experience do you have on infrastructure PPP projects?
   - ○ 0-2 years
   - ○ 3-5 years
   - ○ 6-10 years
   - ○ 11-20 years
   - ○ Over 20 years

2. How many infrastructure PPP projects have you been involved in?
   - ○ 0-1 project
   - ○ 2-5 projects
   - ○ 6-10 projects
   - ○ 11-15 projects
   - ○ More than 15 projects

3. Please respond to the questions below in relation to infrastructure PPP projects you were involved in. Select all that apply

a) Project location (in Australia)

- ☐ ACT
- ☐ NSW
- ☐ NT
- ☐ QLD
- ☐ SA
- ☐ TAS
- ☐ VIC
- ☐ WA
- ☐ Other, please specify _____

b) Your main professional role on the projects

- ☐ Financier
- ☐ Project director
- ☐ Project manager
- ☐ Project team member
- ☐ PPP advisor (commercial, legal, technical)
- ☐ Equity investor
- ☐ Others, please specify _____

c) The extent of your involvement in dispute resolution

- ○ Not involved at all
- ○ Reasonably involved
- ○ Largely involved

d) The type of infrastructure PPP projects

- ○ Economic infrastructure: the private partner recovers their investment from user-imposed charges such as toll fees (e.g. toll roads, bridges, water systems, tunnels).
- ○ Social infrastructure: government retains the demand risk and issues a service payment to the private partner during the operation phase (e.g. schools, prisons and hospitals).
- ○ Both
- ○ Other, please specify _____

e) The sector you were/are representing

- ☐ Public e.g. public/government agency contracting the project
- ☐ Public e.g. public/government agency managing the project
- ☐ Private e.g. private company and direct participant in the project
- ☐ Other, please specify _____

f) The stage of the infrastructure PPP project lifecycle you were involved in. Please select all that apply.

- ☐ Formulation
- ☐ Procurement
- ☐ Design and construction
- ☐ Operation and maintenance
- ☐ Others, please specify _____

g) Brief description of one of the projects (optional)

_____
_____
_____

Section 2: The importance of dispute resolution in infrastructure PPP projects

4. To what extent do you agree that dispute significantly affects the success of an infrastructure PPP project?

- ○ Strongly disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly agree

5. What are the sources of dispute in infrastructure PPP projects? Please select all that apply.

- ☐ Contractual issues
- ☐ Governance issues
- ☐ Improper risk allocation
- ☐ Issues related to attitudes and behaviour of project parties
- ☐ Issues related to the competence of project parties
- ☐ Issues related to the inherent set-up of infrastructure PPPs e.g. long duration of projects, multiple stakeholders with differing organisational culture, among others
- ☐ Unforeseen events such as change in demand arising from economic fluctuations, natural disasters, disease outbreaks, war, among others.
- ☐ Others, please specify_____

6. To what extent do you agree that effective dispute resolution is crucial to the success of an infrastructure PPP project?

- ○ Strongly disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly agree

7. To what extent are the following statements true in relation to the importance of a joint dispute resolution system for infrastructure PPP projects?
A joint dispute resolution system: A joint dispute resolution system is hypothesised as one that is jointly developed by all infrastructure PPP project parties for application in dispute situations that relate to all of the parties on a given project. It could be made project-specific for each project.

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
A joint dispute resolution system accommodates the interests of multiple stakeholders on the infrastructure PPP project	○	○	○	○	○
A joint dispute resolution system integrates differing organisational culture and dispute resolution practice of different project parties	○	○	○	○	○
A joint dispute resolution system helps with relationship management over the long duration of infrastructure PPPs	○	○	○	○	○
A joint dispute resolution system enhances communication amongst infrastructure PPP project parties	○	○	○	○	○
Disputes are managed faster with a joint dispute resolution system	○	○	○	○	○
The cost of dispute resolution is significantly reduced when a joint dispute resolution system is in place	○	○	○	○	○
A joint dispute resolution system is not necessary for infrastructure PPP projects	○	○	○	○	○

If there are any other points not included above, please list them

_____

8. Which PPP project party is usually responsible for initiating a dispute resolution system in infrastructure PPP projects?

- ○ Public e.g. public/government agency contracting the project (a dispute resolution framework is a prerequisite to obtaining Cabinet approval for an infrastructure PPP project)
- ○ Public e.g. public/government agency managing the project
- ○ Private company within the Special Purpose Vehicle (SPV) consortium
- ○ All of the above (All PPP project parties work jointly to formulate a dispute resolution system)
- ○ Any of the parties who feels the greatest need for a dispute resolution system
- ○ None of the parties. There is usually no official dispute resolution system.
- ○ Others, please specify _____

9. At what stage of the infrastructure PPP project is a dispute resolution system that will be followed for the project formulated/established?

- ○ During the contracting period of the infrastructure PPP
- ○ During design and construction period
- ○ Ad hoc basis. A dispute resolution system is established when the need arises.
- ○ Never. There is usually no formally-established dispute resolution system.
- ○ Others, please specify _____

Section 3: Behavioural tendencies

10. To what extent do you agree with the following statements in regard to the dispute resolution environment of infrastructure PPP projects?

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Both opposing sides openly exchange information and examine their differences in order to find mutually-acceptable solutions to both parties	○	○	○	○	○
Only one of the PPP parties openly exchanges information and works towards an amicable solution	○	○	○	○	○
One of the PPP parties is obedient and generous towards the needs and demands of the other party	○	○	○	○	○
Both PPP parties downplay each other's concerns	○	○	○	○	○
One of the PPP parties ignores the needs and viewpoints of the other party	○	○	○	○	○
Both PPP parties tend to be disinterested in the dispute situation and subsequently ignore it	○	○	○	○	○
One PPP party gives up a need in exchange for a favour from the other PPP party	○	○	○	○	○
Each PPP party gives up a need in exchange for a favour from the other party	○	○	○	○	○
The PPP parties in dispute have constant interaction throughout the dispute resolution process	○	○	○	○	○
Interaction aimed towards managing the dispute between the PPP parties is moderated by an external party	○	○	○	○	○

If there are any other behavioural orientations that infrastructure PPP project parties tend to be inclined to, please state them here

_____
_____
_____

11. To what extent do you agree with the following statements in relation to your actions during a dispute situation on any infrastructure PPP project you were part of?

	Very much so	Somewhat	Unsure	Not so much	Not at all
I was aggressive in the dispute resolution process	○	○	○	○	○
I strongly pursued my own interests/goals	○	○	○	○	○
I bargained hard with the other party	○	○	○	○	○
I was competitive	○	○	○	○	○
I was cooperative	○	○	○	○	○
I was tough during the dispute resolution process	○	○	○	○	○
I was approachable	○	○	○	○	○
I was accommodative	○	○	○	○	○
I was collaborative	○	○	○	○	○
I obliged to the other party's demands	○	○	○	○	○

Please provide additional information (if any)

_____
_____
_____
_____
_____

12. To what extent do you agree with the following statements in relation to the actions of the other infrastructure PPP party (with whom you were on opposite sides of the dispute) during a dispute situation on any infrastructure PPP project you were part of?

	Very much so	Somewhat	Unsure	Not so much	Not at all
The other party was aggressive during the dispute resolution process	○	○	○	○	○
The other party pursued their own interests/goals strongly	○	○	○	○	○
The other party bargained hard with me or the party I was affiliated to	○	○	○	○	○
The other party was competitive	○	○	○	○	○
The other party was cooperative	○	○	○	○	○
The other party was tough during the dispute resolution process	○	○	○	○	○
The other party was approachable	○	○	○	○	○
The other party was accommodative	○	○	○	○	○
The other party was collaborative	○	○	○	○	○
The other party obliged to my demands or those of the party I was affiliated to	○	○	○	○	○

13. To what extent do you agree with the following statements in respect to your management style or other general situations during dispute situations on infrastructure PPP projects?

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
I am open to different points of view	○	○	○	○	○
Diversity of opinion and background is valuable to building my case	○	○	○	○	○
I usually perceive people who disagree with me as wrong	○	○	○	○	○
I decide the course of action to be taken during dispute resolution and disregard other people's input	○	○	○	○	○
I consider myself to be open-minded	○	○	○	○	○
I have experienced that people who are very different from us (me and/or the party I am affiliated to) are usually dangerous	○	○	○	○	○
I try to consider how someone might feel before I disagree with them	○	○	○	○	○
I believe that every situation has two sides to it and therefore try to consider both sides before I make a decision	○	○	○	○	○
When I disagree with someone, I try to consider their point of view	○	○	○	○	○
I sometimes have difficulty seeing things through the other party's point of view	○	○	○	○	○
When I am certain that I am right about something, I do not waste time listening to other people's points of view	○	○	○	○	○
I prefer thinking about the short-term impact of disputes rather than the long-term impact	○	○	○	○	○
It is enough that the project gets completed, I do not care how the disputes are managed	○	○	○	○	○
I prefer waiting on someone else's suggestion on how the dispute will be resolved rather than formulating one myself	○	○	○	○	○

Section 4: Dispute resolution issues in infrastructure PPPs

14. Are you satisfied with the current dispute resolution practice in infrastructure PPP projects?

- ○ Very dissatisfied
- ○ Dissatisfied
- ○ Unsure
- ○ Satisfied
- ○ Very satisfied

15. To what extent do you agree that the following dispute resolution issues exist on infrastructure PPP projects?

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Lack of streamlined dispute resolution systems	○	○	○	○	○
Lack of a unified dispute resolution system specifically designed for each infrastructure PPP project	○	○	○	○	○
Poor collaboration	○	○	○	○	○
Lack of flexibility around exploring dispute resolution options outside the dispute resolution stipulations in the contract	○	○	○	○	○
Unclear guidelines on who is responsible for oversight of the public partner's actions	○	○	○	○	○
Overlapping responsibilities between project parties	○	○	○	○	○
Inefficacy of applied DR systems/processes	○	○	○	○	○
Multiple roles of government i.e. as partner and regulator of the PPP	○	○	○	○	○
Lack of public involvement in the decision making process for the infrastructure PPPs	○	○	○	○	○
Interests of the general public not adequately addressed and represented	○	○	○	○	○
Political interference in delivery of the infrastructure PPP project	○	○	○	○	○
Interference from the general public during delivery of the infrastructure PPP project	○	○	○	○	○
Inadequate capacity in dispute resolution by the staff involved in the infrastructure PPP project	○	○	○	○	○
Inadequate information sharing	○	○	○	○	○
Exclusion of behaviour of project parties in the dispute resolution process	○	○	○	○	○
Absence of monitoring and evaluation systems for the efficacy of dispute resolution processes	○	○	○	○	○

If there are any other issues missing from the above list, please add them

_____
_____
_____
_____

16. How often are the following approaches used for dispute resolution in infrastructure PPP projects?

	Almost always	Often	Sometimes	Seldom	Never
Negotiation	○	○	○	○	○
Mediation	○	○	○	○	○
Arbitration	○	○	○	○	○
Litigation	○	○	○	○	○
Dispute board	○	○	○	○	○
Expert determination	○	○	○	○	○
Adjudication	○	○	○	○	○

17. What is the average duration of the dispute resolution process for any given dispute when each of the above approaches is used?

	0 – 3 months	4 – 6 months	7 – 12 months	1 – 3 years	3 – 5 years	> 5 years
Negotiation	○	○	○	○	○	○
Mediation	○	○	○	○	○	○
Arbitration	○	○	○	○	○	○
Litigation	○	○	○	○	○	○
Dispute board	○	○	○	○	○	○
Expert determination	○	○	○	○	○	○
Adjudication	○	○	○	○	○	○

Section 5: Best practice for constructive DR in infrastructure PPPs

18. To what extent are the following approaches important for constructive dispute resolution in infrastructure PPP projects?

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Proactive identification of anticipated dispute resolution-related issues for the entire infrastructure PPP project cycle at the beginning of the project	○	○	○	○	○
Constant monitoring and evaluation of dispute resolution interventions for different dispute situations	○	○	○	○	○
Establishing relationships among dispute resolution issues	○	○	○	○	○
Understanding each infrastructure PPP project partners' objectives	○	○	○	○	○
Understanding each infrastructure PPP project partners'obligations	○	○	○	○	○
Incorporating the opinion of the general public during project formulation	○	○	○	○	○
Incorporating the opinion of the general public during project delivery	○	○	○	○	○
Understanding and incorporating behavioural tendencies and attitudes of infrastructure PPP project parties in dispute situations	○	○	○	○	○
Allowing the project party with more power and influence on the project to drive the course of dispute resolution	○	○	○	○	○
Exploring solutions that are acceptable to all project parties in dispute	○	○	○	○	○
One of the parties in dispute adhering to the demands of the other party	○	○	○	○	○
Maintaining peace by ignoring dispute	○	○	○	○	○
Identifying an interest/need of the other party in dispute and offering it to them in exchange for freedom to pursue one's own interests	○	○	○	○	○
Transparency and open communication among project parties	○	○	○	○	○
Involving the private sector in early stages (e.g. formulation) of the infrastructure PPP project	○	○	○	○	○
Applying a dispute resolution system that has been specifically developed for the infrastructure PPP project	○	○	○	○	○
Applying a dispute resolution system that has been developed for all infrastructure PPP projects	○	○	○	○	○

If there are any other approaches missing from the above list, please add them

_____
_____

19. To what extent are the following factors critical to the success of a dispute resolution system in infrastructure PPP projects?

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Flexibility of PPP project parties	○	○	○	○	○
Speed of dispute resolution	○	○	○	○	○
Confidence of the infrastructure PPP project parties	○	○	○	○	○
Confidence in the dispute resolution system	○	○	○	○	○
Neutrality of the infrastructure PPP project parties	○	○	○	○	○
Neutrality of the mediator	○	○	○	○	○
Privacy of the dispute matter from the media and/or public	○	○	○	○	○
Non-adversarial approach to managing dispute	○	○	○	○	○
Fairness by all parties	○	○	○	○	○

If there are any other approaches missing from the above list, please add them

_____
_____
_____

20. Kindly share any additional comments on dispute resolution in infrastructure PPPs

_____
_____
_____
_____
_____

Thank you for completing this questionnaire survey.

Appendix 4: Participant Information Sheet

PROJECT TITLE: Development of an integrated framework for constructive dispute resolution in infrastructure public-private partnership projects

HUMAN RESEARCH ETHICS COMMITTEE (HREC) APPROVAL NUMBER: H-2020-230

PRINCIPAL INVESTIGATOR: Dr. Sam Baroudi

STUDENT RESEARCHER: Ms. Leah Musenero

STUDENT'S DEGREE: PhD (Professions)

Dear Participant,

You are invited to participate in the research project described below.

What is the project about?
This research project is about developing a framework for constructive conflict management (DR) in infrastructure public-private partnership (PPP) projects. The framework will embed the influence of behaviour and attitudes of project parties in the conflict management process. For this, the Dual Concern Theory will be used as a founding theory for behavioural orientation. Additionally, the project will investigate the following aspects of infrastructure public-private partnership projects:

- sources of conflict and critical issues in conflict management;
- current conflict management practices and behavioural orientations of project partners;
- relationship between critical issues in conflict management and current conflict management practices in order to explore critical success factors and barriers for conflict management processes in infrastructure PPPs; and
- recommended practices for constructive conflict management.

It is anticipated that the findings will better researchers' understanding of conflict and its management within the unique context of infrastructure PPPs in relation to existing theory. Furthermore, a set of DR guidelines will be developed for infrastructure PPP practitioners. The project will focus on infrastructure PPP projects in Australia.

Who is undertaking the project?
This project is being conducted by Ms. Leah Musenero. This research will form the basis for the degree of Doctor of Philosophy at the University of Adelaide under the supervision of Dr. Sam Baroudi and Assoc. Prof. Indra Gunawan. The project is funded by Adelaide Scholarships International.

Why am I being invited to participate?
You are being invited because you are knowledgeable and experienced in infrastructure PPP projects and have had some degree of involvement in conflict management in infrastructure PPPs.

What am I being invited to do?
You are being invited to participate in a focus group discussion, questionnaire survey and/or semi-structured interview conducted by Ms. Leah Musenero.
For focus group discussions and interviews, you will sign a consent form prior to your participation. For online questionnaire surveys, submission of survey responses implies consent. A note has been provided at the beginning of the survey to this effect.
Focus group discussions and semi-structured interviews will be audio-recorded (or video-recorded if conducted online in the event that inter-state COVID-19 restrictions are still in place). No personal information will be collected or revealed to any third party.
The focus group discussions will be undertaken in one session lasting approximately 3 hours (with a 15-minute break after the first 1.5 hours). Inter-participant discussions will be guided by open-ended questions on the nature of typical conflict in infrastructure PPPs, critical issues in conflict management, performance of current conflict management practices in infrastructure PPP project settings, and suggested improvements to conflict management.

Questionnaire surveys will involve selecting your most appropriate response based on a Likert scale rating on the importance of conflict management in infrastructure PPP projects, behavioural tendencies of infrastructure PPP project parties in conflict situations, conflict management issues in infrastructure PPPs, and best practice for constructive conflict management in infrastructure PPPs. There will also be a field for sharing additional thoughts on conflict management in infrastructure PPPs.

During the semi-structured interviews, you will be asked questions under the broad topics of sources of conflict and critical issues in conflict management in infrastructure PPPs, current conflict management practice in infrastructure PPPs, and suggested improvement to conflict management practice in infrastructure PPPs.

How much time will my involvement in the project take?
Focus group: 3 hours (with a 15-minute break after the first 1.5 hours)
Questionnaire survey: 15 minutes
Semi-structured interview: 45 – 60 minutes

Focus group participants will receive a transport refund/parking fees of $50 if the focus group discussions are conducted face to face. For online focus groups, no financial reimbursement will be made.

Are there any risks associated with participating in this project?
You may experience some discomfort when talking about situations of conflict that have caused you stress in the past or those that were not managed well. Also, during the focus group discussions, you may encounter other participants with opinions that differ from yours. Consequently, you may openly disagree and you may feel that your opinion is not being considered. Additionally, you will give up your time to participate in focus group discussions, interviews and/or questionnaire surveys depending on which one(s) you are eligible for and/or choose to participate in.
To minimise discomfort associated with sharing past events, you will not be coerced to share any information; the data collection process will operate on voluntary information-sharing basis. To ensure that you feel that your opinion is valued during focus group discussions, you and all other participants will sign a Group Norms Agreement to assure sanity and discipline and that all participants are allowed time to voice their opinions. For questionnaires and interviews, anonymity and confidentiality of your personal information will be maintained throughout the research process in order to promote your peace of mind. The Group Norms Agreement that will be signed prior to commencement of the focus group discussions will also depict the need for confidentiality of other participants' personal details. Also, you will be regularly reminded of your rights of withdrawal from the research process should you have any concerns related to your participation.
Adverse events will be immediately reported to the University of Adelaide's HREC Secretariat.

What are the potential benefits of the research project?
It is anticipated that the findings will better researchers' understanding of conflict and its management within the unique context of infrastructure PPPs in relation to existing theory. Furthermore, a set of DR guidelines will be developed for infrastructure PPP practitioners.

Can I withdraw from the project?
Participation in this project is completely voluntary. If you agree to participate, you can withdraw from the study at any time. However, it is important to note that while data can be removed from the data set for future use, published data cannot be withdrawn.

What will happen to my information?
The questionnaire surveys will be anonymous. The focus group discussions and interviews will be audio or video recorded for transcription purposes. Data collected may be included in the PhD thesis and possibly journal articles, book chapters, news articles, conference presentations, and websites under this PhD project. You will not be identified in the publications. Also, your personal information will not be transcribed and your identity will be replaced by a code. While all efforts will be made to remove any information that might identify you, complete anonymity cannot be guaranteed because the sample size is small. However, utmost care will be taken to ensure that no personally identifying details are revealed.

Summary feedback of the research findings will be provided to participants at the end of the research project upon request. Participants of the focus groups and interviews can request to review transcripts of their responses during the course of the project.
The research data will be retained by the University of Adelaide for a minimum of 5 years from the date of publication of the research, after which it will be deleted and destroyed. Prior to being destroyed, the data will be accessible to Ms. Leah Musenero, Dr. Sam Baroudi and Assoc. Prof. Indra Gunawan. During this period, the data may be used by the researchers (named above) to publish papers related to the research project.

Your information will only be used as described herein and will only be disclosed according to the consent provided, except as required by law.

Who do I contact if I have questions about the project?
Questions about the project should be directed to:

Dr. Sam Baroudi (primary contact)
Senior Lecturer
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Ms. Leah Musenero
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Assoc. Prof. Indra Gunawan
Associate Professor
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What if I have a complaint or any concerns?
The study has been approved by the Human Research Ethics Committee at the University of Adelaide (approval number H-2020-230). This research project will be conducted according to the NHMRC National Statement on Ethical Conduct in Human Research 2007 (Updated 2018). If you have questions or problems associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should consult the Principal Investigator. If you wish to speak with an independent person regarding concerns or a complaint, the University's policy on research involving human participants, or your rights as a participant, please contact the Human Research Ethics Committee's Secretariat on:

Phone: +61 8 8313 6028
Email: hrec@adelaide.edu.au
Post: Level 4, Rundle Mall Plaza, 50 Rundle Mall, ADELAIDE SA 5000

Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

If I want to participate, what do I do?
If you would like to participate in the research, kindly contact any of the three members of the research team by email. Consent forms will be sent to you for signing and returning to the research team prior to participation.

Yours sincerely,

Dr. Sam Baroudi (primary contact)

Ms. Leah Musenero

Assoc. Prof. Indra Gunawan

Appendix 5: Consent Form

1. I have read the attached Information Sheet and agree to take part in the following research project:

Title:	Development of an integrated framework for constructive dispute resolution in infrastructure public-private partnership projects
Ethics Approval Number:	H-2020-230

2. I have had the project, so far as it affects me, and the potential risks and burdens fully explained to my satisfaction by the research worker. I have had the opportunity to ask any questions I may have about the project and my participation. My consent is given freely.

3. Although I understand the purpose of the research project, it has also been explained that my involvement may not be of any benefit to me.

4. I agree to participate in the following activities (select both if you are available and willing to participate in both activities):
   ☐ Focus group discussion
   ☐ Interview
5. I agree to be audio/video recorded

6. I understand that I am free to withdraw from the project at any time.

7. I have been informed that the information gained in the project may be published in a book/journal article/thesis/news article/conference presentations/website/report.

8. I have been informed that while I will not be named in the published materials, it may not be possible to guarantee my anonymity given the nature of the study and/or small number of participants involved.

9. I agree to my information being used for future research undertaken by these same researcher(s) or by any researcher(s).

10. I hereby provide 'extended' consent for the use of my data in future research projects that are an extension of, or closely related to, the original project; or in the same general area of research as this project.

11. I understand that my information will only be disclosed according to the consent provided, except where disclosure is required by law.

12. I am aware that I should keep a copy of this Consent Form, when completed, and the attached Information Sheet.

Participant to complete:

Name: _____ Signature:_____ Date:

_____

Researcher/Witness to complete:

I have described the nature of the research to

_____

(print name of participant)

and in my opinion she/he understood the explanation.

Signature: _____ Position:_____ Date:

_____

Appendix 6: Ethics Approval

THE UNIVERSITY of ADELAIDE

RESEARCH SERVICES
OFFICE OF RESEARCH ETHICS, COMPLIANCE AND INTEGRITY THE
UNIVERSITY OF ADELAIDE

LEVEL 4, RUNDLE MALL PLAZA
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ADELAIDE SA 5000 AUSTRALIA
TELEPHONE +61 8 8313 5137
FACSIMILE +61 8 8313 3700
EMAIL hrec@adelaide.edu.au
CRICOS Provider Number 00123M

Our reference 34737

03 November 2020

Dr Sam Baroudi
Management

Dear Dr Baroudi

ETHICS APPROVAL No: H-2020-230
PROJECT TITLE: Development of an integrated framework for constructive conflict management in infrastructure public-private partnership projects

The ethics application for the above project has been reviewed by the Low Risk Human Research Ethics Review Group (Faculty of Arts and Faculty of the Professions) and is deemed to meet the requirements of the *National Statement on Ethical Conduct in Human Research 2007 (Updated 2018)* involving no more than low risk for research participants.

You are authorised to commence your research on: 03/11/2020
The ethics expiry date for this project is: 30/11/2023

NAMED INVESTIGATORS:

Chief Investigator:	Dr Sam Baroudi
Student - Postgraduate Doctorate by Research (PhD):	Ms Leah Musenero
Associate Investigator:	Associate Professor Indra Gunawan

CONDITIONS OF APPROVAL: Thank you for addressing the feedback. The revised ethics application provided on the 2nd of November 2020 has been approved.

Ethics approval is granted for three years and is subject to satisfactory annual reporting. The form titled Annual Report on Project Status is to be used when reporting annual progress and project completion and can be downloaded at http://www.adelaide.edu.au/research-services/oreci/human/reporting/. Prior to expiry, ethics approval may be extended for a further period.

Participants in the study are to be given a copy of the information sheet and the signed consent form to retain. It is also a condition of approval that you immediately report anything which might warrant review of ethical approval including:

- serious or unexpected adverse effects on participants,
- previously unforeseen events which might affect continued ethical acceptability of the project,
- proposed changes to the protocol or project investigators; and
- the project is discontinued before the expected date of completion.

Yours sincerely,

Dr Susan Hemer
Convenor

Ms Kellie Toole
Convenor

The University of Adelaide

Appendix 7: Descriptive Statistics for the Survey Data

	N	Skewness	Kurtosis
Sources of dispute - Contractual issues	101	-7.9125	3.445378
Sources of dispute - Governance issues	101	4.208333	-2.09874
Sources of dispute - risk allocation	101	-5.21667	-0.93067
Sources of dispute - attitudes and behaviour	101	-1.62083	-3.96429
Sources of dispute - competence	101	1.620833	-3.96429
Sources of dispute - PPP set-up	101	0.420833	-4.26471
Sources of dispute - Unforeseen events	101	-0.42083	-4.26471
Sources of dispute - Others	101	14.34583	21.11975
Importance of effective DR	101	-6.725	5.258403
Importance of joint DR - accommodates interests of multiple stakeholders	101	-6.82083	8.993697
Importance of joint DR - integrates organisational culture and DR practice	101	-3.3875	1.573529
Importance of joint DR - relationship management	101	-5.59583	4.930672
Importance of joint DR- enhances communication	101	-3.40833	1.155462
Importance of joint DR - faster DR	101	-2.41667	1.252101
Importance of joint DR - cheaper DR	101	-0.975	0.897059
Importance of joint DR - not needed	101	0.233333	-1.20798
Party responsible for DR	101	2.45	-1.08613
When - Formulation of DR system	101	9.379167	8.762605
Behaviour - Mutual openness	98	1.413934	-1.83437
Behaviour - one-sided openness	98	1.983607	-0.38095
Behaviour - one-sided obedience and generosity	98	2.495902	1.786749
Behaviour - Mutual downplay of concerns	98	-2.38115	-1.10766
Behaviour - One-sided ignoring	98	-1.21311	-1.67909
Behaviour - Mutual disinterest in the dispute	98	3.336066	2.376812
Behaviour - One-sided sacrifice in exchange for a favour	98	-0.15574	-0.47412
Behaviour - Mutual sacrifice in exchange for a favour	98	-0.85246	-0.22567
Behaviour - Constant interaction	98	-2.88934	-0.89855
Behaviour - Interaction moderated by an external party	98	-2.55738	-0.294
Behaviour - I was aggressive	98	-2.2541	-1.53416
Behaviour - I strongly pursued my own interests/goals	98	2.192623	-1.05383
Behaviour - I bargained hard with the other party	98	3.745902	3.517598
Behaviour - I was competitive	98	1.127049	-0.73913
Behaviour - I was cooperative	98	2.077869	2.492754
Behaviour - I was tough	98	0.704918	0.333333
Behaviour - I was approachable	98	3.5	2.718427
Behaviour - I was accommodative	98	1.237705	-0.21946
Behaviour - I was collaborative	98	1.889344	-0.65631
Behaviour - I obliged to the other party's demands	98	-3.34426	0.279503
Behaviour - Other party was aggressive	98	1.745902	-0.93789
Behaviour - The other party pursued their own interests/goals strongly	98	3.872951	2.52381
Behaviour - Other party bargained hard	98	3.618852	3.293996
Behaviour - Other party was competitive	98	3.012295	1.302277

	N	Skewness	Kurtosis
Behaviour - Other party was cooperative	98	0.008197	-1.58178
Behaviour - Other party was tough	98	0.659836	0.759834
Behaviour - Other party was approachable	98	0.42623	-1.0352
Behaviour - Other party was accommodative	98	-2.47131	-0.76812
Behaviour - Other party was collaborative	98	-1.73361	-1.2236
Behaviour - Other party obliged	98	-4.08197	0.795031
Management style - I am open to different points of view	98	-10.1434	15.02277
Management style - Diversity of opinion and background is valuable to building my case	98	-7.45902	7.308489
Management style - people who disagree with me are wrong	98	1.963115	3.287785
Management style - decide course of action and disregard input from others	98	3.266393	4.805383
Management style - consider myself to be open-minded	98	-10.4508	15.34783
Management style - people who are very different from us are usually dangerous	98	2.971311	1.076605
Management style - I try to consider how someone might feel before I disagree with them	98	-3.32787	0.424431
Management style - I believe that every situation has two sides to it	98	-9.0123	12.31677
Management style - When I disagree with someone, I try to consider their point of view	98	-9.2541	12.14907
Management style - difficulty seeing things through the other party's point of view	98	1.262295	-0.56315
Management style - When certain, I do not listen to other people's points of view	98	2.762295	4.768116
Management style - I prefer thinking about the short-term impact of disputes	98	3.762295	3.36646
Management style - I do not care how the disputes are managed	98	4.733607	4.091097
Management style - I prefer waiting on someone else's DR suggestion	98	4.897541	4.453416
Satisfaction with current DR practice	97	-1.84082	-0.78969
DR issues - Unstreamlined DR systems	97	-2.53469	-0.7299
DR issues - No unified DR system	97	-3.62857	0.338144
DR issues - Poor collaboration	97	-4.53061	1.548454
DR issues - No flexibility on DR options	97	-2.58776	-0.75876
DR issues - Unclear guidelines on oversight of the public partner's actions	97	-1.62041	-0.61649
DR issues - Overlapping responsibilities between project parties	97	-2.81633	0.17732
DR issues - Inefficacy of applied DR systems/processes	97	-2.3102	0.915464
DR issues - Multiple roles of government i.e. as partner and regulator of the PPP	97	-2.09388	-0.33402
DR issues - No involvement of the general public	97	0.432653	-0.96495
DR issues - Inadequate incorporation of interests of the general public	97	0.946939	-0.37938
DR issues - Political interference	96	-3.57724	0.834016
DR issues - Interference from the general public	96	-0.34959	-1.17008
DR issues - Inadequate staff DR capacity	96	-2.35366	-0.19262
DR issues - Inadequate information sharing	96	-4.26423	1.532787
DR issues - Exclusion of behaviour in DR process	96	-2.8374	1.44877
DR issues - No M&E	96	-4.68699	3.065574
DR Techniques Frequency - Negotiation	97	5.583673	4.309278
DR Techniques Frequency - Mediation	97	-1.33469	-0.76701
DR Techniques Frequency - Arbitration	97	-1.37551	-1.11753
DR Techniques Frequency - Litigation	97	-3.25306	1.393814

	N	Skewness	Kurtosis
DR Techniques Frequency - Dispute board	97	-3.85714	2.571134
DR Techniques Frequency - Expert determination	96	-1.13415	0.893443
DR Techniques Frequency - Adjudication	96	-3.18699	1.377049
DR techniques average duration - Negotiation	97	1.330612	-1.33608
DR techniques average duration - Mediation	97	0.061224	-1.32577
DR techniques average duration - Arbitration	97	-4.96327	1.307216
DR techniques average duration - Litigation	97	-4.62041	0.2
DR techniques average duration - Dispute board	97	0.106122	-1.22062
DR techniques average duration - Expert determination	96	-0.67886	-1.21311
DR techniques average duration - Adjudication	96	1.504065	-1.68033
DR factor importance - Identify anticipated DR-related issues early	96	-5.26423	1.641393
DR factor importance - Constant M&E of DR interventions	96	-5.80894	3.385246
DR factor importance - Establishing relationships among DR issues	96	-5.87398	3.786885
DR factor importance - Understanding each party's objectives	96	-7.00813	5.040984
DR factor importance - Understanding each party's obligations	96	-7.54878	5.838115
DR factor importance - Opinion of general public during project formulation	96	-0.04878	-1.31967
DR factor importance - Opinion of general public during project delivery	96	0.256098	-0.73566
DR factor importance - behavioural tendencies and attitudes	96	-4.57724	1.954918
DR factor importance - Allowing the more powerful/influential party to drive DR	96	3.243902	2
DR factor importance - Acceptable solutions for all	96	-9.37398	10.57992
DR factor importance - One of parties adhering to the demands of the other	96	2.654472	1.959016
DR factor importance - Maintaining peace by ignoring dispute	96	4.674797	4.354508
DR factor importance - Offering a need in exchange for own interests	96	-2.61789	-0.09836
DR factor importance - Transparency and open communication	96	-7.35772	5.596311
DR factor importance - Early private sector involvement	96	-6.88618	5.657787
DR factor importance - DR specifically developed for the project	96	-5.21138	2.690574
DR factor importance - DR that has been developed generally	96	-2.89024	0.282787
DR CSFs - Flexibility of PPP project parties	96	-8.44309	9.077869
DR CSFs - Speed of dispute resolution	96	-6.84553	5.334016
DR CSFs - Confidence of the infrastructure PPP project parties	96	-6.7439	5.959016
DR CSFs - Confidence in the dispute resolution system	96	-7.96748	7.553279
DR CSFs - Neutrality of the infrastructure PPP project parties	96	-0.80488	-0.65779
DR CSFs - Neutrality of the mediator	96	-7.94715	6.631148
DR CSFs - Privacy of the dispute matter from the media and/or public	96	-5.50407	2.360656
DR CSFs - Non-adversarial approach to managing dispute	96	-3.29675	0.018443
DR CSFs - Fairness by all parties	96	-5.87805	3.131148

Appendix 8: Distribution table of critical values

One-tailed α	0.10	0.05	0.025	0.01	0.005	0.0005
Two-tailed α	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
df						
1	3.078	6.314	12.71	31.82	63.66	636.62
2	1.886	2.920	4.303	6.965	9.925	31.599
3	1.638	2.353	3.182	4.541	5.841	12.924
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.869
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.408
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.768
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
80	1.292	1.664	1.990	2.374	2.639	3.416
100	1.290	1.660	1.984	2.364	2.626	3.390
1000	1.282	1.646	1.962	2.330	2.581	3.300
z	1.282	1.645	1.960	2.326	2.576	3.291

Appendix 9: Abstracts of research publications

Application of dual concern theory in elucidating conflict behaviour in infrastructure public-private partnership projects

Abstract: Conflict and its management are prevailing challenges in infrastructure public-private partnership (PPP) projects. In developing effective conflict management (CM) systems for PPPs, the consideration of behaviour and attitudes of PPP project parties is valuable given their contribution to escalation and de-escalation of conflict. In order to guide the incorporation of behaviour and attitudes in the CM process for infrastructure PPPs, this paper examines how the behavioural patterns and corresponding CM styles proposed by the dual concern theory (DCT) relate to CM in infrastructure PPPs. Behavioural tendencies of PPP project parties in conflict situations are scrutinized based on their concern for their own and/or others' outcome and subsequent inclination toward the five CM styles (integrating, obliging, dominating, avoiding, and compromising) depicted by the DCT. The results demonstrate, in some part, that there is sufficient connectivity to support the application of the DCT in CM of infrastructure PPPs. On that basis, a conceptual framework that incorporates behavioural aspects in CM for infrastructure PPPs has been developed. This framework fills a theoretical gap in existing knowledge regarding conflict and can be applied to develop strategies for constructively managing conflict in infrastructure PPP practice.

Critical issues affecting dispute resolution practice in infrastructure public-private partnerships

Abstract: Infrastructure public–private partnership (PPP) projects across the world have suffered early termination, premature change of ownership, cost and time overruns, among others, often resulting from a number of issues some of which are related to poorly managed dispute. Despite this, literature revealed that no process-centric attempt had been made to highlight the critical issues affecting dispute resolution (DR) in infrastructure PPPs. Through event sequence analysis (ESA) of 158 data sources (including 63 journal articles), this study examined the critical issues affecting infrastructure PPP DR practice, with the motivation of unveiling areas of potential improvement to the DR practice. Among other findings, the multiple roles of the public partner in the DR process were found to result in ambiguity on who was responsible for overseeing their actions. Relatedly, the effectiveness of dispute boards was on some

occasions undermined when they were assigned multiple functions. Besides this study adding to the theoretical body of knowledge through application of ESA in infrastructure PPP DR research, it clarified the critical issues affecting current infrastructure PPP DR practice, thereby enhancing infrastructure PPP practitioners' understanding of potential barriers to successful infrastructure PPP DR. Although the researchers acknowledge the plausibility of an in-depth investigation into ways in which the critical issues in DR practice can be addressed, the main focus of this study was to provide clarity on the critical issues affecting DR in infrastructure PPPs. A separate study focusing on improvements to DR in infrastructure PPPs is recommended.

Sustainable financing for infrastructure projects through better dispute resolution arrangements for public-private partnerships

Abstract: Planning for public infrastructure projects usually involves a number of key considerations such as sourcing and allocation of financial resources, appropriate design, construction, and maintenance, among others. However, governments around the world are increasingly finding it challenging to finance public infrastructure due to budgetary pressures. With the budgetary pressures further exacerbated by unplanned occurrences such as natural disasters, climate change and pandemics, it has become even harder for governments to meet the rising demand for quality public infrastructure. As such, most governments have embraced private sector involvement in infrastructure development through private-public partnerships (PPPs) as a sustainable means of mobilizing additional funds for public infrastructure projects. Through PPPs, governments have gained access to private funds and expertise to deliver much needed public infrastructure, among other benefits. Despite PPPs being a viable alternative for financing infrastructure projects, they are predisposed to disputes owing to their complex set-up particularly their long-term arrangements, multiplicity of project parties, competing goals of the parties, among others. Moreover, infrastructure PPPs are characterized by inefficient dispute resolution (DR) systems – a shortfall that continues to threaten their sustainability. This is manifested through the numerous infrastructure PPPs that have been cancelled, nationalized, or suspended in various parts of the world.

Through qualitative and quantitative data collected from focus group discussions, survey questionnaires and semi-structured interviews with specialized and experienced practitioners in Australia, this study

provides insight on lessons from Australia highlighting the recommended DR practices for infrastructure PPPs. Among other findings, the importance of collaborative and joint means of DR in facilitating both proactive and reactive DR was highlighted. Additionally, it was found that for disputes arising from linked claims, there is need for consolidation of the parallel DR processes that usually ensue. Consolidation of parallel DR processes would allow for direct participation of all involved parties on a single front thereby providing a platform for more amicable and sustainable DR. Findings of this study will inform the structuring of DR clauses that are appropriate for the complex dispute environment of infrastructure PPP projects. Although the research context was Australia, the findings of this study can be extendable to other established PPP markets where DR challenges are comparable. For emerging PPP markets, the lessons from Australia may provide valuable lessons on how DR practices can be made more effective in order to achieve sustainable infrastructure PPPs.