The Interplay of Alliance Governance, Cooperation and Coordination in Inter-organisational Projects: A Viable Alliance Model Perspective

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A Thesis Submitted in Partial Fulfilment of The Requirements of University College London for the degree of Doctor of Philosophy

THE BARTLETT SCHOOL OF SUSTAINABLE CONSTRUCTION
UNIVERSITY COLLEGE LONDON
I, Mohamad El Tannir confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:                                      Date: 18/08/2023
Abstract

Inter-organizational relationship (IOR) governance involves contractual and relational mechanisms. Prior research has examined their interplay in dyadic arrangements to determine if they complement or substitute each other. However, few studies explore these dynamics in inter-organizational projects (IOPs) within alliance networks, which have unique characteristics such as time constraints and high uncertainty. This thesis aims to understand how governance, cooperation, and coordination interact in IOPs within alliance networks and introduces a new framework, the Viable Alliance Model (VAM), for analysing these constructs across multi-level boundaries. Abductive reasoning guided this research, which consisted of three phases. First, ten semi-structured interviews contributed to shaping the VAM and providing a comprehensive view of alliances. Second, three alliance networks were studied to comprehend the interplay of governance, cooperation, and coordination across project and sub-system boundaries. These networks included two projects each, with varying success levels. Third, card-sorting exercises involving six participants were conducted to validate the interplay of these factors. The findings reveal that governance and coordination mechanisms cascade across inter-organizational boundaries, while cooperation remains largely within sub-system boundaries. The study emphasizes the influential role of governance on both cooperation and coordination, as well as the reinforcing effect between cooperation and coordination. Managers are advised to carefully design and monitor governance and coordination mechanisms at upper sub-systemic levels. Additionally, the maintenance of cooperation across all levels is crucial. It is cautioned that attributing cooperation and coordination failures solely to specific governance mechanisms may overlook the cascading effect, where the root cause could be a different governance mechanism with broader influence.

Keywords: IOPs, Inter-organisational Relationships Governance, Cooperation, Coordination, Viable System Model
Impact Statement

The multi-case study of three alliance networks and interviews described here helped develop and shape a framework to assess the interplay of governance, cooperation, and coordination in inter-organisational arrangements (namely alliance networks). The adaptation of the Viable System Model into a Viable Alliance Model (VAM) framework.

The multi-level analysis of inter-organisations can now be explored beyond a dyadic arrangement. The VAM has framed the IOPs and alliances as sub-systems. Enriching our understanding of inter-organisational projects and alliances, and their governance. It is also posited to serve as an assessment tool for governance throughout the project lifecycle.

The initial research findings were presented by Tannir et al. (2019) at the British Academy of Management, and Tannir et al. (2021), at the European Academy of Management. Further, some of the findings had been published in the International Journal of Operations and Production Management (IJOPM) in 2023. Also, from a practical perspective, the findings will be presented to the Major Projects Association, as part of a research grant, which enabled wider application of the VAM framework within the construction industry. In doing so, practitioners will have an awareness of how governance influences cooperation and coordination in projects, also they will be able to identify key mechanisms and assess their influence. Finally, the outcome of this research is being used to inform a research collaboration with the Institution of Civil Engineers (ICE) and P13 initiative from the Infrastructure Client Group (ICG) in investigating and assessing the viability of alliances.
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<tr>
<td>APM</td>
<td>Association of Project Management</td>
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<tr>
<td>BIM</td>
<td>Building Information Modelling</td>
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<td>CIB</td>
<td>Construction Industry Board</td>
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<td>CII</td>
<td>Construction Industry Institute</td>
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<td>CIP</td>
<td>Chartered Institute of Purchasing and Supply</td>
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<td>Coop</td>
<td>Cooperation</td>
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<td>Coord</td>
<td>Coordination</td>
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<td>ECC</td>
<td>Engineering and Construction Contract</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>Gov</td>
<td>Governance</td>
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<td>ICE</td>
<td>Institution of Civil Engineers</td>
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<td>ICG</td>
<td>Infrastructure Client Group</td>
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<td>IE</td>
<td>Information Exchange</td>
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<td>IOP</td>
<td>Inter-organisational Projects</td>
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<td>IOR</td>
<td>Inter-organisational Relationship</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>JV</td>
<td>Joint Venture</td>
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<td>KPI</td>
<td>Key Performance Index</td>
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<td>MIS</td>
<td>Management Information System</td>
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<td>NEC</td>
<td>New Engineering Contract</td>
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<td>NEDO</td>
<td>National Economic Development Office</td>
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<td>OPM</td>
<td>Organisation Project Management</td>
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<td>P13</td>
<td>Project 13</td>
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<tr>
<td>PM</td>
<td>Project Management / Manager</td>
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<td>RC</td>
<td>Relational Contracting</td>
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<td>S1</td>
<td>System 1</td>
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<tr>
<td>SF</td>
<td>Success Factor</td>
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<tr>
<td>SPV</td>
<td>Special Purpose Vehicle</td>
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<tr>
<td>TCE</td>
<td>Transaction Cost Economics</td>
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<td>TOC</td>
<td>Target Outcome Cost</td>
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<td>VAM</td>
<td>Viable Alliance Model</td>
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<td>VfM</td>
<td>Value for Money</td>
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<td>VSM</td>
<td>Viable System Model</td>
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<td>WBS</td>
<td>Work Breakdown Structure</td>
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Glossary of Terms

An alliance network is defined as an arrangement of different organisations connected to develop and deliver multiple projects. The network consists of client, contractor, consultants and suppliers’ organisations. An alliance network is formed to combine capabilities and increase value to deliver project objectives. This depicts an inter-organisational dimension which makes the alliance network design largely dependent on governance, cooperation and coordination of participating organisations.

Project Governance is a set of procedures and mechanisms applied between different participating organisations in projects. Project governance requires the dynamic management of inter-organisational cooperation and coordination across sub-systems. It is seen as essential in guiding the inter-organisational arrangements and relationships and can influence the cooperation and coordination between participating organisations.

Inter-organisational Cooperation is the multilevel voluntary attitudes and behaviours that translate into mechanisms to jointly agree to achieve alliance goals and tasks. Inter-organisational cooperation in a project context is seen to have similar characteristics across inter-organisational boundaries. This contributed to the behaviour and attitude aspect of the project team. For example, trust is a characteristic that can be found in any interpersonal relationship and is conductive to cooperation. Cooperation is seen to be confined within one systemic boundary – that is to say – one systemic interaction cooperation does not affect other systemic interaction cooperation.

Inter-organisational Coordination is the multilevel behaviours and mechanisms that align alliance partners’ actions to jointly deliver agreed goals. It usually involves different mechanisms across different levels, yet commonalities in mechanisms exist in all sub-systems given the integration and information flow mechanisms. For example, documentation and task management can be found in any systemic interaction. Coordination exhibits a chain of effects across systemic boundaries and can be influenced by governance and cooperation. The relationship between inter-organisational cooperation and coordination is reinforcing and mutually incremental. For instance, good communication mechanisms can foster inter-organisational coordination.

Multi-level perspective is the analysis undertaken on a sub-systems interaction level and project level. This perspective allows the understanding of different sub-system interactions (dyadic) and what that means on the project level as a whole.

Viable Alliance Model (VAM) is a framework stemming from the Viable System Model (VSM) that was developed as part of this research. It supports understanding of the interplay of inter-organisational governance, cooperation, and coordination. The framework consists of five sub-systems showing the different characteristics in terms of
governance, cooperation, and coordination – allowing for assessment and benchmarking.

**Viable System Model (VSM)** is a framework to depict how organisations are structured and governed through the adoption of sub-systems and cybernetics thinking. The VSM consists of five sub-systems S1-S5 each depicting a certain functionality of the organisation. The five sub-systems are recursive in such that sub-system 1 can include another five sub-systems. VSM is used as a framework to help represent and assess organisations’ interactions by their functions within the projects.

**Inter-organisational relationship (IOR)** is the connection and interaction between two or multiple organisations joining forces to achieve a set of pre-determined objectives. IOR forms range from dyadic alliances to networks involving multiple organisations. In inter-organisational projects (IOPs) IOR represents the interaction of multiple organisations (i.e., client, contractor, consultant and suppliers) joining forces to deliver the project’s objectives

**Governance mechanisms** are the structured entities, activities and contractual and relational dimensions that are put in place and are organised in a hierarchical order. For example, contractual mechanisms consist of roles, responsibilities and approaches (e.g., risk management).

**Inter-organisational projects (IOPs)** are a mode of organising that involves multiple organisations that work jointly for a considerable amount of time on shared activities to deliver complex products and services
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Chapter 1. Introduction

1.1 Empirical Field and Research Rationale

Infrastructure projects are complex, dynamic, uncertain and of a scale that directly affects societies and economies (Hirschman, 1995). They involve multiple organisations joining forces and capabilities to deliver the required outputs (Sydow and Braun, 2018) - known as inter-organisational projects (IOPs). Their economic contribution represented nearly 14% of the global GDP in 2015, increasing to cope with United Nations’ sustainable development goals (Mckinsey and Co, 2017). Despite their importance, their performance appears to fall short in many aspects including time, cost and benefits (Flyvbjerg, 2014). Governance is known to support IOP performance improvement and drive success (Joslin and Müller, 2016). Recent studies have focused on IOP governance and its impact on performance (Jones and Lichtenstein, 2008; Ahola et al., 2014; Sydow and Braun, 2018; Ahola, 2018). For example, how different governance mechanisms were effective in coordinating work and relationships (Müller, 2011; Ahola et al., 2014; Kujala et al., 2020) and limiting opportunism by fostering cooperative outcomes (Williamson, 1975; Das and Teng, 1998).

While governance is considered an important aspect of managing IOPs, cooperation and coordination are also considered to be crucial factors in determining the nature and success of inter-organisational arrangements (Gulati et al., 2012; Whyte and Davies, 2021). Essentially, problems of cooperation and coordination and their importance have been widely acknowledged in project management literature as well as in general management literature (Soderlund, 2012; Gulati et al., 2012). Cooperation is problematised by perceived conflicting goals and the opportunistic behaviours of actors. Problems in coordination, on the other hand, relate to the complexity of synchronisation of tasks and activities (Soderlund, 2012). While it is evident that governance affects cooperation and coordination between organisations (Poppo and Zenger, 2002), it is not yet clear however how these factors interplay across multiple organisations involved in IOPs. In other words, how do these factors interact beyond dyadic arrangements to include multi-level arrangements (Ahola et al., 2014).
Fundamentally from a theoretical perspective, project governance relies mostly on transaction cost economics (TCE) which draws from economics, contract law and organisation theory in determining the optimal way of governing a specific economic transaction while limiting opportunistic behaviour (Williamson, 1975). Nevertheless, it also draws from corporate governance literature which represents the agency problem; depicting and tackling the relationship between the principal and agent (Jensen and Meckling, 1976). This in turn reflects the relatedness of governance with inter-organisational cooperation and coordination. Most theoretical perspectives of governance integrate issues of cooperation and coordination from different perspectives. Therefore, making inter-organisational cooperation and coordination instrumental to good governance and serve as a measure of its effectiveness (Gulati et al., 2012; Cao and Lumineau, 2015). Given such importance, it is crucial to incorporate a holistic analysis of governance, cooperation and coordination in IOPs aiming to unpack key mechanisms and their interaction. In doing so such analysis would enhance the understanding of governance effectiveness in projects.

It is worth noting that IOPs’ governance is considered unique due to the multifaceted nature of different and sometimes conflicting governance theories. This is due to different levels of analysis incorporating different organisational arrangements, the multiplicity of actors’ involvement, and the complexity of their relationships in carrying out tasks and pooling resources (Ahola et al., 2014). Let alone the temporal element that differentiates projects from other types of organising (Sydow and Braun, 2018). In addition to that, IOPs are often embedded in permanent inter-organisational networks that operate multiple projects (Sydow and Braun, 2018). Such embeddedness often leads to ambiguity in organisational boundaries especially that project actors may vary from one project to another (Defillippi and Sydow, 2016). All this makes analysing governance, cooperation and coordination more challenging. Having a common method of analysis could help address such challenges and help achieve consistency across projects and show how and where different governance mechanisms are enacted across inter-organisational boundaries.
This study addresses governance, cooperation and coordination in IOPs. The following shed light on the research rationale behind this study by highlighting the problem statement and literature gaps, before proceeding to the research questions, aim and objectives. Later, the thesis structure and research phases are laid out. Lastly, the academic and practical significance of this study are tackled.

• The first gap is related to the lack of elaborative analysis of different relational and contractual mechanisms and dimensions across inter-organisational boundaries. Most of the studies argue for the importance of both mechanisms in improving project performance (Poppo and Zenger, 2002; Cao and Lumineau, 2015; Benítez-Ávila et al., 2018). Although this advances the need to have both mechanisms in projects, little is known about how these mechanisms are being implemented across different inter-organisational boundaries (Cao and Lumineau, 2015). In other words, studies of contractual and relational mechanisms do not reveal in detail how such mechanisms and their different dimensions interact across inter-organisational boundaries. Limited studies have attempted to tackle the classification of contractual and relational dimensions and their relationships (Cao and Lumineau, 2015). For instance, Kujala et al., (2020) have provided multiple dimensions of governance mechanisms in inter-organisational project networks. Despite this endeavour, still, different mechanisms and dimensions are not elaborated across inter-organisational boundaries and lack a micro-analytical approach which is instructive in understanding any economic organisation (Williamson, 1988). The ambiguity of governance mechanisms in projects (Ahola et al., 2014) reflects the multiplicity of dimensions and theoretical basis on which governance is explicated and analysed. This is especially important in better understanding the interplay of contractual and relational mechanisms across inter-organisational boundaries (Cao and Lumineau, 2015; Lumineau, 2017). Therefore, this leaves an important gap in the interpretation of these mechanisms and their application across inter-organisational boundaries. This thesis tackles this and in doing so the analysis will not only be nuanced in terms of understanding the details of such interplay but also enable a better understanding of the dynamics of governance mechanisms.
across the lifecycle of the projects. Thus, the discourse is shifted from “governance” towards “governing” (Sanderson, 2012).

- The second gap relates to the unpacking of inter-organisational cooperation and coordination dimensions. Inter-organisational cooperation and coordination are crucial for the viability of any IOR arrangements (Kretschmer and Vanneste, 2009; Gulati et al., 2012; Castañer and Oliveira, 2020). As such, studies have been tackling issues of cooperation and coordination in inter-organisational relationships from a wider management perspective. Seminal works of Gulati et al. (2012) and Castañer and Oliveira (2020) have provided elaborate views on inter-organisational cooperation and coordination. Although this elaborate view has spanned across the general management literature, project management literature lacks such scrutiny. Most of the assumptions made in project management literature refer to wider IOR management literature (Anvuur and Kumaraswamy, 2008; Söderlund, 2012; Anvuur and Kumaraswamy, 2012). This may overlook some of the important aspects in project organising which can give additional contextual dimensions to cooperation and coordination. For example, project time and different standards of work can influence how different organisations cooperate and coordinate thus leading to different dimensions. Characterisation of inter-organisational cooperation and coordination and their interplay in IOPs is rarely addressed in the context of projects. This is important and needed for a better conceptualisation of cooperation and coordination within the context of projects as often their context is rooted in operation and general management literature where relationships are continuous. Additionally, the studies evolving around coordination and cooperation in IOPs do not tackle the characteristics and dimensions, despite acknowledging their importance in contributing to the theoretical foundation of projects (Söderlund, 2012). As such Söderlund (2012) argued that despite the intertwine of cooperation and coordination, it is better to separate them analytically. In terms of coordination, Oliveira and Lumineau (2017) added that coordination mechanisms focus should be studied through their use in meeting coordination needs. The authors also called for further investigations of different coordination mechanisms and dimensions beyond the use of integrators and contracts (Oliveira and Lumineau,
For cooperation, while the IOR literature provides multiple perspectives and demonstrates a multi-dimensional construct, IOP research has cast cooperation as a one-dimensional construct with limited studies showing its multidimensional aspect (Anvuur and Kumaraswamy, 2012). Hence, a targeted focus is needed to understand the nature of cooperation and coordination in IOPs that moves beyond the one-dimensional absolute construct (e.g., having different cooperative behaviours\(^1\)) into more detailed multi-dimensional constructs to allow for a better explanation of these phenomena in IOPs. Exploring the cooperation and coordination in multiple dimensions would allow for a better understanding of what they are and how different dimensions can affect each other in IOPs.

- The third gap pertains to most studies that tackle inter-organisational governance and associate it with addressing problems of cooperation and coordination (Gulati, 1998; Faems et al., 2008; Keller et al., 2021; Kujala et al., 2020). Such association is often limited to studying one-to-one relationships between mechanisms or constructs. For instance, often studies investigate governance effect on trust (Luo, 2008; Cao and Lumineau, 2015; Ahola et al., 2014; Derakhshan et al., 2019), on cooperation (Das and Teng, 1998; Poppo and Zenger, 2002; Schepker et al., 2014) or coordination (Gulati and Singh, 1998). Hence, also overlooks the pluralistic dimensions of each (cooperation and coordination) which include trust and process coordination for example. Inter-organisational governance literature has lacked a detailed and micro-analytical view of how governance interplays with cooperation and coordination (Gulati et al., 2012; Cao and Lumineau, 2015). Much of this may be contributed to seeing both elements as either a function of governance in the case of coordination (Lumineau, 2017; Kujala et al., 2020) or as an outcome for cooperation (Poppo and Zenger, 2002), disregarding the multiple perspectives of both coordination and cooperation (see Whang, 1995; Gulati et al., 2012; Castañer and Oliveira, 2020). This is also the case in the context of IOPs, where not only the interplay of governance,  

\(^1\) For instance Anvuur and Kumaraswamy (2012) argued and developed a multidimensional model of cooperation that involves four different and distinct behaviours namely inrole, extra role, compliance and deference behaviours.
cooperation and coordination is characterised with ambiguity, but also where IOP governance literature appears to be fragmented and based on multiple underlying assumptions (Ahola et al., 2014). This study investigates such interplay and addresses how these factors affect each other in IOPs, leading to a better understanding of their relationship which in turn can improve the process of governability (Floricel and Miller, 2001) and governance design (Guo et al., 2014). Therefore, contributing to the project governance literature in providing a more pluralistic view of such interplay.

- The fourth gap pertains to another particular concern related to inter-organisational relationships (IORs) studies. Despite the increasing interest and insightful findings in IORs, core assumptions made are at odds with IOR core features (Lumineau and Oliveira, 2018). As such, according to Lumineau and Oliveira (2018), studies have often focused on a single party to determine IOR outcomes; on a singular (either positive or negative features) feature between parties; on a singular level of analysis (i.e., team, individuals); and a single-time conceptualisation. A pluralistic view gives a better understanding of IORs by overcoming these “blind spots” (Lumineau and Oliveira, 2018). This is also the case in IOPs as calls to go beyond the dyadic exchange and governance arrangement to include the entire inter-organisational project network (Jones et al., 1997; Ahola et al., 2014; Roehrich et al., 2020) which indeed is also reflected in other management studies streams (Cao and Lumineau, 2015). This research tackles two of the major “blind spots” in inter-organisational relationship literature, namely, the multi-level view that incorporates different levels of analysis (networks, projects and sub-systems 2) while also addressing the positive and negative features between parties.

IOP governance literature appears to be scattered across different theoretical perspectives and focused on singular dyadic relationships. This reflects an issue when analysing governance and operationalising governance as the level of analysis would be incomplete and does not reflect such a level of scrutiny. Previous studies progressed our

2 Sub-systems are part of the Viable Alliance Model elaborated on in the subsequent sections.
view of both governance perspectives, they were limited to the operationality of governance mechanisms or the process of “governing” per se (Sanderson, 2012). The diversity of theoretical perspectives by which project governance is underpinned is inherently a multidimensional phenomenon (Müller, 2012; Ahola et al., 2014) which in turn posits the need to allow for a pluralistic view that incorporates all these perspectives. For instance, stakeholder theory focuses on the needs of stakeholders, while transaction cost economics focuses on buyer-supplier relationships. As such, a mainstream framework of analysis of project governance has been recently advocated for which can give a holistic view of project governance (Musawir et al., 2020; Kujala et al., 2020). Having said that, there is a need for a common basis of analysis (Sydow and Braun, 2018). This study addresses these issues by unpacking where what and how governance mechanisms are structured and used across inter-organisational boundaries. Shifting the focus on the different contractual and non-contractual mechanisms and their classification is an important emerging area (Cao and Lumineau, 2015). This thesis adopts a systems lens to tackle these issues. This gives a holistic approach to the IORs and their governance. The Viable Systems Model (VSM) is seen to be a good framework for analysis given its use in depicting how organisations are structured (Beer, 1981). This in turn allows for organisations to be depicted by their roles or functions. Also, the VSM serves as a diagnostic tool for organisations. This is also important in tackling the elaboration of different governance mechanisms and dimensions and allow for an understanding of the relationship between governance, cooperation, and coordination. While VSM framework is useful in tackling the issues of this thesis, it has to be moulded through an abductive reasoning to suit the contextual elements of IOPs. Having said that, this thesis has developed a Viable Alliance Model (VAM) which takes into consideration the idiosyncrasies of IORs and IOPs. Therefore, a broader basis for analysis is provided and the issues of disordered boundaries in IOPs and their networks is overcome (Sydow and Braun, 2018). Doing so would allow for a better understanding of the relationships between different mechanisms while developing a governance framework that characterises these mechanisms. In doing so, the research would take a step further in addressing multiple
inter-organisational boundaries beyond dyadic relationships and address the gaps identified in the previous section.

1.2 Research Question, Aim and Objectives

Following the identified gap in the previous section, the research question that this thesis poses is:

“how IOP governance, cooperation and coordination interplay across sub-systems levels?”

1.2.1 Research Aim

The research aims to investigate the interplay of governance, cooperation and coordination across inter-organisational sub-systems. The notion of interplay refers to how governance, cooperation and coordination interrelate and to their interaction in influencing one another. This would allow for a better understanding of the relationships between different mechanisms while developing a governance framework that characterizes these mechanisms from a multi-level perspective. In doing so, the research would take a step further in addressing multiple inter-organisational boundaries through sub-systems boundaries, therefore moving beyond dyadic relationships and addressing the gaps identified in the previous section.

1.2.2 Research Objectives and Questions

To achieve the aim of the research, the following objectives are tackled throughout this thesis as shown in Table 1.1.

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<td>To explore and understand different characteristics and mechanisms of governance, cooperation and coordination</td>
<td>Literature review, workshop and semi-structured interviews (Chapters 3, 6 &amp; 8)</td>
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To explore the Viable System Model (VSM) as a governance framework for IOPs

<table>
<thead>
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<th>To develop the Viable Alliance Model (VAM) as a governance framework for IOPs</th>
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<tr>
<td>To assess governance, cooperation and coordination across different inter-organisational levels through the VAM</td>
</tr>
<tr>
<td>To explore and analyse the interplay of governance, cooperation and coordination mechanisms in different IOPs</td>
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| Literature review and workshops (Chapters 4, 6 & 9) |
| Literature review, workshops and semi-structured interviews (Chapter 4 & 6) |
| Secondary data analysis (Chapter 7) |
| Secondary data and semi-structured interviews (Chapters 7, 8 & 9) |

### 1.3 Contribution to Theory

The contribution of this thesis is threefold. First, this thesis unpacks contractual and relational mechanisms in IOPs governance to tackle the specifics of these mechanisms across different inter-organisational boundaries. Usually, the focus seems to be on the macro-analytical view of governance mechanisms – namely – tackling the relationship between contractual and relational governance, without diving deeper into the specifics of these mechanisms. I look to understand the relationship between contractual and relational governance by considering how different mechanisms from both camps affect each other (Poppo and Zenger, 2002; Olsen et al., 2005; Ahola et al., 2014). Recent studies have shifted the focus to determine different governance dimensions addressed in the project management literature, which in turn gives a more practical approach (Kujala et al., 2020). This study elaborates on this and unpacks these mechanisms across the various sub-system interactions. In doing so, it moves knowledge of contractual and relational mechanisms on from the generic study of contractual and relational mechanisms, to a nuanced interaction of mechanisms, where they are enacted and how they interplay.

Second, this thesis gives a holistic perspective of the interplay of governance, cooperation and coordination on multi-levels. Namely project (across sub-systems) and dyadic (between governance sub-systems), which will help theoretical conceptualisation
of how these factors affect each other across inter-organisations and what that means to the project outcome. Therefore, providing a more nuanced view of inter-organisational relationships especially when tackling multiple actors which in this case are not deemed to be solely dyadic as in most studies of alliances. It extends knowledge on control and contract coordination (Williamson, 1975) by showing the relationships between different governance mechanisms with cooperation and coordination dimensions and their dynamics across sub-systems interaction. As such, it was found that governance and coordination exhibit a filter-down effect to lower sub-systems, while cooperation does not. Furthermore, in terms of the interplay, governance affects both coordination and cooperation across sub-systems while cooperation and coordination exhibit a reciprocal effect on each other. This has implications for how governance, cooperation and coordination should be analysed.

Third, as most studies of governance tackle different theoretical lenses and perspectives (Müller, 2011), limited studies attempt to diffuse different theoretical perspectives into praxis (Ahola et al., 2014). This thesis addresses this issue by adopting a middle-range theorising approach, thus enabling the straddling between abstract grand theorising and local descriptions which are not related to any theoretical perspective, yet are related to the concerns of practitioners (Merton, 1967). In doing so, aiming to explain what mechanisms are accounted for in the analysis of IOP governance, cooperation and coordination can be achieved by drawing on a range of grand theories (Green and Schweber, 2008). Having said that, this thesis provides a platform through which a Viable Alliance Model (VAM) framework can incorporate the practicalities of these perspectives. VAM serves to be a common basis for analysis which can be interpreted using different theories and hence adopt a middle-range theory approach. An approach that does not attempt to unify or merge different theories or their assumptions (Maitland et al. 1985) but allows the understanding of the ambivalence presented in the context of practice within the built environment (Cairns, 2008). Through the adoption of a praxis-oriented approach that depicts project practices, this thesis advances the knowledge and enriches the understanding of different theoretical perspectives coming into play within one framework of analysis (Cicmil et al., 2006; Sanderson, 2012; Green et al., 2013).
1.4 Contribution to Practice

Knowing the specifics of governance mechanisms across inter-organisational boundaries helps in designing a governance framework that suits the inter-organisational arrangements in projects. This research provides three managerial implications/contributions. Firstly, it highlights key systemic characterisations in terms of governance, cooperation and coordination. This can assist practitioners when setting out the governance framework to know which mechanisms to focus on in which system. In doing so, practitioners would be aware of the important key mechanisms which would be crucial for them in the process of governing. Secondly, this research provides a methodological framework to analyse governance for different projects within networks irrespective of whether the same actors are involved in these projects or not. Project network leaders can apply this framework to compare the efficiency of mechanisms across multiple projects within their alliance network. Third, VAM serves as a diagnostic tool that helps practitioners to identify the key issues in governance, cooperation and coordination and their locations. As such, it can help in adapting different processes, standards and mechanisms throughout the project lifecycle, enabling them to shift from a rigid framework design to an adaptive framework that reflects the process of “governing”. Furthermore, the research outcome is used to inform Project 13 and Infrastructure Client Group on how alliances can assess their governance and inform their delivery models.

1.5 Research Chapters

This thesis has the following structure:

Chapter 1 Introduction provides an overview of the background and research gaps surrounding IOP’s governance. It discusses the multiple facets of project governance and lays out the key issues of IOP governance. The research aim and objectives are presented as are the key theoretical foundations and studies contributions.

Chapter 2 Inter-organisational Projects and Procurement Models is a literature review chapter that tackles inter-organisational projects (IOPs) and gives a brief overview
of the procurement models. The main governance characteristics of IOPs and procurement models provide a grounding to explore cooperation and coordination.

Chapter 3 Governance, Cooperation, and Coordination in Inter-organisational Projects is a literature review of IOPs governance, cooperation, and coordination. The chapter starts with the basis and streams of literature. IOPs governance and within project management literature is described, then inter-organisational cooperation and coordination in wider management literature and finally project governance. Concepts of inter-organisational cooperation and coordination are provided, as are key governance concepts and mechanisms.

Chapter 4 Sub-systems Theory, Cybernetics and Viable System Model provides a brief review of sub-systems theory, Cybernetics science and the Viable System Model (VSM). This chapter lays out the key characteristics of the VSM, which is used as a foundational governance framework. Each subsystem is described - what it consists of and its key limitations. The intention, conceptual shape and need for a new framework to contextualize IOPs is proposed.

Chapter 5 Methodology tackles the epistemological and ontological assumptions that this study is based on. It discusses the key research approaches and provides the rationale for taking an abductive approach. Later, the research process, design and strategy are discussed. A qualitative approach is adopted as a research method through namely interviews and secondary data based on case studies. Three phases for this research are then described alongside the qualitative data analysis, its reliability and validity.

Chapter 6 Viable Alliance Model Development of Governance Cooperation and Coordination lays out the Viable Alliance Model (VAM) this research developed through reviewing the literature, semi-structured interviews and workshops. Based on the data provided the VAM was developed. The VAM is developed to suit the contextualisation of governance, cooperation and coordination highlighting the key characteristics for each sub-system of the VAM.
**Chapter 7 Case Study Analysis** details the analysis of three inter-organisational networks. Each inter-organisational network had two embedded projects. Using the VAM framework, key project issues in terms of governance, cooperation, and coordination were highlighted. As such systemic interactions are analysed to be able to understand the interplay of governance, cooperation and coordination across inter-organisational boundaries.

**Chapter 8 Interplay of Governance, Cooperation and Coordination Across Multiple Projects** addresses the third phase - 6 semi-structured interviews which validate the emerged findings and test their generalizability beyond the context of case studies. Project governance, cooperation and coordination mechanisms are explored, and their interaction is addressed.

**Chapter 9 Discussion** provides a detailed discussion of the findings. First, it discusses the differentiation and commonalities of governance, cooperation and coordination in different sub-systems – challenging the literature using the study's empirical data. A viable alliance assessment is proposed using VAM as a diagnostic tool to understand the complex and varied interaction of governance, cooperation and coordination.

**Chapter 10 Conclusions, Limitations and Future Work** is the final chapter of this thesis. It synthesises key conclusions, proposes key contributions, sets out the study limitations and highlights opportunities for future research.
Chapter 2. Inter-organisational Projects and The Context of Alliances

This chapter discusses the basis of inter-organisational arrangements in construction projects known as inter-organisational projects (IOPs). First IOPs are discussed in terms of their salient features. Second, different inter-organisational arrangements are tackled through procurement models which are used to inform governance arrangements and sometimes are confused with governance. Different procurement models more particularly those adopting a relational approach to contracting (i.e. alliancing, partnering and joint ventures) are considered which, by and large, sets the context of alliances. Attributes of relational approaches are therefore discussed which help inform the basis for how governance, cooperation and coordination can be understood and analysed in inter-organisational alliances.

2.1 Inter-organisational Projects

Inter-organisational projects (IOPs) are considered a mode of organising that is manifested in different industries and across different organisations to create and deliver complex products and services (Bakker et al., 2011; Grabher, 2004). IOPs are distinguished from other types of inter-organisational arrangements (such as long-term supplier relationships or strategic alliances) in their temporal dimension (Sydow and Braun, 2018). The temporary nature of projects posits a view of temporary organising which involves according to Lundin and Söderholm (1995) time, team, task, and transition dimensions. As such, inter-organisational relationships can be highly dependent on these dimensions given the dynamics of projects across their lifecycles.

Inter-organisational relationships’ dimension is a crucial aspect of IOPs theorising and is often seen to be lagging in conceptualising inter-organisational facets of the project (Sydow and Braun, 2018). The authors argued for different ideas in theorising the inter-organisational dimensions of IOPs including a multi-level approach that takes into consideration the levels above the IOPs such as institutional environment or alliances and
another level below which involve the different organisations collaborating on the project (Sydow and Braun, 2018). Another way is on the dynamics of projects including mechanisms and processes that reflect the complex and dynamic nature of these projects. Arguably a practice-based perspective is being advocated which focuses on activities leading to a dialectical approach that conceives both actors and structures as duality – that is to say – both shape each other. A third postulation is related to governance modes that are considered different to hierarchies and market transactions, and involve different facets including collaborative arrangements (Ibid, 2018). Usually, in infrastructure projects, a hybrid mode of governance is assumed by a lead organisation that installs a hierarchical structure coupled with collaborative structures aiming to coordinate relationships and activities across organisational boundaries. The lead organisation is sometimes consisting of an owner or a general contractor or a project delivery organisation (Ibid, 2018).

All these ideas or postulations are interrelated, for instance, governance modes may affect the dynamics of projects and organisations, which in turn differ across different levels in IOPs given different routines and capabilities of participating organisations (Brady et al., 2017). As IOPs consist of many heterogeneous actors each assuming a different role that comes together to deliver certain outcomes (Ahola, 2018), the nature of the relationship may differ from one IOP to another or from one organisation to another. Essentially this is guided by the interplay of forces from one level above and another below that affect structures and transforming forms of governance (Sydow and Braun, 2018). For instance, the level of trust among organisations can impose different kinds of relationships (Uzzi, 1997). It is also tied to the repeatability of work between these organisations which also influences the governance mode taken in IOPs.

Projects as such are complex in nature and involve multiple actors. Organisations are usually procured to deliver project outputs. Clients or leading organisations, therefore, set the delivery models or procurement models through which governance mechanisms are being enacted (Chen et al., 2018). Accordingly, different procurement models are established to align with the mode of governance that depicts the nature of inter-organisational relationships (IORs) in projects (Chen et al., 2018). For example, relational
procurement models are usually employed when the level of trust is high and the repeatability of the business is secured (Chen et al., 2018). All these aspects make IOPs unique and posit a different level of analysis than the usual inter-organisational arrangements. It is worth therefore discussing the procurement models of such projects and drawing upon their key features which effectively play a crucial role in guiding the inter-organisational relationships especially when tackling alliances.

2.2 Procurement Models in IOPs: The Move Towards a Relational Approach

Procurement models vary depending on the contractual agreement used between the client and the involved parties including the designer and contractor. From a cost perspective, the types of delivery models vary along the cost risk spectrum (Walker et al., 2000). A traditional fixed-cost project delivery system lies at one extreme and is used on small-scale projects. On the other hand, a fully cost-reimbursable delivery model is usually used on large-scale projects. According to Walker et al. (2000), the procurement model for the client can be seen through a cost risk and relationship risk perspective. The difference between such delivery models is therefore found in the appointment of authority, responsibilities, and risk (Cox and Townsend, 1998). The project procured through a fixed tender price can pose a high risk to the contractor. Alternatively, on a cost-reimbursable contract, the risk will be shifted to the owner/client. This in turn is reflected in contracts where they vary depending on procurement approach.

The choice of procurement method is highly dependent on the type of project and is usually manifested through a contractual arrangement (Clegg et al., 2002). According to Rahman and Kumaraswamy (2002a), the nature of the project dictates the contracting method and the type of contract. Turner and Simister (2001) explained the selection of contract type based on transaction cost economics (TCE) and concluded that the contract type is dependent on the uncertainty of the project. For example, a fixed price delivery model is widely used when the scope is well known, on the other hand, cost reimbursable
is an adequate choice when the project is highly uncertain, complex and involve a lot of risks (Walker et al., 2000).

Traditional procurement routes that focus on low-cost tendering and risk transfer to contractors appeared to cause many issues in complex projects as their use do not achieve value for money for the client due to the instigation of adversarial relationships which is associated with the lowest tender price selection basis (Latham, 1994; Cox and Townsend, 1998). Therefore, this results in a lower quality of work, changes in design and construction, less trust between the parties involved, and a blame environment (Latham, 1994). Not to mention the inappropriate allocation of risks between the client and the contractor in an attempt to reduce their own cost which in turn fuels the adversarial culture among the parties (Cox and Townsend, 1998). The adversarial culture has been recognized for many years in the construction industry. According to the Chartered Institute of Purchasing and Supply (CIPS) in the Latham review, adversarial practices have a negative impact on clients and discourage the application of the best procurement processes that add value and enhance quality (Cox and Townsend, 1998; CIPS 1994). The CIPS have concluded that this problem is prevalent at all supply chain levels and the causes of this problem are the lack of a clear contract strategy; communication problems throughout the supply chain; improper assessment and appropriate allocation of risk; traditional form of contracting which creates the potential for conflict (Cox and Townsend, 1998).

Another issue highlighted by the CIPS (1994) and the National Economic Development Office (NEDO) (1988) on the fragmented structure of the industry which is still noticed to this day ul Musawir (2020). This encourages adversarial relationships shifting risks among parties and creating a blaming culture. In their report Faster Building for Commerce, NEDO has argued that the growing number of organisations and specialisms have worsened the already existing problems of coordination, communication, motivation, and control (Cox and Townsend, 1998; NEDO, 1988). As a result, it is argued that the structure of projects has many interfaces, points of tension and conflict which in turn will increase costs and reduce efficiencies. For example, having primary contractors working with sub-contractors shifts responsibilities to the sub-contractors with little
consideration of who is the best qualified to manage the risk, resulting in conflicts especially since each party has its interest in the project. What all this shows is that the choice of procurement model has an influence on how projects are delivered, the cooperation and coordination of the parties involved, and overall project performance. Having said that, it was also found that governance is considered an important element in ensuring projects are delivered within time and to the required outcomes. Accordingly, governance mechanisms can differentiate and are operationalised differently based on the choices of the procurement model (Chen et al., 2018), in addition to the role of contracts in prescribing how projects are governed (Williamson, 1975). Therefore, it is adequate to say that procurement models play an important role in the delivery of projects. For example, as seen earlier, the fixed price delivery model may not achieve the benefits required not forgetting the development of adversarial relationships among project parties.

Recent shifts toward more relational approaches were noticed in an attempt to tackle the aforementioned issues of the traditional approach to procurement (Morris, 2011). Relational contracting (RC) emerged as an alternative to such an approach aiming to bring different relational mechanisms to inter-organisational interaction rather than a solely transactional view of interactions as such. This shift was instrumental in re-conceptualising the inter-organisational relationships of participating parties.

In this thesis, the relational approach is conceptualised by alliances which incorporate different types of relational contracting such as JVs, alliancing, partnering and the like.

**2.2.1 Types of Alliances**

Clark and Fujimoto (1991) introduced “alliance or partnered” projects which dealt extensively with supply chain issues. During this time, there were considerable efforts across many sectors more particularly the construction sector to shift from a traditional form of procurement and contracting and improve project performance (Morris, 2011).
The concept of alliances has shifted the transactional form of contracts to a relational form of contractor engagement, focusing on performance improvement and alignment (Morris, 2011). Alliance types of procurement and arrangement are known as relational contracting. Relational Contracting (RC) was initially defined by Macaulay (1963) as a working relationship among parties where they do not often follow a legal mechanism presented by the written contracts and govern the transactions within social guidelines acceptable by all parties. Relational contracting is viewed as a cooperative working relationship among parties emphasized by win-win scenarios and recognition of mutual benefits; Partnering, Alliancing, Joint ventures (JVs) and other collaborative working arrangements and risk-sharing mechanisms are part of RC (Rahman and Kumaraswamy, 2002; Yeung et al., 2012).

Yeung et al. (2012) provided a holistic comprehension of the concept of RC methods through a systemic review of the concept. The authors summarized the five core elements used in the construction of relational contracting; commitment, trust, cooperation and communication, common goals and objective, and win-win philosophy. Although these elements are found in all relational contracting methods, there are still some “non-core” elements that constitute specific variants of relational contracting. Macdonald (2005) mentioned that there is a wide range of relational contracting methods across the spectrum of relational methods. At one end, parties commit to work cooperatively in a basic preliminary charter. At the other end lies a formal alliance agreement, and between both ends, a variety of contracts involving incentives and direct cost reimbursement (Macdonald, 2005).

2.2.2 Success Factors and Attributes: The Case of Partnering

The concept of partnering has emerged as a solution to avoid adversarial relationships and provide enhanced cooperation among the parties. Partnering can be in the form of a short-term one-off arrangement on a project, or a long-term arrangement, also known as strategic partnering, between two or more organisations aiming to achieve specific business objectives by benefiting from each other’s resources (Cox and Townsend,
Strategic partnerships can incentivize project teams to deliver project targets by giving them future work from the same client (Brensen and Marshall, 2000a; Alderman and Ivory, 2007; Børve et al., 2017). Despite the potential benefits of strategic partnership and due to the nature of projects and clients, the short-term one-off arrangement remains the most common (Morris, 2011; Roerich et al., 2021).

Black et al. (2000) studied the success factors of partnering and its benefits in projects among clients, consultants, and contractors across the UK. They have found that contractors and clients perceived partnering more positively than consultants. The study has also indicated the critical factors for partnering to succeed. Academics mentioned a variety of requirements for the success of partnering in projects. Gattorna and Walters (1996) focused on the measures that parties need to take for partners to succeed. They advocated that parties involved should bring value to the relationship and have encouraging reasons to enter it. Accordingly, it is important that relationships fit in with the strategic plans of parties involved, and that they are well committed to it. As a result, the parties should be integrated at all levels and free to share information formally and informally (Gattorna and Walters, 1996). According to Harback et al. (1994), partnering will not achieve its aims unless there is mutual trust among the parties involved and this can be achieved through their alignment with their joint objectives. On the other hand, Lewis (1995) stressed the importance of the early involvement of key suppliers in the design phase. He argues that failing to involve suppliers in the design phase will result in a considerable loss of value. This in turn will hinder creativity and the changes made afterwards in the project will be costly due to the time lost and aborted design (Lewis, 1995).

Black et al. (2000) listed all these factors in their survey and found that respondents mainly identified that mutual trust, effective communication, senior management commitment, actions consistent with stated objectives, dedicated teams, flexibility to change and a commitment to continuous improvement were the main factors. All parties among respondents (Contractors, Consultants and Clients) believed that mutual trust is crucial if the partnering relationship is to succeed. Also, effective communication was acknowledged by participants as an important factor in partnership. For contractors, that
was the most important issue reflecting the problems derived from poor communication between all the parties (Black et al., 2000). The participants also emphasized the importance of commitment from senior management to be an important factor. Signalling the need for governance mechanisms that guide the success of such arrangements.

The benefits of partnering were widely stated in the literature. According to Chadwick and Rajagopal (1995), one of the key benefits that partnering with suppliers offered was the synergy among teams which enables constant improvement of project variables such as cost, time and quality (Black et al., 2000). Gattorna and Walters (1996) mentioned that the benefit of adopting a partnership approach in procurement is the development of joint strategies to achieve strategic objectives. Therefore, reducing risks and improving the return on scarce resources. Another beneficial element was discussed by MacBeth and Ferguson (1994), which is focusing on medium to long-term relationships. Accordingly, partnering encourages the learning curve which in turn enhances the relationships between the parties and reduces the costs of developing and supporting procutive relationship between the involved parties (MacBeth and Ferguson, 1994; Black et al., 2000).

Nevertheless, as stated earlier the use of partnering is not a fit for all projects. It is mainly used in large complex projects and multiple projects that are part of an alliance network. Despite the widely acknowledged benefits shown in reports and conferences among scholars and practitioners, there are still some limitations and pitfalls to partnering. Bresnen (2007) stated that the development of partnering relationships encounters numerous difficult challenges. Bresnen (2007) argued that this requires a more commercial and organisational realism than is usually articulated among practitioners. Barlow et al. (1997) found that partnering requires a lot of time spent on meetings and senior management involved, and was hence more expensive in terms of higher management overhead. Furthermore, clients may use partnering as a tool to drive contractors/suppliers and to lower their costs rather than focusing on adding value to the project which Alderman and Ivory (2007) described to be the “cynical version of continuous improvement”. Green (1999) also argued that partnering can be used as propaganda and rhetoric. As such the rhetoric of major clients and their behaviour in practice could be in dissonance. He added
that the rhetoric of customer responsiveness and continuous improvement falls owes more to propaganda than to a good management policy (Green, 1999).

As seen, there is a wide literature on the success factors of partnering, however, they do not appear to tackle issues of governance, cooperation, and coordination in detail and how these factors can affect each other. Especially, governance guides such arrangements and instigates different mechanisms that are directly related to these success factors. Furthermore, some of the success factors are considered attributes and mechanisms of governance, cooperation and coordination which posits the need to tackle this aspect in IOPs and their alliance networks. Although these studies have provided some insightful information on partnering, they tend to give a descriptive notion of how partnering succeeds without scrutinizing these perceptions and showing how and on what level should these mechanisms be found.

### 2.2.3 Elements and Success Criteria: The Case of Alliancing

Another form of relational contracting is known to be Alliancing. Although mostly incorporating the same attributes, it differs from partnering in that it also consists of contractual provisions that complement the relational dimension such as incentives. There are several definitions of project alliancing in the construction industry and still no consensus on a thorough meaning of the concept (Yeung et al., 2007). Gerybadze (1995) defined project alliancing as a joint force for a specific project between clients and associated firms, but legally they remain independent organisations. Strategic alliancing is viewed as the establishment of inter-organisational relations and the engagement of collective behaviour to achieve a specific purpose (Love and Gunasekaran, 1999). Later on, Hampson et al. (2001) defined strategic alliancing as an inter-organisational arrangement that happens between two companies and continues after the project with sharing ongoing business benefits. Yeung et al. (2007) classified the characteristics of Alliancing in two elements known as hard and soft elements as a framework for their attempt. The hard elements are related to the contractual agreements and legal features while the soft elements are referred to relationships and people (Yeung et al., 2007).
Therefore, hard elements include real pain/gain share and formal contract. While the soft elements comprise trust, long-term commitment, cooperation and communication, common goals and objectives, win-win philosophy, equity, agreed problem resolution methods (which are indirectly related to the contract), continuous improvements, alliancing workshops, and early selection of contractors (Yeung et al., 2007).

- **Formal contract and real pain/gain risk sharing** are the characteristics that differentiate project partnering from alliancing. A key attribute of alliancing is that it has both a relationship management system and a delivery system (Yeung et al., 2007). Accordingly, an agreed profit/loss legal contract binds all the parties (Walker et al., 2000, Hauck et al., 2004, Rowlinson and Cheung, 2004). This kind of contract arrangement will encourage the parties to work as a team during the project. Alliance contracts or Alliance agreements consist of - risk/reward sharing (known also as pain/gain share) where parties agree on their required profit and their share of risks. Consequently, if one party underperforms, all other parties are placed at risk of losing the profit and incentives or even share losses according to the agreed pain/gain sharing model (Yeung et al., 2007). The element of risk and reward sharing is considered the major difference between alliancing and partnering (Walker et al., 2002; Yeung et al., 2007). Unlike partnering where all parties agree to mutually cooperate with no formal agreement, alliancing imposes for project members to cooperate by a risk/reward scheme where generally there are either win-win or lose-lose scenarios.

- **Trust** is considered an important element in relational contracting. According to Hampson and Kwok (1997) stated that trust is a major element for the success of strategic alliances and business relationships. Trust is deemed to be an emotional and human phenomenon due to the direct association of the person(s) with past experiences, and the indirect association of the anticipated experiences (Yeung et al., 2007). Luhman (1979) described trust as having the confidence in realizing one’s expectations. For instance, it is about having positive expectations in the other when dealing with risky situations.
(Gambetta, 1988) and believing without the means to confirm that belief (Tomkins, 2001). Many scholars argue that trust is particularly relevant to alliances due to its importance in risky situations and that risk management is an important aspect of alliances (Luhmann, 1979; Ring and Van de Ven, 1992; Das and Teng, 2001). The need for trust is essential in alliancing to generate constructive dialogue and commitment (Walker et al., 2000). Trust in alliancing lies in the centre of relationship contracting where a culture of no-blame no dispute is one of its elements.

- **Long-term commitment** is more related to strategic alliances where the relationship among the members of the alliance extends to more than a single project or programme. Walker et al. (2001) stressed the importance of long-term commitment to achieving mutual objectives, continuous improvement and resolving problems. Commitment is essential to achieve project and programme goals and plays a critical role in ensuring the success of the alliance (Thorpe and Dugdale, 2004).

- **Cooperation** and **Communication** are considered by scholars to be key elements of alliance success (Kwok and Hampson, 1997; Walker et al., 2000). Most of the attributes of an alliance require cooperation to foster the inter-organisational relationship which in turn lead to a successful alliance. Also, communication is considered to be important as such high integration and collaboration processes require communication at the personal, business and operational level (Hauk et al., 2004; Walker et al., 2002).

- **Common goals and objectives** are considered in the literature to be also an important element by which organisations come together to form an overall strategy in delivering and achieving project/programme objectives, therefore, making the organisations purposeful objectives oriented.

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3 The concept of cooperation is defined and elaborated in the subsequent chapter. Here it is used to describe how it is viewed as part of the characteristics of Alliancing according to Yeung et al. (2007).
• **Win-win Philosophy** that is related to the joint budget and cost/time established targets through an alliance board that constitutes key senior project champions that represent each member of the organisation (Walker et al., 2002).

• **Equity** is a feature in alliancing by which parties agree to an equitable risk-reward balance (Manley and Hampson, 2000) accordingly the foundation of collaboration is based on the equity between the parties (Hauck et al., 2004).

• **Agreed problem resolution methods** adopted in alliancing provide the set of procedures to tackle problems that may arise and the time frames for their resolution (Yeung et al., 2007). This is also considered to be an element of alliancing by scholars (Hampson and Kwok, 1997; Walker et al., 2000).

• **Continuous improvements** are perceived to be an essential element of alliancing by learning from experiences and gathering information about the performance to guide the alliance members for improvements (Walker et al., 2000/2002). Thorpe and Dugdale (2004) also agree that continuous improvements are vital to the alliance in achieving the project goals and requirements while adopting innovative solutions to improve the current process.

• **Alliancing workshops** are considered to be a useful tool that helps clients to select capable alliancing partners (Walker et al., 2000/2002; Yeung et al., 2007).

• **Early selection of contractors** is regarded among some researchers to be an important element of alliancing contracting as the selection of contractors earlier is not based on only price but rather on the ability of contractors to provide value for money (Manley and Hampson; 2000).

As a result, the key elements present somehow the criteria for project alliancing to succeed. Similar to partnering, the success factors (SFs) identified in the literature by Chen et al. (2012) include best-for-project attitude, past working relationships, senior management’s commitment and support. Also, trust and equity between partners, education on alliancing philosophy and virtual team and integrated alliance office are considered to be success factors. Additional factors include team selection and building, use of electronic information exchange and knowledge sharing, open and honest communication, goal alignment, joint problem solving and continuous improvements.
(Abrahams and Cullen, 1998; Ross, 2003; Rowlinson and Cheung, 2005; Hauck et al., 2004; Henneveld, 2006; Jefferies et al., 2006; Love, Mistry and Davis, 2010). SFs help to identify what is required for the alliance to succeed and provide the alliance members with the framework to assess the viability of the alliance. Further, collaborative approaches can deliver benefits in project processes and outcomes for clients (Brensen and Marshall, 2000). Innovation and added value were also the results of alliancing during the National Museum of Australia Project (Hauck et al., 2004). Not to mention the enthusiasm and commitment of team members are relatively high during alliancing (Walker, 2002; Walker et al., 2001). The characteristics of this approach provide a useful means of achieving collaboration between project teams and organisations. Especially since contractual arrangements support such behaviour due to the incentives and pain/gain share.

Although alliancing provides promising results in increasing project performance and delivering value for money (Walker, 2002; Sakal, 2005; Wood and Duffield, 2009; Mills, 2019) not every project can be delivered using the alliancing method. Turner and Simister (2001) showed that alliance contracts can be useful when uncertainty is high and when clients have knowledge about the situation in which they can assist the contractor in the design and delivery phase. Chen et al. (2012) argued that project alliancing is suitable for projects that are characterized by high risk, tight timeframe, multiple stakeholders, and complex external environment issues, with no guarantee that it will lead to optimal outcomes as a result. Ross (2003) stated that clients opt for alliances without a sufficient commitment to alliancing principles. Further, the use of alliancing is not a concept that can be “acquired off the shelf and installed” (Lloyd Walker and Walker, 2012). Project alliancing requires a cultural and behavioural change, and the project team should be fit for such an environment. Also, continual development of staff is needed to maintain an effective alliance members’ behaviour (Lloyd Walker and Walker, 2012). Such training and culture shifts could also be costly to the owner and the parties involved with complex interfaces, therefore, making project alliancing not suitable for every project except for large complex ones where such projects can be uncertain and ambiguous (Walker et al., 2015). Behavioural change is not usually prescribed in the contract, and even so, this does not ensure the cooperation of project teams. This is despite that alliancing tackles
cooperation problems using contractual arrangements and incentive structures (Love et al., 1998; Briscoe et al., 2004; Edkins; 2009; Söderlund, 2011). As such, a stratified understanding of cooperation across organisational boundaries is needed to be able to understand how cooperation evolves and what may lead to cooperative outcomes. Furthermore, governance and coordination are also crucial in showing their relation to cooperation. This will help in assessing the viability of alliances through these units which in turn serve as predictors of successful outcomes (Love et al., 2010). As not all alliances are considered viable even such contractual provisions are provided in contracts. Lastly, Similar to partnering, the multiplicity of success factors gives an additional challenge for alliances to have successful outcomes yet again do not reveal how these factors are achieved through governance cooperation and coordination mechanisms and attributes and where they are enacted.

2.2.4 Findings on Inter-organisational Relations (IORs) and Their Implications

The inter-organisational relations and their arrangements in infrastructure projects have been focusing on the procurement model by which such arrangements are governed (Chen et al., 2018). As such, different procurement models were applied to projects to improve performance. The models vary in terms of actors’ authority, responsibilities, and risks (Cox and Townsend, 1998) not to mention the cost and price modelling. Despite having such models – also known as the traditional approach to procuring – the industry suffered from fragmentation and adversarial relationships (Latham, 1994). This made the industry shift towards a more relational approach where such issues have started to be mitigated. Models such as partnering and alliancing have gained much recognition in the sector, especially after successful implementations across multiple projects (Sakal, 2005; Walker and Lloyd-Walker, 2016). This is reflected as a result in the case studies that were documented by researchers (Walker et al., 2002; Hauck et al., 2004; Lingard et al., 2007). Although partnering and alliancing has brought some benefits to the industry in terms of increasing the performance and efficiency of projects, there are still some challenges evolving around such approach. As seen earlier, the cultural and behaviour
change that such models posit the need to understand how such shifts can be attained, especially since governance modes play a crucial role in achieving such change. Further, the adoption of such models does not guarantee the success of alliances due to many complex factors including multiple stakeholders, uncertainty, complex interfaces and commitment to alliance principles. This, in turn, makes the use of contracts not the only solution to such challenges. More dimensions are involved in governing, developing and improving such relationships, and ensuring the success of alliances. These dimensions are usually grouped under two camps namely the contractual and relational.

2.3 Inter-organisational Projects and The Move to Relational Governance

This chapter tackled inter-organisational projects (IOPs) and discusses their temporal nature which is distinguished from other types of inter-organisational arrangements. Additionally, this chapter reviewes different procurement approaches under two main camps, the traditional and the relational adopted in IOPs. Through reviewing different relational approaches to project key attributes and success factors are discussed which allow for a better understanding of how alliances are different from traditional transactional approaches and therefore frame their key characteristics. This chapter also helps in understanding how governance, cooperation and coordination play an important role in the viability of these alliances and their relationship towards alliance performance. Therefore, this advocates a need to unpack how different governance mechanisms are operationalised in IOPs. The following chapter discusses governance, cooperation and coordination in IOPs.
Chapter 3. Governance, Cooperation, and Coordination in Inter-organisational Projects

This chapter reviews the literature from the lens of governance, cooperation, and coordination in inter-organisational settings that signals an alliance context. The first section addresses the synthesis of these areas by reviewing two literature streams, namely general management and project management. Mostly, inter-organisational cooperation and coordination have been studied and reviewed from general management while governance is from project management literature. The rationale behind the literature review strategy is laid out in the first section showing the thorough and elaborate analysis of cooperation and coordination in wider management while limited studies tackled them in project management literature. Further, cooperation and coordination are reviewed and discussed. As such, multiple attributes of both concepts are discussed showing their heterogeneity across the literature. Similarly, project governance is discussed and different mechanisms are addressed to show the multiplicity of project governance and to highlight the need to move beyond the absolute terms of relational and contractual mechanisms. Lastly, the chapter ends by showing the need to have an integrated view that encompasses governance, cooperation and coordination especially beyond dyadic interactions and across multiple inter-organisational boundaries.

3.1 Establishing The Organisational Focus for Governance, Cooperation and Coordination

This section lays the foundation by which the literature review is underpinned. It sets out the concepts of project governance alongside inter-organisational cooperation and coordination. Ultimately the focus is the interrelatedness of cooperation and coordination with governance. Cooperation, coordination and governance were found in wider management and project management (PM) literature, but not discussed in full altogether, especially in project management literature. The following tables 3.1 and 3.2 provide a
summary of key literature in project management and general management investigating cooperation, coordination and governance. The finding from this review is that the project management literature fails to tackle these aspects altogether as seen in Table 3.1. Although in some instances two aspects out of three are tackled such as governance and cooperation (Kumaraswamy et al., 2008; You et al., 2018), governance and coordination (Ahola, 2018; Hietajärvi et al., 2017; Artto et al., 2016) and cooperation and coordination (Söderlund, 2012; Jiang et al., 2018; Adami et al., 2019; Whyte and Davies, 2021; Zhang et al., 2018), none of these studies present these three factors equitably. This however was not the case in some of the general management literature (Schepker et al., 2014; Albers et al., 2016; Luo, 2008; Cao and Lumineau, 2015). Effectively, this poses an interesting finding in that each stream differs in its way of tackling governance, cooperation, and coordination. Despite the lack of structural substance in the governance of alliances (Albers et al., 2016), the focus of the general management on the three constructs may be mainly due to the continuous relationships of alliances, their strategic nature and the advancement of alliance studies. However, these aspects altogether were undertheorized in project management (literature with the focus mostly contributed towards governance from one side or cooperation and coordination from the other). Also, most of the project management literature refers to the general management literature in tackling these issues. This may be due to the major role of transaction cost economics in governing the relationships between project organisations which posits the inherent need to focus on contracts and their effect on trust, opportunism, and performance to name a few (Williamson, 1985; Pryke, 2004), leaving a vacuum in cooperation (which is used interchangeably with trust and collaboration in most studies) and coordination (mostly limited to coordination of contracts) in their relationship with governance. Additionally, it is not only governance which follows the streams of general management, but also cooperation\(^4\) and coordination follow the general management literature in their definition with little contributions to the

\(^4\) The cooperation in projects was discussed in alliances and inter-organisational arrangements, however limited to just an outcome based through a causal relationship mainly attributed to procurement models. For example, incentives led to cooperation (for more see Brensen and Marshall, 2002; You et al., 2018). However, Kumaraswamy et al. (2008) elaborated more on cooperation in construction and provided a definition.
project management literature made in both (Kumaraswamy et al., 2008; Phuwa and Rowlinson, 2004; Adami et al., 2019; Kujala et al., 2020; Whyte and Davies, 2021), given the nature of the PM field as a sub-systems integration field (Morris, 2011).

Table 3.1 Key Literature in Project Management Tackling Governance, Cooperation and Coordination

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<th>Governance</th>
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<td>Turner and Simister (2001)</td>
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5 The literature reviewed and presented in both project and general management literature shows what areas the authors have tackled in their research. There may be some areas that have been mentioned in their research yet were not the main aim of these studies. For instance, you may find cooperation mentioned however briefly in research discussing and aiming solely on governance, and therefore governance was the only aspect that was tackled. Also, it must be noted that the presence of these units in these research show that they are interrelated or at least cannot be disjoined from each other.
### Key Literature in General Management Tackling Governance, Cooperation and Coordination

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<tr>
<td>Gulati and Singh (1998)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poppo and Zenger (2002)</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Lui and Ngo (2004)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faems et al. (2008)</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Luo (2008)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Gulati et al. (2012)</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Schepker et al. (2014)</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cao and Lumineau (2015)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Albers et al. (2016)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Oliveira and Lumineau (2017)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnbull (2019)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Castañer and Oliveira (2020)</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Having said that, the general management literature considers these factors as equal importance to each other and essential when discussing inter-organisational arrangements. However not always, this was manifested by the presence of such studies tackling the three factors altogether (Luo, 2008; Cao and Lumineau, 2015; Albers et al., 2016; Schepker et al., 2014). On the contrary project management literature presents the relationship between these factors equivocally. For instance, cooperation is subsumed under coordination (Kumaraswamy et al., 2008) and coordination is presented as a dimension under governance (Kujala et al., 2020). Other studies view coordination as an integration mechanism (Whyte and Davies, 2021) and governance as an integration mechanism (Hietajärvi et al., 2017). Given such differences in assumption, it is therefore important to unpack the relationship between the three factors and enhance our understanding of them in inter-organisational context namely in alliances. This will help merge both lines of enquiry in general and project management to give a more nuanced view of the interplay of these factors in the temporary organising of alliances.

As already mentioned, governance, cooperation and coordination are tackled from a wider management perspective and a project management perspective. In inter-
organisational settings, elaborate studies of cooperation and coordination are mostly found in general management literature which project management literature mostly tends to incorporate when discussing these constructs. On the other hand, studies evolving around project governance have been recently gaining much attention in project management literature and differ strictly from strategic alliances in general management literature, especially from the perception of time. For instance, governance in strategic alliances is determined through decisions made at three nested levels, the choice to enter an alliance before forming (i.e buy or make), the type of alliance arrangement (equity vs non-equity) and the operationality of governance after merging forces (control rights, contractual safeguards…) (Reuer et al., 2016). However, project governance is viewed in two ways, either internal to the project related to the inter-organisational network or externally studying the project-based organisation dealing with a portfolio of projects (Ahola et al., 2014). Having said that, it is appropriate for the aim of this study to take the review of project governance that is internal to the project as the foci in this study. As such, Ahola et al. (2014) and Kujala et al. (2020) have systematically reviewed governance from a project management perspective. On the other hand, Gulati et al. (2012) and Castañer and Oliveira (2020) review cooperation and coordination from a wider management lens. Given the advancement of inter-organisational cooperation and coordination in general management and the presence of systematic reviews in these domains and the reliance on this literature in project management, it is adequate to take those reviews as the central focus when reviewing cooperation and coordination. In terms of governance and as mentioned earlier it is appropriate to make the reviews of project governance (Ahola et al., 2014; Kujala et al., 2020) the central focus when reviewing governance.

The following Table 3.3 summarises the contextual entities of both streams of literature and shows which literature is dominant in terms of the context of this study.

<table>
<thead>
<tr>
<th>Units of analysis</th>
<th>Project management literature</th>
<th>General management literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation</td>
<td>Cooperation in projects is an outcome-based view and tied mostly to incentives. In project</td>
<td>Wider view of cooperation in alliances involving different school of thoughts that explain the</td>
</tr>
</tbody>
</table>
context, cooperation follows the general management literature⁶
behaviour, targeting relationship risk including unstable commitments and hidden motivations

| Coordination | Coordination in projects include integration of the work and sub-systems, and coordination of contracts. Coordination in project context mostly follows the general management literature in tackling issues of coordination | Wider view of coordination in alliances involving different school of thoughts tackling mainly inter-organisational arrangements. Targeting operational risks including challenges in coordination across organisational boundaries |
| Governance | Project governance is viewed either specific to the project namely the internal view or specific to the project-based organisations undertaking different projects under a portfolio. | Governance in alliances focus is mostly on the decisions to enter in a strategic alliance, equity or contractual based governance. In addition to the operationality of governance mechanisms. |

Additionally, to make sure the review has targeted cooperation and coordination in inter-organisational settings specifically to projects, a second level of quasi-systemic review is done by searching for keywords of “inter-organisational cooperation”, “inter-organisational coordination”, “alliance cooperation” and “alliance coordination” and tackling the context of projects. In this way, cooperation and coordination are covered across multiple literature streams while also reviewing the systematic literature reviews that are explored in the general management stream. Since both constructs are not widely discussed in the project management stream, the review has followed the general management in addressing them. However, unlike cooperation and coordination, governance is well discussed in the project management literature (systematic literature reviews are found on this subject), and it is different to some extent than in general management (i.e., general governance in alliances). This therefore necessitates reviewing governance from a project context nonetheless key literature on inter-organisational governance in general management was also reviewed given that project governance is rooted in theoretical assumptions stemming from general management literature especially those targeting organisational studies (i.e Poppo and Zenger, 2002; Cao and Lumineau, 2015). Hence, the review will be more rigorous and cover inter-organisational governance, cooperation and coordination from the streams that are well explored yet without disregarding underexplored streams.

⁶ See section 3.5
This strategy sets out the demarcation between the generic aspects of governance, cooperation and coordination in the inter-organisational context in both general management and project management milieu. The schematic shown in Figure 3.1 depicts the review strategy followed shown in Table 3.4 detailing the number of articles found in each phase of the research process.
Figure 3.1 The Focus of The Literature Review
Table 3.4 Number of Relevant Papers in Scopus and Web of Science

<table>
<thead>
<tr>
<th>Area of focus</th>
<th>Key words</th>
<th>Database</th>
<th>Number of papers</th>
<th>Number of papers after (First order filter concerning management literature and includes the project management literature)</th>
<th>Number of papers after Second order filter concerning the project context in the management literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination</td>
<td>“Inter-organisation” and “Coordination”</td>
<td>Scopus</td>
<td>20</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Web of Science</td>
<td>17</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Coordination</td>
<td>“Inter-organisation” and “Coordination”</td>
<td>Scopus</td>
<td>11</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Web of Science</td>
<td>12</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Coordination</td>
<td>“Alliance” and “Coordination”</td>
<td>Scopus</td>
<td>732</td>
<td>38</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Web of Science</td>
<td>797</td>
<td>87</td>
<td>15</td>
</tr>
<tr>
<td>Cooperation</td>
<td>“Inter-organisation” and “Cooperation”</td>
<td>Scopus</td>
<td>23</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Web of Science</td>
<td>18</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cooperation</td>
<td>“Interorganisation” and “Cooperation”</td>
<td>Scopus</td>
<td>10</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Web of Science</td>
<td>9</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Cooperation</td>
<td>“Alliance Cooperation”</td>
<td>Scopus</td>
<td>3626</td>
<td>67</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Web of Science</td>
<td>3459</td>
<td>337</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 3.4 depicts the first and second-order review of the literature. It tackles the shown keywords in Scopus and Web of Science databases. It must be noted that these numbers include duplicates. For instance, Inter-organisational cooperation search led to several papers, of which some are also found in the alliance cooperation search. Further, after a careful filtering process, the number of papers that tackle inter-organisational

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7The number shown here represent the total number of searches for key words on main databases including journal articles and book chapters only.

8 The number shown here depicts papers that tackle inter-organisational settings in projects. Therefore, any paper that does not represent the contextual element of projects is omitted. However, projects may be studied in a wider management literature. Although this table covers almost all papers in management field, the author makes no claim that this is a systematic literature review. However, the table depicts mostly all the papers that mention the contextual elements (i.e Interorganisation and cooperation). Also, it is worth mentioning that this review was undertaken up until June 2021 when the researcher finished the analysis and was in the process of write up. It must be noted that the researcher honed down any information that was not tackled by the systemic literature reviews to give more rigor.
cooperation and coordination amounted to 36 papers. Some of these papers have been used in this thesis as they directly tackle the contextual elements that this research focuses on. The rest did not appear to be relevant regarding the aim of this research. It must be re-emphasized that in tackling inter-organisational cooperation and coordination, the research follows mainly the general management literature stream as it provides a more detailed and elaborated view of both concepts in addition to the over-reliance on it from the project management milieu. However, to complement the review additional reviews that take into consideration projects as a context in inter-organisational settings as shown earlier in Table 3.4. In this way, the author was able to tackle the systemic literature reviews of cooperation and coordination which allowed to stratify the key attributes of both concepts. This was complemented by the second-order review of the project context which also allowed to tackle the context of this study and provided a good understanding of cooperation and coordination within the realm of projects. In doing so, the thesis gives a more rigorous approach to identifying key literature related to alliance settings in projects.

3.2 Inter-organisational Relationships: Cooperation and Coordination

This section sheds light on the multiplicity of definitions of inter-organisational cooperation and coordination which in turn unpack its different attributes across project and wider management literature. Management literature has been focusing on issues of cooperation and coordination in inter-organisational relationships (IORs) (Das and Teng, 1998; Gulati et al., 2012; Kretschmer and Vanneste, 2017; Castañer and Oliveira, 2020). Although there are differences in terminologies (Castañer and Oliveira, 2020), there are also consistencies. For instance, Das and Teng (1998, pp.492) define cooperation as the “willingness of a partner firm to pursue mutually compatible interests in the alliance rather than act opportunistically”. While Gulati et al. (2012) view cooperation as a joint pursuit of agreed goals and Kretschmer and Vanneste (2017) see cooperation as the alignment of incentives and the willingness of partners to work together. With regards to coordination, it is an “integrating or linking together different parts of an organisation to accomplish a collective set of tasks” (Van de Ven, 1976, pp.322) or an alliance that pools resources, creates a division of labour across partners, and allows the integration of dispersed
activities for value generation (Hoetker and Mellewigt, 2009). For Gulati et al. (2012) coordination is the deliberation and alignment of partners’ actions towards achieving predetermined goals. Tables 3.5 and 3.6 present a set of definitions from the IOR literature.

Table 3.5 Definitions of Inter-organisational Cooperation

<table>
<thead>
<tr>
<th>Inter-organisational relationship – Cooperation (General management literature)</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation - (Parkhe, 1993)</td>
<td>“Interfirm cooperation may rest on two basic building blocks: (1) initiation of a mutually beneficial relationship, catalyzed by favorable calculations of discounted future payoffs from mutual cooperation and culminating in the commitment of some credible, significant nonrecoverable investments on both sides and (2) fading of the fear of opportunism as the partners build a cooperative history and fledgling mutual trust develops between them” (Parkhe, 1993: 821)</td>
</tr>
<tr>
<td>Cooperation - (Das and Teng, 1998)</td>
<td>“We define partner co-operation as the willingness of a partner firm to pursue mutually compatible interests in the alliance rather than act opportunistically” (Das &amp; Teng, 1998: 492)</td>
</tr>
<tr>
<td>Cooperation - (Gulati et al., 2012)</td>
<td>“We define inter-organisational cooperation as joint pursuit of agreed-on goal(s) in a manner corresponding to a shared understanding about contributions and payoffs.” (Gulati et al., 2012: 533)</td>
</tr>
<tr>
<td>Cooperation - (Kretschmer and Vanneste, 2017)</td>
<td>“Cooperation is the alignment of incentives, or the extent to which partners are willing to work together.” (Kretschmer and Vanneste, 2017: 55)</td>
</tr>
</tbody>
</table>

Table 3.6 Definitions of Inter-organisational Coordination

<table>
<thead>
<tr>
<th>Inter-organisational relationship – Coordination (General management literature)</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination – (Van de Ven et al., 1976)</td>
<td>Coordination means integrating or linking together different parts of an organisation to accomplish a collective set of tasks (Van de Ven et al., 1976: 322)</td>
</tr>
<tr>
<td>Coordination – (Hoetker and Mellewigt, 2009)</td>
<td>Coordination addresses the pooling of resources, the division of labor across partners, and the subsequent integration of the dispersed activities, all of which are critical to the generation of value</td>
</tr>
</tbody>
</table>

9 Van de Ven et al. (1976) define coordination at the departmental level of the organisation level rather than inter-organisational level. However, the definition here can be related to IOR as the action of linking different parts to achieve a collective set of tasks is existent within alliance organisations. Also, this definition has been adopted in other IOR literature such as in Briscoe and Rogan (2016) Coordinating Complex Work: Knowledge Networks, Partner Departures, and Client Relationship Performance in a Law Firm. Management Science 62(8):2392-2411.
Project management literature has lacked proper definitions of cooperation and coordination. It is especially the case in inter-organisational settings found in project alliances where inter-organisational facets have been undertheorized (Sydow and Braun, 2018). This is despite attempts to define cooperation and coordination or describe these notions as issues within the project management field (Söderlund, 2012; Stjerne et al., 2018; Tee et al., 2019). Not to mention the use of cooperation and coordination as key factors of good inter-organisational arrangements in alliancing and partnering (Nyström, 2005; Yeung et al., 2007). Further, the perception of cooperation and coordination used by project management scholars follow the general management literature stream in their definitions. For instance, Söderlund (2012) views cooperation as a joint effort through a relationship among several actors for mutual benefits. This echoes Das and Teng (1998), Gulati et al. (2012), and Castañer and Oliveira (2020) perception of cooperation. Similarly, Tee et al. (2019) in their work on modular designs and integrating practices see cooperation as a willingness to collaborate signalling an adoption of Gulati et al. (2012) model of collaboration\(^\text{10}\), comprising both coordination and cooperation. By the same token, coordination is perceived as the ability to collaborate (Tee et al., 2019; Whyte and Davies, 2021) following Gulati et al. (2012) framework on collaboration. Whyte and Davies (2021) view coordination as an important part of system integration choices that are to be made and highlight its importance in managing uncertainties. Despite some emphasis on

\(^{10}\)Gulati et al. (2012) view collaboration as an umbrella incorporating cooperation and coordination. In this research, the author adopts Castañer and Oliveira (2020) review of collaboration which evoke behaviour and outcome-oriented definitions. As such, collaboration can be viewed in terms of a by-product of cooperation and other behaviour, or incorporated within cooperation as a behaviour.
cooperation and coordination in projects, it is evident that these terminologies in the project management field follow wider management literature in their definitions.
The following Table 3.7 depicts how project management literature of inter-organisational relations adopts a wider management view.

**Table 3.7 The Project Management Literature View of Cooperation and Coordination and Their Relationship with Wider Management Literature**

<table>
<thead>
<tr>
<th>Key literature</th>
<th>Own definition</th>
<th>Referring to wider management literature</th>
<th>Relation to other factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anvuur and Kumaraswamy (2008)</td>
<td>Cooperation refers to “Behaviour that promotes the goals of the work group to which one belongs”</td>
<td>Adoption of Tyler and Blader (2000) definition of cooperation</td>
<td>N/A</td>
</tr>
<tr>
<td>Söderlund (2012)(^{11})</td>
<td>“Cooperation is primarily a matter of achieving some kind of joint effort or operation through the association of a number of people/actors for mutual benefit” (Söderlund, 2011: 46)</td>
<td>Reviewing of the literature including both wider and project management.</td>
<td>N/A</td>
</tr>
<tr>
<td>You et al. (2018)</td>
<td>N/A</td>
<td>Focusing on wider management literature including Gulati et al. (2012); Argyres et al., (2007); Das and Rahman, 2010; Poppo and Zenger, 2002</td>
<td>Contractual functions (control, coordination and adaptation) and opportunistic behaviour.</td>
</tr>
<tr>
<td>Whyte and Davies (2021)</td>
<td>N/A</td>
<td>Considering coordination as the ability to collaborate and cooperation as the motivation to do so following Gulati et al. (2012)</td>
<td>Both relating to Collaboration</td>
</tr>
<tr>
<td>Jiang et al. (2018)</td>
<td>Coordination is “The extent of effort to align and link the activities among multiple suppliers”</td>
<td>Multiple definitions of cooperation and coordination guided by multiple project management, marketing and wider management studies (Pinto et al., 1993; Ernst et al., 2010;</td>
<td>For coordination it is about procedural alignment of actions. Whereas for cooperation, it is</td>
</tr>
</tbody>
</table>

\(^{11}\) Söderlund (2012) here presents cooperation and coordination as problems in project management and reviewed literature on overcoming these problems. The review in Table 3.7, thus only provide the author own definition. Other sources on measures to overcome cooperation and coordination problem were not discussed in this table as it is not related to it. However, such sources are considered in the subsequent sections to be behaviours and mechanisms that are used to overcome such problems.
Cooperation is “The extent of collaboration among the multiple suppliers to achieve common goals program” (Jiang et al., 2018:927) Hoegl et al., 2004; Peterson et al., 2005; Gulati et al., 2012)  

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>Reference(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahola (2018)</td>
<td>N/A</td>
<td>N/A</td>
<td>The article analyzes network based perspectives and incorporates the act of coordination into these networks (i.e more coordination in certain network than others).</td>
</tr>
<tr>
<td>Adami et al. (2019)</td>
<td>N/A</td>
<td>Referral of wider management literature when discussing cooperation (Luo, 2002; Axerold, 1984; Gulati and Sing, 1998)</td>
<td>Interdependencies among actors create incentives for cooperation.</td>
</tr>
<tr>
<td>Zhang et al. (2018)</td>
<td>“Cooperation refers to the behaviour that promotes goals between parties” (Zhang et al., 2018: 941) “Coordination aspects of contracts focuses more on what both contractual parties are willing to achieve and how they achieve the mutual goals” (Ibid:942)</td>
<td>Adoption of Anvuur and Kumaraswamy (2012) project management literature for cooperation with views from wider management. Authors adopted wider management literature in discussing contractual coordination (including Schepker et al., 2014; Parkhe, 1993; Luo, 2002; Poppo and Zenger, 2002)</td>
<td>Role of contract (control and coordination), power and trust in influencing cooperative behaviours</td>
</tr>
<tr>
<td>You et al. (2020)</td>
<td>N/A</td>
<td>Referring mostly to general management literature (including Luo, 2002; Gulati, 1995; Dyer, 1997)</td>
<td>Prior cooperation experience effect on cooperation and coordination</td>
</tr>
<tr>
<td>Hietajärvi et al. (2017)</td>
<td>N/A</td>
<td>Adoption of Mintzberg (1989) view of coordination mechanisms as similar to integration. Also the authors have provided a review of inter-organisational coordination with views from wider management including (Galbraith, 1974; Thompson, 1967; Okhuysen and Bechky, 2009)</td>
<td>Coordination mechanisms are related to integration mechanisms.</td>
</tr>
<tr>
<td>De Blois et al. (2011)</td>
<td>N/A</td>
<td>The authors address formal and informal coordination mechanisms. No clear relation to wider management literature.</td>
<td>Impact of coordination mechanisms on project participants relationships and Temporary multiorganization(TMO)structure</td>
</tr>
<tr>
<td>Phua and Rowlinson (2004)</td>
<td>N/A</td>
<td>N/A</td>
<td>Cooperation here is a measure of behaviour (outcome) to assess the cultural differences.</td>
</tr>
</tbody>
</table>
Further, cooperation and coordination are perceived as problems/issues in projects (Han et al., 2019; Söderlund, 2011; Hietajärvi et al., 2017) or as key determinants for projects success (Whyte and Davies, 2021; Adami et al., 2019; Love et al., 2010; Walker et al., 2000), without tackling the attributes of cooperation and coordination in detail (that is to say what are attributes or parameters of cooperation/coordination). This is so despite some work trying to relate trust and contractual arrangements to cooperative behaviour and coordination processes (Das and Teng, 1998; Lazard, 2000; Lui and Ngo, 2004; You et al., 2018 Adami et al., 2019), in addition to alliance literature (partnering, alliancing, integrated project delivery) tackling attributes of such arrangement, in which cooperation and coordination are part of (Lahdenperä, 2012). Moreover, as cooperation and coordination are researched in an alliance context, project governance literature does not discuss the relationship between governance mechanisms and cooperation and coordination, rather governance appears somewhat detached. For instance, Ahola et al. (2014) in their review of project governance literature have mentioned the use of governance as a means to coordinate and safeguard exchanges between project organisations without mentioning how governance can affect coordination, while also limited definition of what cooperation entails. In Kujala et al. (2020) review of governance dimensions in an inter-organisational setting, cooperation was discussed as behaviour within the addressed case studies, yet with no further elaboration on the extent of cooperation or even what it consisted of. Unlike cooperation, coordination has been defined as an essential dimension in governance. Coordination of inter-organisational exchanges is seen as an effect of governance mechanism application, which to some extent reveals their interrelation (Kujala et al., 2020). Leaving the interrelationship between governance, cooperation, and coordination unclear. It is therefore important to understand the interrelationship between governance, cooperation and coordination and to shed light on how these constructs are perceived in the literature. The following sections will address inter-organisational coordination, cooperation and governance of alliances and their relationships in more detail.
3.3 Inter-organisational Coordination

Coordination efforts can involve managing task interdependencies (Raveendran and Puranam, 2012) and uncertainty emerging from internal tasks or external environment (Bensaou and Venkatraman, 1995; Clark and Fujimoto, 1991; Van de Ven et al., 1976). The higher degree of interdependence and environmental uncertainty the higher the coordination should be (Galbraith, 1977). Shenhar and Dvir (2007) stated that three contingency factors; uncertainty, complexity and pace should be considered when analysing the coordination problem. As such, project organisations must coordinate the work as it involves task interdependencies and uncertainties (Lindkvist et al., 1998; Pich et al., 2002; Söderlund, 2012). Coordination is known as a set of linking, meshing, synchronization, or alignment of actions (Okhuysen and Bechky, 2009). Jiang et al. (2018) view coordination as a degree of effort used to align and link activities among multiple suppliers. Evidently, alliance coordination can be seen as alignment of actions across participated members, it is seen to include the processes that require the involvement of different organisations to achieve the project/task goals. Gulati et al. (2012) view coordination as the alignment of actions to reach common goals. This signals two main parameters in the process of coordination namely actions and goals. Also, Castañer and Oliveira (2020) partially overlap with Gulati et. al (2012) definition, the authors give a more rigorous explanation and classify coordination as a phenomenon that consists of attitude, behaviour, and outcome. For instance, they argue that coordination attitude; is the willingness of a team to identify a common goal in the context of alliances; coordination behaviours refer to the actions undertaken by alliance members in preparing for, deliberating, and negotiating the reach of an agreement on common goals; and coordination outcomes refer to the positive or negative mutual agreement or goal achievement (Castañer and Oliveira, 2020). Although the view of coordination in these dimensions has its merits, its description focuses only on the generic aspect of goal achievement which regards organisation actors as executives negotiating and trying to achieve common wider goals, disregarding the detailed level of coordination which include day-to-day tasks. In other words, the focus is on top actors reaching agreements for example, and not on detailed
level of task interdependencies. This has also been found in discussing contractual coordination (You et al., 2018; Zhang et al., 2018) in construction projects. Despite the importance of contract coordination found in contractual provisions and what it entails, still, the notion of coordination is merely represented by it. Especially since contracts are used as a last resort in non-equity alliances and their coordination guidance is not being sought after by the project team (for example project teams usually use their heuristics to coordinate without reflecting back to the contract) (Sanderson, 2012). Further, the concept of bounded rationality reflects the limitations of having a complete contract which makes contractual coordination have limitations and in turn necessitates other kind of coordination (Simon and March, 1993).

Therefore, the coordination view here is rather simplistic or limited to the views of senior managers and does not take into consideration the multi-level aspects of alliances. In inter-organisational project context, this disregards in many instances the notion of actuality in projects (Cicmil et al., 2006; Sanderson, 2012) especially since sometimes alliance members are unaware of the main goal of the project as they are confined within their realm of work (i.e., short vs long term goals). Moreover, the attitude notion mentioned earlier signifies more cooperative behaviour in the sense of being willing to coordinate (Whyte and Davies, 2021). However, the coordination outcome is deemed explanatory as to say whether coordination has achieved its aim or not such as standardisation of work or streamline of workflows, which in turn addresses an assessment of coordination behaviour. Having said that, it is appropriate to view coordination from a behaviour and mechanistic perspective especially if one needs to understand its relationship to governance and hence assess its viability. For instance In this thesis, the principle of coordination is viewed as a multi-levelled behaviours and mechanisms with outcomes that aim on aligning alliance partners’ actions to jointly deliver agreed goals.

12 The behaviour element stems from the definitions of inter-organisational coordination in the literature that is evoked in pooling of resources, communication and integration (Castañer and Oliveira, 2020).
13 Mechanisms of coordination include contract administration, integration, and communication.
3.3.1 Coordination Attributes

This section describes the main attributes of coordination to understand the interrelationship between coordination and its counterpart of governance and cooperation. The attributes that constitute a good outcome of coordination could for example be used to define and assess the viability of an alliance. And so include the mechanisms and behaviour that lead to a positive outcome of coordination. While these attributes appear to be similar to those in project management processes such as task and work decomposition, they are key to achieving a positive outcome of coordination especially since these attributes involve multiple organisations in delivering the work.

The following Table 3.8 provides a summary of key attributes of coordination found in the literature.

<table>
<thead>
<tr>
<th>Literature of inter-organisational Coordination</th>
<th>Attributes (in terms of actionable behaviour and mechanisms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulati &amp; Singh, (1998); Sobrero &amp; Schrader, (1998); Vlaar et al., (2007); Jiang et al., 2018; Kujala et al., (2020); Söderlund, (2012); Hauk et al., (2004); Walker et al., (2002); Hietajärvi et al., (2017); Kujala et al., (2020)</td>
<td>Communication (behaviour &amp; mechanisms)</td>
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<td>• Information processing and exchange</td>
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<td>• Information sharing</td>
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<td>• Management Information System</td>
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<td>• Meetings</td>
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<td></td>
<td>• Co-location</td>
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<td></td>
<td>• Task and Work decomposition</td>
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<td></td>
<td>• Monitoring</td>
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<tr>
<td>Albers, Wohlgezogen, &amp; Zajac, (2016); Briscoe &amp; Rogan, (2016); Gulati &amp; Singh, (1998); Hoetker &amp; Mellewigt, (2009); Jiang et al. (2018); Hietajärvi et al. (2017); Whyte and Davies (2021)</td>
<td>Integration (mechanisms)</td>
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<td></td>
<td>• Planning, scheduling, and forecasting</td>
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<td></td>
<td>• Standardization and practices</td>
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<td>• Processes and sub-systems</td>
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<tr>
<td>Gulati et al. (2012); Kujala et al. (2020); Okhuysen and Bechky (2009); Hietajärvi et al. (2017)</td>
<td>Culture (Behaviour)</td>
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<td>• Organisation routines and practices</td>
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</table>

The notion of attribute is defined by Cambridge Dictionary as “a quality or feature regarded as a characteristic or inherent part of someone or something” (Cambridge Dictionary, Attribute). As such, this research uses attributes, characteristics, elements and dimensions used interchangeably throughout this thesis to depict the qualities of cooperation, coordination and governance.
These attributes represent the coordination behaviours and mechanisms as reviewed in key literature. These were grouped under four major themes: Communication, Task and Work, Integration, and Culture. Communication is an important aspect of coordination (Castañer and Oliveira, 2020; Gulati et al., 2012) as it allows alliance members to share information which in turn helps in adjusting the work to suit the goals of an alliance. Task or work adjustment and decomposition is also an important part of coordination as it permits organisation members to know who is doing what, and this is partially found in contractual provisions (Zhang et al., 2018). Integration is often used interchangeably with coordination in many instances (see Whyte and Davies, 2021; Hietajärvi et al. 2017; Xue et al., 2005). It is seen as a process that makes constituent parts of sub-systems working together (Whyte and Davies, 2021) which make it a key attribute for coordination. Lastly, culture plays a crucial role in determining how partners coordinate. For instance, some organisations may rely on an informal structure and practices others are more formal. This can cause some confusion and lead to a process of trial and error to reach adjustment (Gulati et al., 2012). The multiple attributes found in coordination show that coordination problems can be tackled in different ways. For instance, Gulati et al. (2012) reviewed three different schools of thought in tackling coordination problems namely; the structural, the institutional and the relational perspective. The structural aspect focuses on mitigating coordination failures through a proper job and organisational design for example standardization of activities, joint venture structure and contracts (Weber, 1974). From an institutional perspective, organisations may also use different coordination techniques without much effort of communication by setting some sort of conventions and values (information sharing, metrics and measurement sub-systems, etc..) (Chwe, 2001). This has been seen in the institutional-led research from ICE for project alliancing namely Project 13 (P13) (ICE,2017) which serves as a handbook for alliancing issued by the Institute of Civil Engineers.
The relational perspective states that inter-organisational coordination is achieved without prior preparation by teams (Gulati et al., 2012). As such, effective interpersonal relationships and unstructured communication and decision-making channels are represented in the capabilities of alliance managers, however, this approach is limited by the cognitive capability of actors and their ability to deal with cultural differences (Gulati et al., 2012). The remedies for coordination problems are contextual and multifaceted imitating the nature of coordination. The flow of information, different structures and procedures, and various cultures impact projects differently and so a viable structure across organisation boundaries is needed to ensure a better understanding of coordination phenomena in inter-organisational interaction while assessing the presence of such attributes, which in turn leads to a positive outcome of coordination.

3.4 Inter-organisational Cooperation

Inter-organisational cooperation is a joint relational effort among several actors to achieve mutual benefit (Söderlund, 2012). Gulati et al. (2012) share a similar view, seeing it as a joint pursuit of agreed goals knowing the contribution and payoffs of different organisations, signalling the willingness to collaborate (Tee et al., 2019). Zeng and Chen (2003) also describe cooperation as the willingness of a partner to maximize the joint interests of the alliance. Cooperation is viewed as a key dimension of inter-partner relations (Ozorhon et al., 2008) and an important factor in overcoming coordination difficulties (Das and Teng, 1998). From a sub-systems integration perspective, cooperation is crucial in managing the complexity and uncertainty of flexible and adaptive processes (Whyte and Davies, 2021). In project-based alliances, the success of projects and alliances can be attributed to good cooperation (Walker et al., 2000) as it is the basis for inter-organisational relationships. Issues of cooperation usually evolve around goals’ incongruence of partners (Han et al., 2019). This makes goal achievement a key aspect in

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15 Project-based alliance is a type of alliance that is usually limited to the delivery of a specific project where organisations involved adjourn when the project objectives are delivered.
determining the outcome of cooperation, that is to say, whether teams or organisations were cooperating or not. Castañer and Oliveira (2020) distinguish between coordination and cooperation from a goal perspective, the former refers to the determination of goals while the latter is concerned with its implementation. Although this can cause some confusion as to whether coordination is just confined to the determination of goals and cooperation in its implementation, the authors argue for three dimensions of attitude, behaviour, and outcomes in explicating cooperation and coordination (Castañer and Oliveira, 2020). The willingness to maximize joint interest (Zeng and Chen, 2003) or collaborate (Tee et al., 2019) highlight an attitudinal dimension. Also, a behavioural dimension is found in cooperation, for instance, Lazard (2000) argues that cooperative behaviour, which relates to a set of actions, leads to win/win situations, thus describing cooperation as a behaviour. Jiang et al. (2018) relate cooperation to the alignment of interests\(^\text{16}\) among partners which also signals a behavioural aspect. Anvuur and Kumaraswamy (2012) suggest cooperation to be referred as to the behaviour that promotes shared projects among parties. Zhang et al. (2018) argue to address cooperation from many dimensions rather than tackling it from a one-dimension construct as previous literature used to do. For instance, the outcome perspective for cooperation is dichotomously self-evident as to say whether the alliance have elements of cooperation or not or whether the team cooperate or not. This is also seen when analysing alliances, as cooperation is usually a key factor in such arrangements (Walker et al., 2000). Having said that, the argument that Castañer and Oliveira (2020) state in terms of dimensions is held true as the notion of cooperation consists of these three dimensions encompassing the view of attitude as a dimension, thus broadening Gulati et al. (2012) framework which was limited solely to behavioural outcomes. Notwithstanding the dimensions set, the authors (Castañer and Oliveira, 2020) have limited the aspects of cooperation to a joint implementation of goals which limits the process of cooperation to the attainment and implementation of a goal. Despite the importance of goal implementation, one cannot detach the notion of goal deliberation from the cooperative

\(^{16}\)Jiang et al. (2018) here adopt Gulati et al. (2012) definition of cooperation as related to alignment of interest.
process as it is inherently a part of it. Further, cooperation is more related to the personal trait of actors which indeed reflect attitude and behaviour dimensions, unlike coordination which can be more mechanistic given the processes and procedures that are put in place.

In alliance projects, the process of goal deliberation can be found in the early involvement of contractors. Further, the goal level can range from a detailed level to achieve a task (Lundin and Söderholm, 1995) to a generic involving strategic objectives. Therefore, in this thesis alliance cooperation is viewed as voluntary attitudes and behaviours of alliance partners and project teams that translate into mechanisms to jointly agree on achieving defined goals and tasks.

3.4.1 Cooperation Attributes

Defined here are the key attributes that lead to good cooperation outcomes in assessing the viability of alliances. These attributes involve behaviour and attitude leading to a positive outcome of cooperation (or affect cooperation). Therefore, these attributes are not limited to just mere characteristics but represent a process involving behaviours and attitudes leading to outcomes. The following Table 3.9 summarizes the key attributes of cooperation.

### Table 3.9 Key Attributes of Inter-organisational Cooperation

<table>
<thead>
<tr>
<th>Literature of inter-organisational Cooperation</th>
<th>Attributes (in terms of attitudes and behaviour)</th>
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<tbody>
<tr>
<td>Gulati et al., (2012); Das &amp; Teng, (1998); Ariño (1997); Vlaar et al., (2007); Jiang et al., 2018; Kujala et al., (2020); Söderlund, (2012); Walker et al., (2002); Parkhe et al. (1993)</td>
<td>Relationships (Attitude &amp; Behaviour)</td>
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<tr>
<td></td>
<td>• Commitment</td>
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<td></td>
<td>• Veracity</td>
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<td>• Respect</td>
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<td></td>
<td>• Good working relationships</td>
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<tr>
<td></td>
<td>• Alignment of purpose and interests</td>
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</table>

17 The voluntary attitudes and behaviours refer to the willingness of the alliance partners and project teams to cooperate and work jointly on defined goals and tasks.

18 Alliance partners refer to the organisations involved in the alliances on a managerial level. While project teams refer to the teams from different organisations that are working in the project.
The attributes presented in the Table 3.9 are related to attitudes and behaviours of good cooperation in alliances. They were grouped under major themes namely relationships, social context, and culture. From a relationship perspective, trust is associated with cooperation problems (Söderlund, 2012). It is considered a key determinant in influencing contractors’ cooperative behaviour (Zhang et al., 2018) and a key success factor in alliances (Yeung et al., 2007). Rousseau et al. (1998) argued that trust can be the result or the cause of cooperation. Trust is deemed an important attribute of cooperation. A handful of cooperation studies show that opportunism may result when trust is not present (Williamson, 1975; Parkhe, 1993; Lui and Ngo, 2004; Poppo et al., 2008; Gulati et al., 2012; You et al., 2020). Commitment is also a characteristic of cooperation and poses a key risk in maintaining cooperative behaviour and attitude (Gulati et al., 2012). Ariño (1997) argued that cooperation involves two key dimensions: commitment and veracity. The state of veracity (being truthful) is also an attribute of good cooperation. Good working relationships are also an attribute of cooperation in relationships as having such

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19 This reference was not found in the previous research of the database mainly because it is still in Press.

20 Trust is viewed as an attitudinal process by which the truster holds a positive attitude towards the trustee’s goodwill (Das and Teng, 1998). Rousseau et al. (1998) view trust as psychological condition that can cause or result from such actions. In this thesis, Trust is seen as an attribute of cooperation while trusting mechanisms are governance mechanisms that lead to trust as an outcome. It is widely acknowledged in the literature that trusting mechanisms are part of relational governance. It must not be confused with the trust as an attribute of cooperative culture.
relationships lead to a positive outcome of cooperation (Walker et al., 2002). Alignment of purpose and interests is also a key attribute in cooperative relationships. According to Das and Teng (1998), cooperation implies the willingness of partners to pursue joint interests. Similarly, Gulati et al. (2012) argue that cooperation is the alignment of interests when distinguishing it from coordination. Salvato et al. (2017) also view the alignment of interests in cooperation as a central feature. From a social context, the norms, reputation, and previous relationships guide the cooperative outcome and are considered determinants of positive cooperation. For instance, the reputation of the contractor can be at stake if opportunism is shown. This is also known as an important remedy for tackling cooperation problems (Gulati et al., 2012). From a cultural perspective, shared values, no blame, collective understanding, joint problem-solving, and learning are considered crucial attributes of cooperation and play a great role in leading to positive cooperative outcomes. For instance, Hietajärvi et al. (2017) found that cooperative culture was strengthened through common identity and shared values culture in a railway project. No-blame culture is considered a key driver of collaboration (Lloyd-Walker et al., 2014). Similarly to coordination, the multiplicity of cooperation attributes reasserts Gulati et al. (2012) review of cooperation remedies. The authors discussed three schools of thought in tackling cooperation failures; the economic perspective through transaction cost economics advocates for an assessment of characteristics of the alliance to determine the level of opportunism and the relevant response to it; the social-structural perspective (sociology) posits the notion that any economic activity is shaped and redirected by the social context and norms (Coleman, 1988), as a result, social pressures through reputational damage can limit the gains from opportunism; and finally, the social psychology which maintains that trust-based perspective leads partners not to behave opportunistically (or not cooperate) simply because their internal values systems would not permit them to do so even if they have the ability to do it (Barney and Hansen, 1994 cited in Gulati et al., 2012). Finally, as mentioned earlier, the remedies of cooperation are multifaceted as their attributes depict the real nature of cooperation. As such, relationships, social context, and culture are part of cooperation and influence its outcomes in inter-organisational settings. Therefore, it is important to have a viable structure that stratifies cooperation attributes against partner
boundaries allowing for a better understanding of cooperation phenomena across inter-
organisational interaction, while assessing the presence of such attributes which in turn
lead to positive outcomes of cooperation.
3.5 Inter-organisational Governance

It is worth looking towards governance in alliances as a mean to achieve cooperation and coordination among project organisations while maintaining the set of procedures and regulations among involved organisations. Inter-organisational governance is distinguished into two streams namely contractual and relational (Roehrich et al., 2020; Cao and Lumineau 2015; Poppo and Zenger, 2002). Contractual governance refers to the safeguarding and control mechanisms that are accompanied with contracts. However, relational governance is related to informal social mechanisms and is usually manifested in socially derived arrangements (Roerich et al., 2020). This highlights the structural and relational aspect of governance which is subsequently manifested in coordination and cooperation.

Referring to scholars in the project governance literature which usually operates on a hybrid approach between markets and hierarchies (Sydow and Braun, 2018), there is also a link between cooperation and coordination and the choice of governance structure (Turner and Simister, 2001; Winch, 2006). To be able to align the interests of several organisational actors towards a common goal, a governance structure is needed to ensure adequate coordination, safeguarding and control mechanism (Ahola et al., 2014). Further, in the alliance context, the contract binds all organisations to work together under risk/reward-sharing mechanisms. This is an essential element in alliances and serves to govern the relationships accordingly. As such, it safeguards against the rise of opportunism among organisations. Nonetheless, the interplay between the choice of contract which is perceived to be the structural perspective, and the relational perspective of governance, which focuses more on the relationship and trust among organisations, influence the cooperation and coordination of these organisations (Zajac and Olsen, 1993; Jefferies and Reed, 2000; Faem et al., 2008). Particularly in alliance governance, the aim is to tackle the problems of cooperation and coordination. In strategic alliances, for example, formal and relational governance are used to reduce the degree of opportunistic behaviour of the actors.
Scholars in the field of project-based governance and general governance provide different definitions (Ahola et al., 2014). Project governance is divided into two major themes. The first is external to the project giving some perception of the project-based firms or institutions and their governance, and its relation to the project. The other is internal to the project making the governance within “the project” context (Turner and Simister, 2001; Engwall, 2003). By way of an example of external governance, the Association of Project Management (APM) states that "Governance refers to the set of policies, regulations, functions, processes, procedures and responsibilities that define the establishment, management and control of projects, programmes and portfolios” (APM, 2012, p.3). The first stream of literature adopts project governance as an external and unidirectional application from project-based firms towards the focal project (Ahola et al., 2014). This view has focused on defining standards/rules and that those projects should comply and be monitored according to these rules (Turner, 2006; Müller and Stawicki, 2007; Williams et al., 2010).

The second stream follows an internal approach to governance. Here the focus of project governance is to make sure that the project meets the goals and expectations of various stakeholders (Ahola et al., 2014). In this stream, the project is seen as a powerful organisational actor that can set the “rules of the game” (Ahola et al., 2014). Rather than focusing on the parent organisation, here the focus is on the temporary organisation that is planning and delivering the project. For example, Turner and Simister (2001) stated that governing projects are about aligning participating firms to work together for shared goals. Winch (2006) stated that the selection of project governance is influenced by the behaviour of involved firms. Other research discussed the synchronization between different activities of many firms in a large project (Reve and Levitt, 1984; Brady et al., 2007). Figure 3.3 depicts both streams external and internal.
Furthermore, the governance theories found in the literature seem to be multifaceted in nature and tackle different aspects of governance ranging from opportunism to stakeholder engagement. This results in a dispersed view of governance and a multiplicity of dimensions where governance mechanisms can be applied (Kujala et al., 2020). Therefore, it is worth looking into some theories of governance and their dimensions.

3.5.1 Governance Mechanisms

As seen earlier the multiple theories in governance result in viewing governance from different dimensions. This in turn can be manifested in mechanisms of governance. Further, the concept of mechanisms was used earlier when discussing cooperation and coordination. Having said that, it is worth elaborating on such concept. Mechanisms share four main characteristics: a phenomenon, parts, causing and organisation (Craver and Tabery, 2019). Illari and Williamson (2012) defined “a mechanism for a phenomenon consists of entities and activities organized in such a way that they are responsible for the phenomenon.” (Illari and Williamson, 2012, p.120). In this research, the author adopts Illari and Williamson’s concept of mechanism as they relate the mechanism to a phenomenon (i.e. explaining a certain behaviour) which involves activities that are
important if one needs to identify governance mechanisms (i.e. resource allocation is an activity which is part of governance mechanism and follows resource dependent theory). Also, the organisation refers to the relation between such activities and entities which produce the phenomenon (Illari and Williamson, 2012). The organisation can take different forms and includes spatial and temporal organising (Craver and Tebery, 2019). Such an element is important in this study as it epitomizes the contextual aspect of projects and alliances (temporal organising). Nonetheless, mechanisms can be multileveled\(^{21}\) as their activities can show on different levels (Craver and Tebery, 2019). Further, the principle of causations or responsibility for a phenomenon is important to acknowledge especially when it comes to governance as many governance mechanisms influence the project teams including but not limited to coordination and safeguarding exchanges (Williamson, 1979); Trust (Olsen et al., 2005); and motivation (de Man and Roijakkers, 2009). Now that the concept of mechanism is clarified, governance mechanisms can now be identified from the literature and elaborated.

As mentioned earlier, most governance mechanisms in the alliance literature can be classified under two main streams: structural or hard and relational or soft. Such streams are often seen as complementary (Poppo and Zenger, 2002). Hard mechanisms refer to the mechanisms that deal with governance as a formal control, rules, regulation, and any structural arrangements and they are mostly related to contracts. Soft mechanisms are more relational aspects of governance referring to inter-organisational relationships including leadership and stakeholder engagement. Kujala et al. (2020) have listed the governance mechanisms as seen in Figure 3.4 found in the inter-organisational project networks. They have grouped these under key governance dimensions namely, goal setting, rewarding, monitoring, coordination, roles and decision-making, and capability building (Kujala et al.,

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\(^{21}\) This concept is important as will be seen later in the analysis how mechanisms represent different activities in different systems across different units. As such mechanistic explanation can be at different levels hierarchical and non-hierarchical depending on the choice of an explanation and the presuppositions of the explanatory context (Bechtel, 2009)
2020). Such classification gives a nuanced view of governance that goes beyond merely contractual mechanisms to include diverse perspectives. The authors have scrutinized the literature on inter-organisational project governance and noted these mechanisms. It is therefore worth noting these mechanisms individually which were based on a quasi-systematic literature review of governance. Hence, this provides an encompassing view of governance in projects.

For **goal setting**, it is widely known that **goal** mechanisms are important governance mechanisms especially when it comes to alliancing (Yeung et al., 2007). For instance, goal sharing and articulation are key mechanisms for ensuring that participating organisations are working towards the same objective (Ahola, 2018). Such mechanisms are seen to affect cooperative behaviour as their applicability leads to an outcome of alignment and purpose. In the same vein, **incentive** mechanisms throughout the project contribute to the alignment
of goals\textsuperscript{22}. Such mechanisms are widely acknowledged in alliances (Yeung et al., 2007; Love et al., 2010; Sanderson, 2012).

However, when it comes to risk, it should not be viewed as only related to just reward dimensions but also as a mechanism on its own due to its wide applicability across organisations. For instance, risk formation (Xiang et al, 2012) and joint risk management (Rahman and Kumaraswamy, 2004) are also considered mechanisms which are not viewed as “rewarding”. Ownership structure is also considered a mechanism to provide some sense of ownership to participating organisations whether through a stake in the asset (Sanderson, 2012). This also concurs with reputation and future business which incentivize organisations towards working for a joint objective.

Monitoring\textsuperscript{23} mechanisms are important when it comes to controlling and overseeing projects. Such mechanisms ensure the progress of the project and are generally used in concurrence with the contract (Ahola et al., 2014; Kujala et al., 2020). These mechanisms include auditing, performance measurement sub-systems and key performance indicators (Ahola et al., 2014; Reve and Levitt, 1984).

When it comes to the coordination dimension, Kujala et al. (2020) posit it as a dimension of governance. It may be so as the authors mostly reflect the contractual coordination mechanisms. Ahola et al. (2014) argue that the governance structure consists of coordination and control in addition to safeguarding mechanisms. However, the authors did not emphasize that such a dimension is solely confined to governance. This is also found when tackling coordination in section 3.3.1 where most alliance literature emphasizes the importance of coordination as a parameter in alliance settings (Whang, ...

\textsuperscript{22} Alignment of goals can be seen as a sub-mechanism for goal mechanisms. However, to avoid confusion and following Illari and Williamson (2012) definition I have opted to include it here due to how mechanisms involve different level of organising.

\textsuperscript{23} This is often seen as a part of control mechanisms.
Having said that these mechanisms are seen as coordination mechanisms on their own in an alliance context (Gulati et al., 2012; Castañer and Oliveira, 2020).

Furthermore, roles and decision-making dimensions are key aspects of project and corporate governance. In fact, such dimension is self-explanatory in governance and most governance definitions and principles incorporate it (Turnbull, 1997; OECD, 2004; APM, 2012). **Roles and responsibilities definition** is usually defined and used within the governance structure and are considered key mechanisms when it comes to governance. Additionally, as mentioned by Kujala et al. (2020) **management structure** and **decision-making authority** are also part of governance mechanisms. These mechanisms usually go hand in hand together for the management structure incorporates decision-making hierarchy. Leadership mechanisms are also linked to management structure mechanisms which mainly are represented by project managers or project leadership teams who are responsible for the governance of the project (Kujala et al., 2020; Chen et al., 2012). Lastly, the authors added the dimension of capability building which includes **actor selection** and **training and continuous learning**. Actor selection or contractor/designer selection is usually manifested in the tendering process through procurement (Manley and Hampson, 2000; Olsen et al., 2005; Ruuska et al., 2011).

Although Kujala et al. (2020) presented an exhaustive list of governance mechanisms, there are still some mechanisms that weren’t identified. **Resource allocation** for example is also a key mechanism in governance which is influenced by contractual terms (Williamson, 2002; Crawford et al., 2008; Winch, 2006; Müller, 2011). **Stakeholder-oriented** mechanisms are also key aspects of governance following stakeholder theory (Derakhshan et al., 2019; Müller et al., 2014). For instance, Müller et al. (2016) argue that governance and the mechanisms adopted can influence the engagement of stakeholders and their trust. **Objectives articulation and alignment** with the overall strategy are also considered to be mechanisms of governance (Derakhshan et al., 2018). Conspicuously most project governance definitions share the view of alignment of objectives to suit organisational strategy (Biesenthal and Wilden, 2014).
Although this section has presented an exhaustive list of governance mechanisms, it still does not depict where and how such mechanisms are employed. That being said, it is critical to explore governance mechanisms in inter-organisational settings and their relation to cooperation and coordination especially that the concoction of different mechanisms appears to be spread across these units (governance, cooperation and coordination). Furthermore, understanding such mechanisms and their effects would serve to enhance the governability of alliances and provide a framework for their operation.

3.6 Towards an Integrated Governance Framework that Involves Cooperation and Coordination in Alliances

Some scholars in corporate and alliance governance have considered an integrative approach when it comes to governance. Sundaramurthy and Lewis (2003) for example advocated moving beyond the either/or thinking and argued for both control and collaborative structures corresponding to agency and stewardship theory. Such endeavour aims to provide a theory that incorporates different theoretical perspectives and addresses human limitations while highlighting the control and collaboration needs (Sundaramurthy and Lewis, 2003). The authors argued that the firm’s lifecycle and its environment may influence the interplay between control and collaboration, recommending a more dynamic approach to governance without preference for one theory over the other (Sundaramurthy and Lewis, 2003). Another integrative approach stemmed from the alliancing governance literature where Faems et al. (2008) discussed the interaction between relational (namely social exchange theory) and structural aspects (transaction cost economics). The authors argued that previous research tried to link the structural aspects and relational processes provided inconsistent results some of which were due to their lack of exploring the evolution of relational processes at the managerial and operational level (Faems et al., 2008). Indeed, the interplay of relational and structural aspects has also been discussed by Gulati et al. (2012) showing the paradigm shift towards a dynamic view of cooperation and coordination of alliances, that is the interchange of focus between cooperation and coordination during the lifecycle of alliances.
Ahola et al. (2014) argued that project-based firms are involved in many significant economic multi-transactions that impact their governance. Zajac and Olsen (1993) see transaction costs for vertical integration as focused on a single firm neglecting the interdependence of involved parties contributing to joint value while suggesting a transactional value framework that depicts inter-organisational dynamics and addressing their joint value maximization. The focus is shifted towards inter-organisational exchange processes that are often subjected to change. Therefore, this suggests richer governance forms which are not focused only on the structural aspect but also on developmental processes depicting the inter-organisational strategies over time (Zajac and Olsen, 1993).

Governance mechanisms seem to affect cooperation behaviours and attitudes. Contract governance mechanisms are considered to be effective in promoting cooperation and limiting opportunism (Poppo and Zenger, 2002). For instance, Hietajärvi et al. (2017) argued that multiparty alliance contracts shed light on collaboration, behavioural commitment and no blame in the aim to reach shared goals. Further, Jost et al. (2005) have found that alignment of objectives appears to be crucial activity resulting in constructive cooperation which fosters trust as an outcome. By the same token, trust also facilitates the determination of a common goal. In their study of two cases in the oil and gas industry, Olsen et al. (2005) emphasized the role of pre-existing trust (trust at the outset) in paving the way for an effective incentive scheme and a conductive authority structure (governance mechanisms) which in turn reinforced trust among parties, leading to positive outcomes. The other case, however, had low trust levels at the outset and that affected the implementation of incentive and authority structure. This in turn resulted in opportunistic behaviour and negative project outcome. However, Caniëls et al. (2012) have found in their case study that trust can lead to a positive outcome when it is accompanied by governance mechanisms (contractual incentives and control sub-systems) and argued that trust alone cannot guarantee such an outcome. They added that different governance mechanisms are mutually dependent and there should be a need to employ a mix of these rather than one in isolation.
Similarly, from a coordination perspective, the governance mechanisms of inter-organisational settings also influence coordination and vice versa. For example, Gulati et al. (2005) emphasized the role of governance in achieving better coordination for alliance actors. In the same vein, You et al. (2018) argue that despite the presence of full cooperation there should be a need for coordination in which contract mechanisms can play a role in promoting efficiency and effectiveness. This can be through the employment of mechanisms that enhance communication, clarify expectations, and assign tasks (You et al., 2018). Additionally, it is seen that the objectives required from the alliance can also dictate the structure and process interaction among partners (White and Lui, 2005).

It is also found that successful cooperation necessitates that partners can communicate and have a clear inter-organisational interface (White and Lui, 2005). Further, Zhang et al. (2018) argue that designing contract mechanisms and focusing more on the coordination elements of it can improve contractors’ in-role behaviour. While the literature has explored the relationship between governance, cooperation, and coordination, it remains ambiguous. These concepts have often been addressed separately in both general and project management literature streams, or their interaction has not been clearly elucidated in existing studies. How these three constructs interact and to what extent they can affect each other, and the overall alliances is still a question.

Further, most of the studies of governance mechanisms are limited to dyadic relationships (Ahola et al., 2014; Lumineau and Oliveira, 2018; Roerich et al., 2020) rather than the network boundaries, especially when it comes to different levels of organisations (i.e. the governance mechanisms of the Owner-Contractor are different from contractor-supplier or owner-supplier and so on). Let alone, how are such mechanisms and behaviours different from one inter-organisational boundary to another.

In conclusion, as seen above there is a shift towards a more dynamic approach in project governance across its timeline. Nevertheless, the multifaceted and complex nature of the project and the different governance theories require an approach of adaptation and control when necessary, that makes use of theories according to their suitability of the situation at hand. Especially in the case of alliances where there is a mixture of structural
(contract) and relational elements (such as trust), making one theory of governance not adequate enough to bind the alliance together and account for different types of risks. This is especially the case when it comes to governance mechanisms and their influence on cooperation and coordination. It is found that also cooperation and coordination in addition to governance exert reciprocity in influence and cannot be detangled, which in turn posits the need to address them altogether. This makes the study of governance way beyond a duo relationship of trust and contract as seen in different literature.

3.7 Summary of Governance, Cooperation, and Coordination in Inter-organisational Projects

This chapter has reviewed the literature on cooperation, coordination and governance. First, it tackled what is meant by cooperation and coordination, what their key attributes are and how they are achieved. Second, it discussed the governance perception in projects and provided two different perspectives, one that is project specific (internal) and the other external as being part of a portfolio of projects. This shows the multitude nature of governance, cooperation and coordination. Further, the chapter tackled different governance mechanisms under the generics of contractual and relational dimensions. The chapter ended by highlighting the interrelationship among governance, cooperation and coordination and the need for their relationship to be addressed altogether across inter-organisational boundaries while arguing towards an encompassing view of the alliance network. The following chapter discusses the theoretical framing of this study through the systems lens.
Chapter 4. Systems theory, Cybernetics and Viable System Model

Chapter four reviews the literature on systems theory, Cybernetics, and viable system model (VSM). First, sub-systems theory and how it emerged to be important in the field of project management are discussed. Later, concepts of systems theory which are important for understanding inter-organisational settings such as alliances are tackled. Subsequently, an overview of Cybernetics that stems from systems theory. Further, the viable system model has its origin rooted in management Cybernetics, which is elaborated on as a framework throughout this study. Lastly, the use of VSM is justified against the research question to be used as a methodological approach towards assessment and understanding of the interplay of governance, cooperation and coordination across multi-levels.

4.1 Project Management as Systems Integration

Modern Project management emerged to be underpinned by systems theory. Systems theory has been and still is a strong foundation in the field of project management with many contributions (Cleland and King, 1975; Checkland, 1989; Senge, 1990; Yeo, 1993). Since the 1950s sub-systems integration developed by the US Air Force was the main focus of project management (Morris, 2011). Later, the development of planning tools and techniques, such as work breakdown structure (WBS) has become an iconic symbol of project and program management in what is called sub-systems engineering (Morris, 2011).

Kerzner (2017) defines a system as: “A group of elements, either human or nonhuman, that is organized and arranged in such a way that the elements can act as a whole toward achieving some common goal or objective.” (Kerzner, 2017, p.45). Cambridge Dictionary defines a system as: “a set of connected things or devices that operate together” (Cambridge University Press, n.d.). According to Meadows (2008), sub-systems consist of three things; elements (the parts),
interconnections (the interaction of the elements or parts), and a function or purpose. Checkland (1981) states systems concept comprises an adaptive whole in a changing environment with processes of communication and control, a layered structure and an entity with emergent properties. The nature of a system can be biological, social, psychological, technological, political, and economic.

Organisations are also considered social systems consisting of groups of individuals (Checkland, 1981). For example, Rouse (2005) argues that organisations are considered as systems and supply chains as sub-systems of systems. This view corroborates with what systems consist of; elements (departments of organisations), interconnection (the interaction and coordination between these departments) and a purpose (i.e., making a profit). In the same vein, inter-organisational settings namely alliances and IOPs also exhibit these attributes and can be considered as systems. For instance, IOPs consist of multiple organisations joining forces to work on a set of deliverables.

The emergence of systems thinking in project management is attributed to the technological race since the Manhattan Project and later to the Atlas Intercontinental Ballistic Missile Program (Johnson, 2002) where a lot of integration of systems occurred. Infrastructure projects also involve systems integration (Davies and Mackenzie, 2014) as they consist of a vast number of activities needed to be integrated in order to reach the project objective. Integrating a set of activities involving many stakeholders and networks of organizations, with different goals come together to work on a project. Therefore, a systems integrator should have the ability to understand the components and interfaces that work together in the whole system (Davies and Mackenzie, 2014). Essentially, that is most of the work of a project manager (Cleland and King, 1975; Morris, 1994).

Infrastructure projects are overly complex (Flyvbjerg et al., 2003; Morris and Hough, 1989; Williams, 2002), especially that many organisations are involved in a temporary setting working together to achieve project objectives (outputs and outcomes). Hence, this requires effective systems integration. In analysing projects, such arrangements cannot be seen through the lens of one organisation nor as a hierarchy of organisations that are analysed apart, and a holistic approach is needed to be able to provide an enriched
analysis of their interfaces and interactions. Not to mention, the nature of projects is inherently inter-organisational in most cases if not always (Sydow and Braun, 2018). For example, it is required that a network of suppliers is integrated by a large organisation (i.e., contractor, JV) based on a bureaucratic process to control and manage the work for an airport project (Davies and Mackenzie, 2014). Systems represent a common ground for analysing governance, cooperation and coordination as systems theory aims to understand the dynamics of its components and its interfaces. Therefore, the emergence of properties of the whole system is derived from the relationships between its parts (Ackoff, 1971). It is worth noting that systems can be modelled subjectively as to suit the particular configuration of elements laid down by the researcher (Ackoff, 1971). Sheffield et al. (2012) mentioned that the project can be illustrated as a complex multi-loop non-linear social system where human actors have a strong impact on decision-making. As such, systems can be modelled in terms of activities and processes or in terms of organisations. In this thesis, the system is considered to be a set of organisations interacting with one another in a temporary network alliance for achieving project objectives. Cybernetics, a science that emerged from systems theory, could provide an underpinning for a more viable theoretical framework.

4.2 Cybernetics in Project Management

This section highlights the use of Cybernetics in project management and sheds light on how it was applied in that field. That being said, this section shows the different applications of Cybernetics concepts in project management literature which has helped in guiding the merging of theoretical framework with the units of analysis. Cybernetics stems from the general systems theory and is concerned with how any system is operated (Robb, 1984). Essentially, cybernetics studies the behaviour of the system rather than the system itself (Ashby, 1956) which analyse how systems work and ensure its stability, that is maintaining and attaining equilibrium. It is often known to be more related to control, for example, the thermostat which controls the room temperature is a cybernetic system (Glanville, 2004).
Cybernetics originated from the Greek word “Kibernetes” which means the “art of steering” and evokes the interaction of actions, goals, feedback, predictions and response in any system (Wiener, 1948). The term “governor” is also derived from the same root (Wiener, 1948). Cybernetics or control and communication as described and coined by Wiener (1948) is a field of study that is trans and inter-disciplinary (Beer, 2002; Pickering, 2015) which touches on established disciplines such as electrical engineering, mathematics, biology, neurophysiology, anthropology, psychology and management. It attempts to find the common components in the functioning automatic machines, the nervous system and viability (Wiener, 1948). Some examples of cybernetics properties that relate to viability include homeostasis and autopoiesis. Homeostasis is a mechanism whereby the capacity of the system to hold against perturbation such as glucose concentration in the blood. While autopoiesis is concerned with autonomy. Other cybernetics properties and laws are shown in the Table 4.1 below

Table 4.1 Cybernetics properties

<table>
<thead>
<tr>
<th>Cybernetics properties</th>
<th>Definitions, Laws and concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety</td>
<td>• The number of possible states the system can exhibit</td>
</tr>
<tr>
<td></td>
<td>• Law of requisite variety which states that in order to control the system the variety of controller should be at least the variety of what is being controlled</td>
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</table>
**circularity and feedback**

Circularity and feedback related. Circularity means that both the system and the controller are in a continuous circular process. This circular process involves feedback which allow the controller to adjust the behavior to achieve stability.

**Purposeful systems**

Systems that have goals and purpose.

**Homeostasis**

The capacity of the system to hold against perturbation i.e. glucose concentration in the blood.

**Black box**

One can invoke the black box to disregard the properties of the system and focus on its behavior to perturbations.

**Autopoiesis**

Self-producing – autonomy.

Management cybernetics is a field of study that applies principles from cybernetics to manage and control complex systems. While management cybernetics and the field of project management both originated around the same time, with project management evolving from operational research and systems thinking (Morris, 2012), there is a notable scarcity of studies that have explored the application of cybernetics principles in project management. For instance, a classic work in project management, "System Thinking and Analysis" by Cleland and King, does not make any reference to cybernetics properties (Morris, 2012). Nevertheless, some scholars have attempted to apply management cybernetics to the field of project management mainly after the 1990s in the information technology (IT) sector (Britton and Park, 1993; Tanaka, 2013; Bathallath et al., 2016; Sisti, 2017). In the oil and gas sector, a PhD study investigated the application of the viable system model (VSM) on a project-based organisation as an infrastructure delivery system to assess the viability and implementation of socioeconomic benefits (Awuzie, 2014), which was more focused on infrastructure projects. Additionally, a new study in modelling
organisation project management (OPM) and megaprojects adopted a cybernetics approach to governance through the application of VSM (Müller et al., 2021).

### 4.3 Viable System Model

The Viable System Model is used in this study as a framework to guide the analysis of this study. It is used to conceptualise IOPs and to aid in analysing governance, cooperation and coordination across inter-organisational boundaries. The viable system model (VSM) was developed by Stafford Beer (1981) as a model to assess the viability of organizations, advocating for a non-hierarchical structure of the organisation while assuring the stability of the organization. Beer aimed to apply the laws founded in viable systems particularly those related to the human body and its nervous system (controller), to give an understanding of how social systems are able to maintain an independent existence (Jackson, 1988). Some of these laws and properties of viability is discussed in Table 4.1 such as homeostasis and autopoiesis.
Figure 4.1 Viable System Model Showing Recursive Embedment (Beer, 1984)
4.3.1 Concept of Viability

It is important to address the concept of viability by which the VSM is relying and what it means in this thesis context. The concept of viability has gained importance in social sciences particularly when it was linked to social systems despite the metaphorical adoption of this concept (Schwaninger, 2006). According to Cambridge Dictionary, Viability is defined as being “able to work as intended or able to succeed” (Cambridge University Press, n.d.). Beer argues that viability is a common long-term goal for organizations and in the case of temporary organisations long enough to achieve the intended purposes (Leonard and Beer, 1994). Therefore, in this thesis, the term viability in alliances is aligned with the purpose of the alliance which aims to achieve its intended purposes which are; improving cooperation and coordination, and achieving project objectives and outcomes. This is directly aligned with the performance of alliances which is described in the cases.

Viability has been adopted metaphorically depicting the laws of viability in management science. According to Schwaninger (2006), the most comprehensive models and concepts of viability are those of Miller's living system theory and Beer of viable system model (Miller, 1978; Beer, 1984). This thesis does not aim to compare or analyse other concepts of viability that are tackled in other disciplines such as biology or physics as it is outside the scope of the research aims and objectives.

Further, such independence should be also able to respond to environmental changes (i.e., temperature changes) although changes may not be predictable by the time the system is formed (Jackson, 1988). To do that, the system should be adaptable to threats and opportunities in a way of achieving the requisite variety to maintain viability. Moreover, to be viable is to be adaptable, and such adaptability in governance is essential as seen earlier that a single governance theory cannot cover all the aspects and challenges of the project especially that situations keep on changing in large complex projects (Sanderson, 2012) and such projects are subjected to a long timeline. In this thesis, viability
is seen in terms of performance which is also measured in terms of governance, cooperation and coordination.

4.3.2 The Five Sub-systems of The VSM

There are five necessary sub-systems found in any organism or organization, that are able to maintain its identity and viability with other organisms within a shared environment (Beer, 1984). The model poses itself to be recursive so each subsystem is embedded with one another. This is shown in Figure 4.1 of sub-systems displayed at a 45-degree angle. That being said, the sub-systems elaborated on will represent the key characteristics relating to governance, cooperation and coordination.

These five sub-systems make up the VSM. The five sub-systems features of the VSM are summarized:

- **Sub-system 1– S1**: consists of various operational units which execute organisation’s duties (Flood and Zambuni, 1990) and produce (i.e. citizens, firms, cities and industries). These units operate in autonomy within the limits of keeping systemic coherence and with direct interaction with the environment (Medina, 2006; Hildebrand and Bodhanya, 2015). The element of control in this sub-system is based on the detection of a pattern of achievement that can be reported through sub-system Two to the organization (Beer, 1981). In project alliances and IPOs sub-system 1 consists of the suppliers, contractors and consultants that provide services for the project, in other words, doing the actual work. It can be also subcontractors or tier 2 contractors. This is aligned with the description of Beer on sub-system 1 as such sub-systems are viable themselves and able to operate independently and interact with their own environments (Leonard, 2009). For example, suppliers/subcontractors/tier 2 contractors have their own business which is independent of the project. As seen in Figure 4.1, sub-system 1 is depicted in a form of a circle and a square. The circle represents the operative parts of sub-system 1 and the square is comprised of the management of these operative parts. It is worth
noting that each sub-system 1 is considered to have sub-systems on a second level of recursion, that is, the sub-system internal structure is also considered to be a viable system on its own. A set of Russian dolls can be an analogy for recursion (Leonard, 2009). Hitherto, sub-system one operates within autonomy to a certain extent. However, it still operates with some managerial constraints according to Beer (1984). Such constraints are threefold; first the operation with the intention of the whole organism which here is the purpose of delivering the project and operating under the ethos of collaboration. Second, its operation within the framework of sub-system 2, which serves the function of coordination among other sub-systems 1 to smooth the work process and enhance the collaboration of these sub-systems 1. The last managerial constraint is that this sub-system is also subjected to the automatic control of sub-system 3 which ensures the corporate synergy. As Beer (1984) puts it, the needs of one division may be sacrificed to the needs of another if a corporate synergy is to be achieved. In other words, a division may be seen as ineffective for the whole corporation and the resources of that division may be shifted to others to maintain synergy and viability of the organization.

- **Sub-system 2 – S2**: acts as a coordination system and a guarantor of the harmonic functioning of sub-system 1 (organizational units) which ensures the synergy of these units (Ríos, 2012). It coordinates the operations of the operational units and prevents uncontrolled oscillations (fluctuations) from happening (Beer, 1981). Uncontrolled oscillations can be in the form of supply chain disruptions or demand fluctuations. The main goal of S2 is to cut down the variety of its operational interaction which are inherently oscillatory (Beer, 1979). For example, sub-system 2 controls the disputes over resources that happen between the operational units. Sub-system 2 also deals with the transmission of filtered information to sub-system 3 (Ríos, 2012). Essentially sub-system 2 serves as an interlink of sub-system 1 divisions, coordinating their value-adding interfaces and their related operations (Espejo and Gill, 1997). Indeed, managing interdependence is part of the
coordination function (Puranam and Raveendran, 2012). As seen earlier in Chapter 3, failing to coordinate can be through bounded rationality (March and Simon, 1993), culture differences (Berends et al., 2011) or different structures and routines (Gulati et al., 2012). Essentially, as sub-system 2 serves the purpose of coordination, the main functions that this system carries out in the project management context are scheduling, articulating standards, quality audit, information processing and coordination (Britton and Parker, 1993). A well-structured system plays an important role in assuring the smooth flow of the work particularly for construction projects where coordination problems arise and are considered to be one of the causes of delays (Alaghbari et al., 2007; Söderlund, 2012; Gulati et al., 2012). Further to this, sub-system 2 is presented in Figure 4.1 to be a coordination system for each supplier (S1), and in a higher order, in what is called to be the corporate regulatory centre which has the function of monitoring, coordinating other divisional sub-systems 2, and an input filter to sub-system 3 (Beer, 1981). Sub-system 2 is consistent with the work of advisors (consultants/project management/site supervisors) who oversees and coordinate the work however it also can be part of the function of the integrator to coordinate the work and monitor it.\textsuperscript{24}

- **System 3 – S3**: is described by Beer (1981) to be the highest level of autonomic management and the lowest level of corporate management. It governs the stability of the internal environment of the organization. In other words, S3 is intended to keep a homeostatic internal balance and optimize performance under certain criteria and within an agreed framework (Beer, 1981). S3 has two main responsibilities; one with relation to the internal environment which ensures its homeostatic stability (the stability of work done by the suppliers for example), and the other with relation

\textsuperscript{24} The organisation(s) assuming the role of sub-systems depends on the functionality that the organization assume and exhibits. Therefore, it is not fixed to one specific kind of organisation(s) rather than what the organisation(s) is doing. For instance, S3\textsuperscript{*} has an audit function which means any organisation(s) performing the audit are considered to be part of this sub-system.
to the higher management or corporate management (in this case with the owner board or alliance board). With these two responsibilities come the communication channels transmitting information in which the sub-system manifests its cohesive operation. According to Beer (1981), S3 transmits policy and instructions to the suppliers while also processing some information on their part that may need either control by S3 itself or by the owner or alliance board. There is also direct control coming from the system to the operational units (suppliers) regarding managing the work and resources and finally receiving direct information from the operational units. Ríos (2012) described the role played by sub-system 3 to include; communicating the aims, purpose and policies of the overall organization (i.e. in alliances case this can be articulating the cooperation culture among suppliers), receiving information regarding the status of internal organisation and this includes an algedonic node – that is a warning signal or alarm system which transfer the information to higher level sub-system in the case of extreme risk, modifying objectives, changes needed, and resource bargaining. Britton and Parker (1993) stated that in project management, S3 can act as a controller of the ongoing activities including cost budget and scope control, in addition to already stated roles. In some cases, such work and role are carried out by a project management office which oversees and integrate the work of suppliers.

- **Sub-system 3* – S3*: As per the VSM, S3* acts as a support sub-system for sub-system 3 getting the information from sub-system 1, that is any information that does not follow the normal channel of communication (Ríos, 2012). In other words, S3* acts as an auditor, to some extent independent, aiming to ensure that the information transmitted to sub-system 3 is complete (Ríos, 2012). Some of S3* activities include quality audits, surveys, operational research, and compliance with accounting procedures. Here, integrator, client, and advisor may all be involved in quality audits and checks depicted in sub-system 3*. This functionality would be carried out by the owner/client and consultants themselves or by the integrator.
• **Sub-system 4 – S4:** described by Beer (1981, p.181) to be the “development directorate of the firm”. It is also known to be the intelligence part of the organization (Müller et al., 2021). It provides all the necessary information to sub-system 5, the highest level of decision-making (Beer, 1981). S4 acts as a switch between S3 and S5, where a stream of instructions descend from S5 to S3 (Beer, 1981). Also, another stream of filtered information about the autonomic conditions of S1 is transferred from S3 to S5. Additionally, S4 is also connected to the outside world (the total environment of the enterprise) and the future by gathering information about the total environment and sending it as input to S5 (Beer, 1981). In other words, S4 is concerned with the future and external environment which is described by Beer as “outside and then” level (Beer, 1979). Accordingly, S4 is fundamental to adaptivity in the sense that firstly it interacts with the environments with regards to the market conditions, technological changes and all other factors that are relevant to the future; and secondly, it conveys the identity of the organization and its message into the environment (Espejo and Gill, 1997). Sufficient to say that the future and external environments are the main responsibilities of S4 (Ríos, 2012). Some of the activities of S4 include; market research, scenario analysis, simulation modelling, operational room to make strategic and operational decisions, and innovation (Ríos, 2012). S4 usually reduces the variety of S3 by absorbing alternatives (Beer, 1979). Some of these elements that allow for changes in variety include; Research and Development (R&D), corporate planning and economic forecasting (Beer, 1979). The functions of S4 require the integrator, advisor and client to work together in this system. In fact, Beer (1981) acknowledged that S4 may be spread across the organisation rather than being a cohesive and well-formulated model. Although, S4 is not always specified it is always found in the activities being undertaken and fed back to the decision-makers (Beer, 1981). Such activities in projects may also include change requests, purchasing and contracts, financing planning and scope control and requests (Britton and Parker, 1993). It is where all the future planning work happens. Here it should be noted that the interaction of S4 and other sub-systems is not
limited to S3 and S4, but also in some instances to S1 as there is a communication channel linking S4 to S1 as seen in Figure 4.1.

- **Sub-system 5 – S5**: The highest decision-making entity of the organisation which forms the policy of the other organisational units (Beer, 1981). S5 handles the variety stemming from S3 and S4, it acts as a balance between the other two sub-systems (Beer, 1981). In other words, any issues that stem between S3 and S4 are tackled by S5. According to Beer (1981), S5 monitors the regulatory machinery ensuring that it does not have an uncontrolled oscillation. S5 can be representatives of management, shareholders, and investors (Ríos, 2012). In short, S5 represents the identity of the enterprise and those responsible for setting out such identity. Here, it should be noted that the notion of closure is embraceable by any given level of recursion (Beer, 1979). In any viable system, S5 acts as an administrator of Ashby’s law25 (Beer, 1979). Ashby’s law of requisite variety states

  Accordingly, the main role of S5 is to provide the overall direction of the organization while laying down its values and purpose (Espejo and Gill, 1997). Some of the activities and responsibilities of S5 include determining the vision, mission and strategic goals of the organisation, monitoring organisation stability and internal equilibrium, ensuring that the organization maintains its identity and managing stakeholders (Ríos, 2012). From a project perspective, S5 can serve the function of defining project organisation objectives, policies, and procedures (Britton and Parker, 1993). Therefore, initially, it can be argued that S5 is the project owner/ sponsor with whom they define the overall project organisation objectives and values. This is deemed important especially when considering the collaboration culture of alliances which is emphasized and developed by the owner/sponsor.

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25 Ashby’s law of requisite variety states that for systems to be regulated and controlled, the variety of the controller/regulator should be at least similar to the variety of what is being controlled. It must be noted that variety is the number of complexity.
4.3.3 Limitations of Viable System Model

The viable system model has limitations as with any model and theory in research. Jackson (1988) argues that the viable system model focuses on the organisational structure of its sub-systems which may disregard the attention to principles of shared belief and organizational culture. He added that such organisation design may be permanent and may impede the learning and adaptation process. Further, scholars argue that VSM has autocratic implications (Checkland, 1981; Jackson 1988). As a result, VSM is believed to serve the purpose of a narrow group when it is applied (Jackson, 1988). Moreover, Checkland (1981) argues that VSM tends to view organisations as machines and the free will of people is not presented. Nevertheless, this free will has also constraints as people also belong to their role in the system (organization) and that does not have any significance (Beer, 1984). Not to mention, that even though these people belong to many social systems they are still constrained or limited by the whole system they are embedded in (Espejo, 2004).

The critique posed by Jackson (1988) and Checkland (1981) although may be valid in terms of the rigidness of the systems, however, they do not stand valid in this thesis. This is because the research context tackles cooperation and coordination which incorporate the aspects of the free will of people and any other cultural challenges. Further, the concept of alliances in itself is based on a trust and collaboration culture (or at least it aims to achieve so) that is championed by project organisations. Second, apropos of the limitation that shows the purpose of a system is to be benefiting the narrow group (Jackson, 1988), the alliance conveys the message of aligning objectives to reach a certain goal. This is believed to be a crucial attribute to the raison d’être of alliances and their success. Nevertheless, this is also a key challenge to alliances in achieving their purpose. In fact, it is what this thesis is aiming to tackle to a certain degree. As such, cooperation between different sub-systems is investigated. Also, it must be noted that in this thesis the modelling of the VSM is concerned with organisations that are considered part of an alliance network depicting a complex social context, rather than being limited to mechanistic functions.
Conversely, the research aims to bring the viable system model as a framework by which the units of analysis are being unpacked and their interplay addressed.

Having said that, this research aims to provide a framework for analysing governance, cooperation, and coordination through VSM. This in turn limits if not removes the argument of serving a purpose of a small group or one organisation. This is not to say that VSM does not have any limitations but taking into account the limitations discussed in the literature, they do not impose a major barrier to this research. From this point, we can reiterate what Beer (1984) has said: “The model cannot be false or true but rather more or less useful”.

4.4 Towards A Common Framework of Analysis through the Viable System Model

This chapter has critically discussed the literature on systems, cybernetics and viable systems model and gave the rationale and necessary information in guiding the use of such theoretical framing to investigate the interplay of governance, cooperation and coordination across inter-organisational boundaries. The use of VSM as the basis for this study has enabled the development of a common frame of analysis relying on sub-systems to investigate the interplay of governance, cooperation and coordination. The constructive approach that VSM has helped in making sense of organisations (Harwood, 2019) which in turn enables answering the research questions. Further, given the organisations being depicted as social systems and the use of systems thinking in projects and their management in solving problems (Ackoff, 1981), the VSM is considered adequate for such analysis (Müller et al., 2021). Moreover, the consistency of framework when applied across alliances permits the understanding of these dynamics across multi-levels namely, project and sub-systems levels. In doing so, the challenge of blurred inter-organisational boundaries can be overcome and the viability of alliances concerning their governance, cooperation and coordination can therefore be assessed. Not to mention that a common framework helps cross-compare multiple projects within alliances irrespective of their inter-organisational structuring. In doing so, the challenge of blurred inter-organisational
boundaries can be overcome and the viability of alliances regarding their governance, cooperation and coordination can therefore be assessed. Figure 4.2 depicts how cybernetics and particularly VSM would be applied to IOP alliances context. It also shows the main units of analysis that are being under investigation.

Figure 4.2 Framework of the Research
Chapter 5. Methodology

5.1 Introduction

The research followed a qualitative method in answering how governance, cooperation and coordination in IOPs interplay across different inter-organisational sub-systems. This allowed for an in-depth rich understanding while addressing different perceptions of organisations’ actors. This chapter describes the methodological framework, and the rationale for each step followed. Following Creswell (2017) framework as seen in Figure 5.1, this chapter details the researcher's philosophical stance; methodologies including design, approach and strategies; sampling methods, and multiple case study design. Then, the research process and the data collection methods are described.

![Figure 5.1 Research Methodology Framework (Creswell, 2017)](image-url)
5.2 Research Philosophy

“Anything said is said by an observer.” (Humberto Maturana, 1970)

“Anything said is said to an observer.” (Heinz Von Foerster; 1979)

Before proceeding with how this research is designed and the data collected and analysed, it is important to review the philosophical standpoint of the researcher as it will influence the direction this research will take. There are different paradigms or worldviews surrounding the way researchers shape their research, according to Guba (1990, p.17). A paradigm or worldview is “a basic set of beliefs that guide actions”. These beliefs are called paradigms (Lincoln and Guba, 2000; Mertens, 1998); ontologies and epistemologies (Crotty, 1998). The main paradigms used generally in research are positivism, constructivism or interpretivism, advocacy or participatory, and pragmatism (Creswell, 2007). The two main opposing views of science widely used are positivism and constructivism (also known as interpretivism).

Positivism takes an objective approach and includes observing social realities to produce generalizable conclusions (Saunders et al., 2016). The aim to give a nonbiased general conclusion based on credible and meaningful data has led some researchers to adopt this philosophy (Crotty, 1998). On the other hand, constructivism takes a subjective approach to research, it highlights the human aspect of research to be different from the physical phenomena as it creates meanings (Saunders et al., 2016). Constructivists critique positivists in the way they attempt to discover a definite universal answer that applies to everybody without taking into account of the rich insights of humanity (Saunders et al., 2016). Constructivists formulate the knowledge of the world to be related to our experience of it nevertheless they do not deny the reality of the external world (Von Glasersfeld, 1984). This research adopts a constructivist approach given the context of this study and the importance of the organisation’s actors' interpretation in tackling the research questions and aim.
5.2.1 Ontology

Ontology is a philosophical view of the nature of reality (Saunders et al., 2019). For instance, objectivism as an ontology views reality as a truth that is out there. This is usually the case in natural sciences. In social science, to have an ontology of realism, that is objective, is to assume that there is only one social reality (Saunders et al., 2019). This makes the social world relatively unchanged and with an independent existence (Burrell and Morgan, 2017). On the other hand, subjectivism views reality as a construction made by social actors (Saunders et al., 2019), which argues that reality exists within our construct and through our experience (Levers, 2013). This research aligns well with the subjectivism view of reality as the research process involves interpretations and interaction between the researcher and the interviewees/data (project team). Each of the team members has his/her own view of the world and experience which cannot emerge into one common unifiable reality if rich and multiple perspectives are not taken into account that addresses the complex nature of the social system residing in the project environment (Cicmil et al., 2006). Accounting for multiple views is not only reliable but also crucial in understanding different organisational actor perspectives. In doing so, the analysis takes account of the conflicting perspective which in turn reduces the presumptions of one single-party viewpoint (Lumineau, 2018). Essentially, research on inter-organisational relationships and their governance discusses the level of cooperation/opportunism that actors may exhibit within the alliance or the project (Gulati et al., 2012). Multiple perspectives may be congruent or not depending on the project's actuality and the different viewpoints of project actors. Such differences hinge on the ontological assumption of project actors which assume a view of reality that is socially constructed based on actors’ experiences of the world (Von Glasersfeld, 2013). In other words, the project actors describe reality as they see it. Given the diverse views of participants and the contextual factor of IOPs (Grahber, 2004) the reality is socially constructed. This research, therefore, argues that a “metaphysical realism” within these contexts is not attainable, yet a possible (viable) explanation and theory of knowledge can be developed through the ordering and organisation of one’s experience (Piaget, 1937; Von Glasersfeld, 2013).
5.2.2 Epistemology

Epistemology has to do with how we come to know reality (Smyth and Morris, 2007). The constructivist epistemology offers a representation of reality (Maturana and Varela, 1987). In social context, it is often argued that knowledge of reality is constructed by a spectator which is affected by their own social context (Andersen, 2016). Given the contextual embeddedness of IOPs and the alliance network, this research adopts a constructivist epistemological approach to answer the research questions and respond to the research aim and objectives. Following the question of *how IOP governance, cooperation and coordination interplay across sub-systems levels,* it is essential as mentioned earlier to gain the viewpoint of different organisational actors within the alliance network since this study tackles the perspective of the inter-organisational relationship (Lumineau, 2018). Hence accommodating different perspectives while ensuring the explanation presented fits the reality presented by the actors (Glaserfeld, 1987). Although evaluation in inter-organisational relationships used to be viewed from a positivist paradigm, recent criticism of such approach was expressed showing that it does not reflect creativity and contextual sensitivity (Provan and Sydow, 2008). Clark (1999) in discussing evaluation research argued that both constructivism and positivism should be complementary and that each has a different emphasis as a disciplined inquiry (Porvan and Sydow, 2008). It follows that the constructivist paradigm allows for multiple subjective and fluid realities showing the political exercise of power and control (Provan and Sydow, 2008). This is essential given the line of enquiries the study is aiming to address, that is in governance, cooperation and coordination which make the constructivist paradigm fundamental in this study.

Project management as a field has been following both paradigms concerned with natural and social sciences (Love et al., 2002) and it is often argued that project management theory like general management cannot be viewed from one single lens (Morris, 2002; Turner et al., 2013). Furthermore, projects do not have a separate and neutral existence from the social world, though they are the effect of actions by interdependent actors (Cicmil et al., 2006). As much, the interdependency of organisational actors and their
actions toward projects within alliances creates multiple realities that are based on project actors' experiences (Cicmil et al., 2006).

Lastly, the VSM used as a framework in this study adopts a constructive epistemological stance in the sense that the systemic modelling follows the constructed reality that it aims to serve (Espinosa and Walker, 2013). According to Harwood (2019), the VSM is employed as an epistemological vehicle to make sense of social organisations. As such the model has been used to suit different organisations and contexts. Harwood (2019) added that VSM is viewed not as a representation of reality but as a support in handling reality. Beer (1984) has declared while using the analogy of the brain that the VSM is constructed through “mapping the brain onto the firm”. He added that VSM can be used in various managerial modes and situations (Beer, 1984).

Having said that, given the salient and peculiar nature of alliance networks in IOPs which involve, the experiences held by participants and the use of VSM, this research adopts a constructivist epistemology. Following this, it is worth having a look at the ethics and value of the researcher. Being part of the research through immersing in the data and holding a constructivist view, this research follows the argument of Von Foerster (1993) which states that ethics are implicit in any discourse one may have and cannot be articulated explicitly as it will be moralized.

5.3 Research Approach

5.3.1 Overview of The Research Approach

This section highlights the research approach adopted in addressing the aim and objectives of this research. The three conventional modes of reasoning are deductive; inductive; and abductive (Creswell, 2009). Deductive reasoning is guided by theory to verify an outcome while inductive reasoning is data driven which is resulted in a theory development (Creswell, 2009). Abductive reasoning is guided by both theory and data to generate a justifiable hypothesis (Peirce, 1960). The research approaches dictate the
research strategy adopted which differs from one approach to another, as different reasoning modes are contrasting (Saunders et al. 2019). The following section discusses the main characteristics of deductive, inductive and abductive modes of reasoning, and highlights the approach taken in this research.

5.3.2 Deductive, Inductive, and Abductive Approaches

The deductive approach is a dominant research approach that involves the development of a theory followed by extensive tests to verify or falsify through a set of hypotheses and propositions to be tested (Saunders et al., 2019). As such the research process would be highly structured to achieve replication which is important to ensure reliability (Saunders et al., 2019). Often deductive approach is associated with quantitative methods which enable the measurements of facts (Creswell and Creswell, 2018). Usually, deductive reasoning aims to achieve generalisation from the data collected, hence leaning towards collecting a larger sample size. In most cases, the deductive approach is underpinned by positivist research philosophy (Saunders et al., 2019).

The inductive approach is opposite of deductive in the sense that the researcher collects data and analyses them. As a result, a theory would be formulated often referred to as a conceptual framework (Saunders et al., 2019). Therefore, this extracts implicit knowledge, patterns, and meanings through this process (Gray, 2004). Unlike deductive reasoning, inductive mode requires a relatively smaller sample size of research subjects (Saunders et al., 2019). Induction involves thorough reading of raw data to extrapolate concepts, models or themes through the researcher’s interpretations (Thomas, 2006). Usually, inductive reasoning is concerned with the contextual space by which events take place, therefore smaller subjects sample is more appropriate (Saunders et al, 2019). Mostly, the inductive approach is associated with constructivism.

The abductive approach as depicted in Figure 5.2 is much more flexible than previous approaches in that it offers the ability for a researcher to straddle between theoretical knowledge and observation through systemic creativity (Kovács and Spens, 2005). Abduction starts with empirical observations that can be preceded by theoretical
knowledge through frameworks (Dubois and Gadde, 2002). However, such frameworks however good or prescriptive are not able to accommodate anomalies in the observations (Danermark, 2001). Therefore, this allows an iterative process of theory matching or systemic combining (Dubois and Gadde, 2002) to take place to advance the theory used (Kovács and Spens, 2005).

![The abductive research process](image)

*Figure 5.1 Abductive Research Process (Kovács And Spens, 2005)*

5.3.3 Abduction as A Research Approach in This Thesis

The research process started with investigating governance frameworks across different inter-organisational projects within alliance networks by empirically observing how these projects were being governed and the effects of governance on coordination and cooperation. Concurrently, literature was reviewed to understand the phenomena of governance and its interplay with cooperation and coordination given the influence of governance on cooperation and coordination. Furthermore, the viable system model (VSM) was adopted as an initial framework for this study (Beer, 1981). This was due to the nature of VSM in having common sub-systems that are based on functionalities and roles allowing for a common frame of analysis. As such, VSM helped address the stratification of governance across different organisations and was instrumental in understanding the interplay of governance mechanisms with cooperation and coordination. However, VSM
as depicted had to be moulded to represent the interorganisational arrangements in a project context. That said, this process is not aligned with the process of “grounded theory”, that is induction which starts with data collection without preconceived theories about a phenomenon. Neither falls in the theory testing category which is known to be deduction. Rather this process is iterative in nature going back and forth between data collection and theoretical framework, which make use of both (data and theory) to enhance the understanding of the phenomena under the study and elaborate theory (Ketokivi and Choi, 2014).

The rationale behind using an abductive approach was due to the iterative nature of the research process which started with general questions for a phenomenon and went through literature concurrently to find a framework, which in this case is the VSM, that assists in explaining and tackling these questions through interpretation and analytical thinking. This is aligned with Peirce's method of abduction, which according to Svennevig (2001) consists of three modes of inferences within three stages process of scientific enquiry (Svennevig, 2001, p.4).

First stage: Abduction (adopt a hypothesis on probation – Adopt the VSM framework)

Second stage: Deduction (spell out the necessary and probable experimental consequences – Use of the literature and data to address the specifics of the study and context of IOPs)

Third stage: Induction (assess the plausibility of the hypothesis based on observed results of predictions – Develop the VAM and interpret the findings)

Following the three stages, the intention was to have a framework that supports tackling the research question and aim. Consequently, as with any research, while collecting data and looking through reports and artefacts on inter-organisational projects, the selected methodological framework was interpreted and modelled when collecting and analysing the dataset to test first its reliability in responding to research questions and aim. This is done through the process of matching (Dubois and Gadde, 2002) which goes back and forth between the data source, analysis and the framework. Following this during the
second and third stages, and through a process of iteration the Viable Alliance Model was
developed, shaped and re-shaped as a result of data interpretation. The steps are iterative,
and circular given the idiosyncrasies of each case study and the perception of participants.
Accordingly, using a tight and evolving framework of viable system model to account for
preconception of the sub-systems and their characterisation within the VSM nevertheless,
it is evolving as empirical observations inspire the theoretical framing and vice versa
(Dubois and Gadde, 2002).

5.4 Research Process

This section details the methodology applied in the process to achieve the research
aim and objectives. The research process followed three phases as shown in Figure 5.3.

The first phase consists of a set of informal discussions and semi-structured
interviews to develop an initial Viable Alliance Model (VAM) framework which was seen
fit to the research problem and that can be used to analyse inter-organisational project
governance in alliance networks. As such, this phase aimed to develop the model in
conjunction with the key aspects of governance, cooperation and coordination within each
system. Therefore, allowing to straddle between the literature of governance cooperation
and coordination discussed in Chapters 2 and 3 and theoretical framing discussed in
Chapter 4 from one side and empirical observations on the other (Dubois and Gadde, 2002).

The second phase which helped furtherly develop and validate VAM involves
secondary data analysis of embedded case studies of three alliance networks (x3) each
having two different projects (x2) amounting to a total of 6 IOPs. The number for each
network and project is represented in Figure 5.3. The data was collected between 2015 and
2016 amounting to a total of 42 semi-structured interviews. The two projects within each
network vary in terms of performance; one is considered highly performing and another
low performing. The performance measurements were advised by the programme directors
of the project depending on cost, time and achieving strategic objectives. This allowed for
within-case comparison and cross-case comparison. The VAM was applied across the six
projects while making sure that the idiosyncrasies of each project and network are
considered. For instance, networks varied in structure. This has allowed us to understand how governance, cooperation and coordination interplay across systemic interaction.

The third phase consisted of a card sorting exercise. Card sorting exercise was exhibited through the use of a web-based tool called Trello. Card sorting allowed the participants to visualise the key mechanisms of governance, cooperation and coordination. As such, participants were asked to identify these mechanisms in highly and low successful projects they worked in. After, participants were asked to talk about the background of these mechanisms and their interplay. This phase was instigated to better understand the dynamics of the three constructs in different projects from another perspective. Detailed information about each phase is provided in the next Chapter 6.
The study of social science generally falls into two categories; Quantitative and Qualitative (Danermark et al., 2002). Quantitative research is generally associated with
positivism especially when dealing with highly structured data collection techniques (Saunders et al., 2016). Quantitative research deals with numerical data in the sense for example collecting data from questionnaires and analysing it through statistics and graphs (Saunders et al., 2016). This methodology is also associated with the deductive approach to test a theory nevertheless it can be sometimes used with an inductive approach whereby a theory is developed (Saunders et al., 2016).

On the contrary, qualitative research design is often associated with the interpretive (Constructivist) philosophy (Denzin and Lincoln, 2011). It is interpretive since researchers tend to do some sensemaking and construct meanings from the data collected (Saunders et al., 2016). As such, the collected and analysed data are well-grounded and contextually rich in descriptions and explanations (Miles and Huberman, 1994).

This research follows a qualitative approach to data collection and analysis, as first, it is contextually rich and in-depth depicting an alliance situation that is specific to a project/program while accommodating different perspectives from different organisations; second it is aligned with the philosophical stance of this research which is constructivism; third to allow an understanding of the Viable Alliance Model (VAM) framework and the interplay of governance, cooperation and coordination there should be a contextual rich description of the events that the participants took part of; lastly, the qualitative inquiry allows the research to induct by developing a theory through inferences and deduct through testing it iteratively along the research process (Saunders et al., 2016). The following Figure 5.4 summarise the research design of this thesis.
5.6 Research Strategy

As mentioned earlier, this research adopts a qualitative approach to inquiry given the nature of this study which attempts to understand the interplay of governance, cooperation and coordination across inter-organisational boundaries. Thus, accommodating different rich perspectives is needed to achieve the research aim and objectives. According to Saunders et al. (2016), research strategy is the plan to achieve research goals and therefore answer the researcher’s questions. Denzin and Lincoln (2011) argue that research strategy is the link between the researcher’s philosophy and subsequent research methods used (data collection and analysis). The choice of qualitative research design informs and leads to a certain research strategy including ethnographies, case studies, grounded theory, phenomenology, and narrative inquiry (Creswell, 2007). This research adopts a case study research strategy. The case study is important for this research given the need to understand previous in-depth experiences and behaviours of participants, and its empirical insights into the phenomena under study for theory development (Dubois and Gadde, 2002). As such, to understand the specifics of inter-organisational arrangements
and their dynamics in regard to governance, cooperation and coordination, a case study is needed (Flyvbjerg, 2006). In addition to the case study strategy, semi-structured interviews and informal discussions were adopted to supplement the development of VAM in Phase 1 and findings from Phase 1 and 2 in Phase 3. The additional interviews and informal discussions helped the researcher to gain more insightful information on inter-organisational arrangements, more particularly in what concerns governance, cooperation and coordination. Further, document analysis was undertaken to analyse and triangulate the information presented. While other methods such as ethnography and surveys can be useful in such study especially because they can give a longitudinal view, they were not used due to the time limitations and constraints in being part of the projects under study (i.e., COVID-19, accessibility to the sites and organisations). That said, through semi-structured interviews and case studies multiple perspectives from different participants and under different methodologies are gathered which helped as a way to reach theoretical saturation and develop a theoretical contribution (Saunders et al., 2016).

5.6.1 Case Study as A Research Strategy

Yin (2014) describes case study research as a rigorous inquiry into a phenomenon within its real-life setting. The case can be organisations, events, persons, a group, or any other subject (Saunders et al., 2016). Case studies provide rich empirical descriptions of the phenomenon being studied whereby insights are generated, which in turn leads to theory development (Dubois and Gadde 2002; Yin, 2014). The benefits of case studies include the ability of the researcher to use multiple techniques in collecting data on the case such as documents, interviews, archival records, or observations (Saunders et al. 2016).

The case study strategy in this research is used to be exploratory (exploring the interplay of cooperation and coordination in alliance network governance of IOPs), explanatory (explaining the complex nature of alliances and how VAM can be applied), and descriptive (describing the viability of alliances within a real-life context) (Yin, 2014). According to Yin (2014), case studies shall be considered when the research is aiming to answer “how” and “why” questions; this study is focused on exploring how VAM can be
applied as a framework to understand the interplay of governance, cooperation and coordination of IOPs across inter-organisational boundaries.

There are different types of case study design as seen in the Figure 5.5. A single case is one case that is usually used when the case represents an extreme or unique scenario (Saunders et al., 2016). Multiple cases focus on the replication of the findings nevertheless it also can be used where there is a difference in a contextual factor. Another dimension where case studies differ is between holistic and embedded cases. This dimension refers to the unit or the focus of the analysis. A holistic case study is a case study whereby the unit of analysis is the case itself. Conversely, an embedded case is a case whereby there are multiple units of analysis involved within the case (Yin, 2014; Saunders et al., 2016). This research adopts multiple case studies (Alliance networks A, B and C) with embedded projects (high and low-performing projects for each alliance network) as seen in the fourth quadrant in Figure 5.5.

![Figure 5.4 Types of Case Study Designs Adopted from Yin (2014)
The multiple embedded case studies are used here to produce an in-depth analysis of the interplay of governance, cooperation and coordination and their systemic characterisation in each project. This permits drawing some general findings across cases and allows to understand the applicability of the VAM as a methodological framework for understanding systemic characterisation and interplay of governance, cooperation and coordination (Yin, 2014).

The choice behind the multiple case studies lies in the uniqueness and small number of types of alliances in the infrastructure and building industry in the UK. Three alliance network cases are being studied namely A, B and C. For each network, there are two projects, one that is deemed highly successful and another less successful. The level of success is guided by the cost and time of delivery and the degree of achievement of the outcomes. Each of the alliance networks operates in different sectors namely flood defence, rail, and water treatment. The differentiation of sectors and alliances provides rich insights into understanding governance, cooperation, and coordination under a different context, and allows the creation of a more robust theoretical framework that takes into consideration multiple empirical evidence (Eisenhardt, 1989; Dubois and Gadde, 2002).

5.7 Research Methods

The methods used in this research were in alignment with the qualitative strategy of data collection and analysis. Methods such as interviews, participant observation (ethnography), narrative inquiry and phenomenology (Saldana et al., 2011). The most common method in qualitative studies is interviews as it is considered effective in soliciting and documenting individual’s perspectives and personal experiences (Saldana et al., 2011). This research is based on semi-structured interviews which included informal discussions in understanding the VSM and inter-organisational governance of different projects, and secondary data that are based on interviews and project artefacts. Other qualitative methods are considered to be also effective especially since they document the day-to-day interaction of actors and their lived experience (Bhattacharya, 2017). However, these methods were not feasible for this research as it necessitated the researcher to have
accessibility to alliances projects and be involved physically on-site which was challenging during the COVID-19. In addition, such methods require a large amount of time and resources to execute especially if the aim is to cross-compare different IOPs and alliances as done in this study.

5.7.1 Interviews

Interviews help the researcher to explore the individuals’ views, experiences and beliefs (Gill et al., 2008). As such, interviews provide a deeper understanding of the social phenomenon under investigation, distinguishing it from quantitative methods such as questionnaires which do not explore in detail the key aspects of the phenomenon (Gill et al., 2008).

This thesis adopts semi-structured interviews as a method of collecting data. Semi-structured interviews were adopted across the three phases of the research. Semi-structured interviews are considered the most common method in qualitative research (Qu and Dumay, 2011). The interviews allow the researcher to explore the peculiarities of events, organisations and projects that formed the reality of participants, while also addressing key theoretical questions that enable theoretical development. Hence, this narrows the focus in tackling research questions and aim whilst allowing for an open-ended discussion that may give more insights into the subject of this study. In this research, semi-structured interviews are used to understand the organisational roles of the participants, the background of alliances and their high and low-performing projects. It also was used to investigate the theoretical perspective of VAM and the interplay of governance cooperation and coordination across inter-organisational boundaries. These interviews were part of the secondary data collected from three alliance networks working on two projects each as will be described in the following section.

Interviews were carried out throughout all three phases of this research. For the first phase, the interviews and informal discussion helped the researcher to gain more insights about governance, cooperation and coordination from participants in different inter-
organisational projects. Further, it also investigated the applicability and practicality of VSM as a methodological framework in analysing governance, cooperation and coordination. For the second phase, semi-structured interviews were part of the secondary data used to inform the understanding of such interplay, and how governance, cooperation and coordination are structures across sub-systems and project levels. Third phase interviews were undertaken to verify the key mechanisms of governance, cooperation and coordination while provide an additional understanding of the interplay of governance, cooperation and coordination.

5.7.2 Secondary Data Analysis

Secondary data analysis consists of using existing qualitative data sets to answer research questions that are different from the original ones asked (Hinds et al., 1997). According to Glaser (1963) one of the benefits of secondary analysis of the qualitative data by an independent researcher is that it “lends new strength to the body of fundamental social knowledge” (Glaser, 1963 p.11). Consequently, researchers aiming to apply secondary data analysis pursue interests different from those of original research (Hinds et al., 1997). Therefore, this allows the process to be transparent. As such, before carrying out secondary data analysis an assessment of the fit of the dataset is needed (Long-Sutehall et al., 2011). The assessment should also consider that such an analysis would employ similar analytic techniques to the primary analysis (Long-Sutehall et al., 2011).

In considering secondary data one needs to be careful of the contextual element that these data are aiming to address, viz., the data answering different research questions to that presented in this study (Vartanian, 2010; Saunders et al., 2019). Further, it is crucial to understand the projects/events and actors’ details involved in the study as well as assess the data validity. As a result, a comprehensive understanding of the data set and assessing its strengths and weaknesses is needed to ensure it is generating meaningful findings on the subject of study.
The secondary data set was collected between 2015 and 2016 through two industry expert workshops involving different organisational actors including infrastructure owners, their suppliers, consultants and contractors from the Infrastructure Client Group (ICG) (see Appendix 1). Consistent factors were established that described project success outcomes and features of effective project teams. As such this was the basis for an abductive reasoning for a starting point of exploration. The initial study was based on three data streams’ collection and analysis. First, data on the projects and their supply chains were collected by project managers through a spreadsheet template26 (Dataset 1). Second, an online questionnaire was sent to 78 participants to evaluate success criteria, team features and innovations (Dataset 2). Different organisation actors including suppliers, contractors and owners assessed their own project structure, contracts, relationships and approaches. Third, a total of 42 semi-interviews (Dataset 3) were carried out face-to-face exploring in greater depth key events, relationships and interactions of actors in the three alliance networks across six projects.

Having said that, the cases transcripts used explored the roles, capabilities, and behaviours of alliances. The use of secondary data is becoming of wide use in research supporting researchers with rich data sets, that are representable in large sample size (42 interviews) and economically feasible to have (Vartanian, 2010). As such, the initial study has evolved around describing the alliance networks and the governance structure of IOPs, understanding their team behaviours, and illustrating the outcomes and innovation variability across the three alliances. That being said, the context of the original study and the collected data appears to be fit and viable for this research as it tackles the contextual aspects of IOPs and alliances which include inter-organisational cooperation, coordination and governance.

The sample selection criteria followed in the original study were based on self-selecting sample targeted alliances-based networks working on different projects and involving different organisations. The sample selection formulation process involved high-

26 Details of the data collected are shown in Appendix 1 and 2
level expert consultation which facilitated timeliness and provided substantial support in reaching out to key participants. After selecting the three alliance networks, programme managers from the three alliances were asked to identify two projects that were considered high and low performing in their own alliances, which allows for within and cross-case analysis and set a benchmark\(^{27}\) by which the analysis is measured. The factors considered in assessing project performance are time, cost, and degree of strategic objective achievement. Upon such decision and availability of the participants, the sample size of 42 was determined. Samples were representative of owner organisation, project management consultants, suppliers and contractors (for more information see Appendix 2).

Although the data were collected in a different study by Mills (2018) answering different research questions, still the context and sample are relevant to this study. For instance in this research such data are considered to be valuable to the research in that; first, it was initiated with the need to understand the causes of alliance success and the innovations behind it (Mills, 2018) which conforms with the inter-organisational setting context of this research specifically to the understanding of the viability of alliances and that it depicts the different inter-organisational interactions; second, the data used in the previous analysis showed different explanations informing project success and innovations happened in these alliances, that includes behavioural aspects to the governance structures and the relational and commercial ties strengthening integration (Mills, 2018). Additionally, the study involved semi-structured interviews employed which evolved around roles and responsibilities, project objectives, key challenges, relationships with other organisations (i.e. consultants, suppliers and contractors) and collaboration of alliance teams (see Appendix 1). Despite usually the differentiation framework investigating different variables, the framing of questions and the relatively answered transcripts would conform with this research (i.e., describing the current interaction between two teams from different organisations and key events happening within the projects). That said, the first section

\(^{27}\) The benchmark does not necessary mean that all projects across networks are comparable in performance. However, within each network each of the projects are assessed by their program managers and the data given.
relates to the role of organisation and project teams, the key project objectives and challenges, and the key interactions. This helps stratify the Viable Alliance Model sub-systems and identify key governance mechanisms. For example, the question about key project challenges helps identify the issues of governance such as risk management. The second section helps identify key issues in relationships such as the collaboration of teams. Also, the questions posed help identify the key positive/negative coordination and cooperation issues. For instance, the question about explaining the collaboration highlights the cooperation of the teams. Most of the data were retrieved from questions 1 to 6 and questions 8, 9, 12, and 13.

Further, the doctoral supervisor Professor Grant Mills has conducted the (secondary data) study himself as a principal investigator and has extensive knowledge of its background (Mills, 2018), which gives rigour to the study and allows for multiple explanations (Ruggiano and Perry, 2019). The dataset was complemented with other sources on the projects and the alliances. This included reports, contracts, and other artefacts such as the costs of projects and their timeline.

5.8 Sample Design

Sample design is considered a crucial aspect of the research framework. As it is impossible to consider all of the population of the subject under investigation, a sample should be taken from the population. Various factors may influence the selection of samples in qualitative research such as the ease of accessibility of the interviewees, the researcher's judgement and his/her knowledge; the researcher’s interest in a situation or event (Kumar, 2018). Sampling techniques can fall under probabilistic and non-probabilistic sampling (Saunders et al., 2016). Non-probabilistic sampling is usually used when qualitative data is considered. A non-probabilistic sampling includes; quota, accidental sampling, convenience, purposive, expert and snowball sampling (Kumar, 2018). In this research, samples are dependent on the research method used and vary accordingly. As such the sample selection and its size for the first and third phases differs from the second phase.
5.8.1 First Phase Samples – Development of VAM and Systemic Characterisation

The first phase consists of 10 semi-structured interviews (n=10) which led to the initial development of VAM and its systemic characterisation. Sampling selection criteria were based on accessibility (convenience) and purposefulness. As such, participants were selected based on their working experience on inter-organisational projects within alliance networks alongside a consultant that applied VSM in different settings. The rationale behind such selection is related to the gathering of information from participants working in different IOPs (Taherdoost, 2016). This allowed to establish common ground between different IOPs and the VSM, leading to the first development of VAM and its systemic characterisation.

The purposeful sampling yielded interviews with consultants that currently work in a major rail project in the UK, VSM practitioner and consultant with over 25 years of experience in designing and applying VSM to organisations, and other participants working in different roles within different project-based organisations. The semi-structured interviews for the first phase happened between April 2019 and August 2019 (mostly two-way informal discussions) which helped formulate a solid understanding of governance design in major IOPs and supplemented the researcher with the knowledge needed in regard to the VSM and its design. Further, the semi-structured interviews tackled different participants working in different project-based organisations. This was instrumental in addressing key systematic characterisation and helped formulate the VAM in the context of alliances and inter-organisational projects.

Three interviews were carried out with four participants. Two of the participants were consultants that work on a railway megaproject in the UK. The role of consultants, their experiences, and the nature of their work which was based on designing the client organisation for a megaproject, was important in trying to understand how client organisations are structured with contractors, consultants and suppliers which in turn helped in mapping out the VAM. Another interview and informal discussion were with a VSM consultant and practitioners with over 25 years of experience in designing VSM for
organisations. Key elements of how sub-systems are structured and designed in organisations were clarified after reviewing key VSM literature (Beer, 1981/1984). The third interview was with the head of quality of a client organisation that adopted an alliance approach with its supply network. In these workshops, the researcher’s role was more of a facilitator where he clarified the context of this study and adopted a consultative method to gain valuable insights. This includes showing the VSM to the consultants and initiating a conversation about governance in inter-organisational projects they were involved in. Also, the VSM consultant was instrumental in gaining more knowledge about the VSM and its modelling. This helped with additional information on how client organisations are designing their governance and how this can be relevant to the sub-systems within VSM. Therefore, informing isomorphism mapping with relation to VSM (Beer, 2002).

Second, another round of interviews was undertaken between August 2019 and January 2021. It consisted of interviews with six participants each working or having worked in a project-based organisation under different roles (Contractor, Consultant, Client, Supplier, etc.) and across different projects. This took place during the Covid-19 pandemic which explains the timeline it took. There were challenges in finding participants for this research given the situation the Covid-19 had on projects and people. Despite such challenges, semi-structured interviews were carried out through Zoom and Teams which facilitated the whole process. The snowballing technique was used to increase sample size and to gather data from different organisation actors (Taherdoost, 2016). This allowed to gain more insight from different perspectives within IOPs (such as the role of organisation within IOPs). Interviews ranged from 40 minutes to one hour. This was concurrent with the secondary data analysis which is discussed more in detail in the next section 5.8.2. More detailed information about the participants, their roles and the interview protocol are discussed in the next Chapter 6 and Appendix 3 respectively.
5.8.2 Second Phase Samples – Alliance Network Case Studies

As the second phase was based on the secondary data which consisted of three datasets, its sampling was similar to the sample selected in the original study. Although not all datasets of the original study were relevant to this study, the semi-structured interviews (dataset 3) and project information (dataset 1) were selected (Appendix 2).

The sampling method of the initial study was mixed between purposeful and convenience (Taherdoost, 2016). Three case studies of alliance networks (n=3) with six embedded projects (n=6) were analysed. For alliance network A, the total number of participants was 17, project A\(^+\)\(^{28}\) had 8 participants and A\(^-\) had 9. Alliance network B, the total number of participants was 14 with Project B\(^+\) having 10 participants and Project B\(^-\) 4. For alliance network C, the total number of participants was 11 with Project C\(^+\) having 6 participants and Project C\(^-\) having 5 (See Appendix 3). Morse (2000) indicated the scope of the study, the nature of the topic, the quality of data, the study design and the use of shadowed data. As mentioned earlier, the scope of study and nature of the topic has been focused on the interplay of governance, cooperation and coordination across inter-organizational boundaries which reveal a more focused scope of study (Morse, 2000). As for the quality of data and study design, the multiple embedded case study design ensured the focus on project structure, inter-organisational relationships and success outcomes. As part of the Infrastructure Client Group (ICG) and Project 13 initiatives\(^{29}\), participants were encouraged to highlight key successes and issues of the overall projects while describing different events. This has allowed to have a solid quality of data (Morse, 2000). Lastly, the use of shadow data by describing different interactions from a participant’s point of view has allowed for a more enriched picture of the overall events that happened in the projects and the different interactions of participants (inter-organisational interaction).

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\(^{28}\) The projects of each network are labelled with + and – to represent the projects that are highly successful and the ones that are less successful, respectively.

\(^{29}\) This can be found in www.project13.info
The sampling size was representative of the previous study to understand the key successes of the project team and outcomes in which complexity and challenges were presented for each alliance network’s projects. The distribution of samples across different organisation actors enabled the mapping of VAM against multiple organisational actors. As such, different organisation actors would represent different sub-systems depending on the governance structure and working arrangement of each alliance network and its projects. Despite the participants only representing S1, S2 and S3 there was some information found about S4 through S4-S3 interaction which is conveyed by S3, hence allowing the use of shadowed data (Morse, 2000).

Having said that, the sample selected depicts different sub-systems of the VAM unpacking the investigation of sub-systemic interaction. Further, this allows for a better understanding of how inter-organisational interactions are manifested in terms of governance, cooperation, and coordination.

The following Table 5.1 depicts sub-systems and its representation in network frameworks.

<table>
<thead>
<tr>
<th>Viable System Model</th>
<th>Functions and roles (in VSM terms)</th>
<th>Functions and roles (in Project Alliance terms)</th>
<th>Network framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 (System 1)</td>
<td>Operations and its management. The system that does the work</td>
<td>Organizations that deliver the work packages</td>
<td>Suppliers and sub-contractors</td>
</tr>
<tr>
<td>System 2 (S2)</td>
<td>Coordination system which aims to limiting the oscillations and ensuring the harmony of operations</td>
<td>Functions that help integrate the work. i.e., scheduling, personnel coordination, quality control, information coordination etc…</td>
<td>Mainly members of the client organization, the integrator and the consultant that are responsible for coordination the work of contractors</td>
</tr>
<tr>
<td>System 3 (S3)</td>
<td>Senior management of the operations and the lowest level of corporate management. it regulates and controls in case of oscillations</td>
<td>Operational control of activities in Progress i.e cost control, scope control, handling change requests, translation of program policies to subcontractors and suppliers, budget allocation etc…</td>
<td>The integrator / the main contractor/Clien (Depending on the structure of the alliance) usually execute the function of the Project Management Office (PMO)</td>
</tr>
<tr>
<td>System 3* (S3*)</td>
<td>Support audit for S3 (quality checks, performance audit)</td>
<td>Scope audit, quality audit, improvements etc…</td>
<td>Client (depending on the roles assigned in the alliance)</td>
</tr>
<tr>
<td><strong>System 4 (S4)</strong></td>
<td>Intelligence and future planning. Essentially this system deals with strategy</td>
<td>Project planning, purchasing and contracts, future activities, scope changes, and strategy</td>
<td>The alliance/network Board, including senior member of the client organization, the integrator, and consultant</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>System 5 (S5)</strong></td>
<td>Highest level of the enterprise. It decides the policy and ethos of the organization.</td>
<td>Defining objectives of project organization, alliance culture policy and procedures. Sometimes intervene to resolve important problems</td>
<td>The client organization/owner/operator organization.</td>
</tr>
</tbody>
</table>

5.8.3 Third Phase Samples – Trello Board Card Sorting Exercise

The third phase is based on a card sorting exercise through the use of the Trello Board online tool which took place between August 2021 and October 2021. The author identified this activity as a way of representing the different governance, cooperation and coordination mechanisms. Card sorting is usually used in qualitative and quantitative studies. This technique is used in qualitative studies across different domains including engineering, psychology and education. It is an interactive research method that aims to allow participants to organise concepts (Conrad et al., 2019). It is considered participatory in nature as participants help in co-developing conceptual categories (Coxen, 2004). Activity as such helps elicit additional reflections from participants which in turn helps widen the investigator’s knowledge and understanding of the study at hand (Ford, 2013). This was essential to validate the key mechanisms found throughout phases 1 and 2 and to provide another perspective on the interplay of governance, cooperation and coordination. Participants were asked to identify two projects; one highly successful and another less successful, that they worked in. The rationale behind choosing two projects was to imitate the previous phase 2 which took into consideration two projects one highly successful and another less successful. This added an additional layer to understanding the interplay of governance, cooperation and coordination across inter-organisational boundaries in projects. Therefore, allowing the researcher to validate the previous findings. As such the
sample size of this phase was based on the reachability of saturation (Grady, 1998). Snowballing sampling was adopted in light of the convenience and relevant experiences of participants. Upon such criteria, six participants (n=6) from different roles were recruited in this exercise. This has enabled a more generic view of the interplay of governance, cooperation and coordination in IOPs. The following Figure 5.6 depicts the data collection timeline of this thesis.

![Research Timeline]

**Figure 5.5 Data Collection Timeline**

### 5.9 Thematic Analysis

As this research adopts a qualitative inquiry, thematic data analysis was applied across phases 1 and 2 (Braun and Clarke, 2006). The Viable Alliance Model (VAM) was developed through the interviews around inter-organisational project governance, cooperation and coordination. The emergence of patterns from Phase 1 in terms of governance, cooperation and coordination across different sub-systems was based on the scrutinization of the data compared to the literature. Further, themes derived were mostly similar to the patterns found in terms of governance, cooperation and coordination issues that happened within cases in the second phase. Patterns from phase 2 were also derived from the scrutiny of the dataset against sub-systemic interactions (i.e., S3-S1) which revealed additional insights on sub-systems characterisation. Given that both phase 1 and phase 2 happened in parallel, findings from each were cross-checked which helped in
developing VAM. In phase 3, the patterns and relationships in terms of governance, cooperation and coordination were used from the first two phases and verified them through the card sorting exercise.

This research adopts a hybrid approach to thematic analysis (Fereday et al., 2006) in that, generic categories were formulated to suit the framework in use while keeping aware of emergent themes that are not within the frame of a theory which, however, are well-nigh related to the units of analysis in this study. This hybrid approach has been adopted given the abductive nature of this study in that categories followed a theoretical framing (i.e., sub-system 1 governance category) while allowing for emerging themes through empirical data. This depicts the nature of abductive reasoning adopted. Braun and Clarke (2006) six steps approach have been followed as mentioned in Figure 5.7.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description of the process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Familiarising yourself with your data:</td>
<td>Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.</td>
</tr>
<tr>
<td>2. Generating Initial codes:</td>
<td>Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.</td>
</tr>
<tr>
<td>3. Searching for themes:</td>
<td>Collating codes into potential themes, gathering all data relevant to each potential theme.</td>
</tr>
<tr>
<td>4. Reviewing themes:</td>
<td>Checking in the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic ‘map’ of the analysis.</td>
</tr>
<tr>
<td>5. Defining and naming themes:</td>
<td>Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.</td>
</tr>
<tr>
<td>6. Producing the report:</td>
<td>The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.</td>
</tr>
</tbody>
</table>

*Figure 5.7 Thematic Analysis Phases (Braun and Clarke, 2006)*
In the first phase, emergent themes resulting from the semi-structured interviews that investigated IOP governance, cooperation and coordination in alliances were identified and placed in relation to the sub-systems of the VSM. As such, theoretical thematic analysis was adopted to focus on some aspects of the data that pertained to the aim of this thesis (Braun and Clarke, 2006). Themes were identified to fit a pre-existing coding frame which belongs to governance, cooperation and coordination and the sub-systems of the VSM. In doing so, the researcher was able to focus on these units of analysis and identify key sub-systemic characterisation.

Using an abductive approach, VSM sub-systemic functionalities from the literature (Beer, 1984) were compared to the empirical dataset. This adaptation provided a stronger alliance context to support inter-organisational network governance. In so doing, this has guided sub-systems framing, but governance, cooperation and coordination characteristics were inducted, as depicted in Table 5.2.

<table>
<thead>
<tr>
<th>Theoretical structure of the VSM</th>
<th>Units of analysis</th>
<th>Examples of emergent themes in terms of Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5</td>
<td>Governance, Cooperation and Coordination</td>
<td>Not applicable due to limited participants representing S5</td>
</tr>
<tr>
<td>S4</td>
<td>Governance, Cooperation and Coordination</td>
<td>Appraisals, Risk Management, etc..</td>
</tr>
<tr>
<td>S3</td>
<td>Governance, Cooperation and Coordination</td>
<td>Requirements, Co-Location</td>
</tr>
<tr>
<td>S2</td>
<td>Cooperation and Coordination</td>
<td>Communication</td>
</tr>
<tr>
<td>S1</td>
<td>Governance, Cooperation and Coordination</td>
<td>Not applicable as S1 represents another set of five sub-systems but on a second level of hierarchy.</td>
</tr>
</tbody>
</table>
Characteristics were collected from participants depending on their roles and their description of governance, cooperation, and coordination.

During the second phase, emergent themes were also fitted into pre-existing coding structure. This was required to answer the research question posed through the methodological framework (VAM) used which differed\textsuperscript{30} from the phase 1 study. Qualitative data can usually be reduced into categories that allow the researcher to focus on his units of analysis and research questions (Suter, 2012). Such categories reveal a system of coding permitting the researcher to classify large datasets. The coding process is a way to achieve emergent categories for subsequent further analysis (Sãldana, 2014). As such, codes are subsumed into subcategories and categories, depicting emergent themes as abstracts (Charmaz, 2006) to guide answering the research questions posed (Sãldana, 2014; Elliott, 2018), which in turn here, exhibit issues of governance, cooperation and coordination. One strategy of grouping a list of codes can be done by classifying them into similar clusters (Sãldana, 2014). In doing so, the codes and cluster of codes extrapolated from the data can be classified into three categories, that is governance, cooperation and coordination serving the purpose of this research. Alongside this process and to make sense of the data within the realm of viable system model (VSM), a typology across sub-systems is needed to ensure the understanding of sub-systemic interaction while highlighting their features (Bakker et al., 2016), which are salient when one wants to understand governance in alliances (Müller and Turner 2017; Müller et al., 2016). Hence, the process of classification includes both categories (related to the VSM) and subcategories (related to governance, cooperation and coordination). This reflects a hybrid process between data and theory-driven codes (Fereday et al., 2006) based on the tenets of VSM and the emergent themes.

In what concerns theoretical categories pertaining to VSM, a set of categories showing sub-systems interaction depicting the nature of inter-organisational issues instead

\textsuperscript{30} The difference lays in the coding structure as for the phase 2 sub-systems interaction (i.e, S1-S2) was analysed as opposed to sub-system characterisation (i.e, S1).
of stratifying each system separately, as no understanding of alliance governance, cooperation and coordination without taking into consideration sub-systems interaction (Jensen et al., 2006; Lumineau and Oliveira, 2018). Hence, SX-SY represents a category in this study which illustrate the interaction between sub-system X and sub-system Y. For those reasons, the following categories and subcategories shown in Table 5.3 have been suggested. Further, Figure 5.8 depicts the emergent themes and the level of abstraction in what concerns the units of analysis. This consists of three levels. As such, the issues that are retrieved from the raw data depict the first-order concepts which were abstracted into second-order concepts. For instance, the “lack of resources” and “consistent team” were abstracted to depict resources as a second-order concept. Then, this was related to governance which is considered the third-order concept in coding structure. In other words, the data were abstracted from issues concerning governance, cooperation and coordination (which represents the third-order concepts) and grouped under these three concepts. Lastly, they were related to the sub-systemic belonging SX-SY where these issues were found. This enabled to locate these issues which in turn allowed for analysis of their interplay.

Table 5.3 Codes and Theme Structure for Phase 2

<table>
<thead>
<tr>
<th>Between Contextual Sub-systems Codes</th>
<th>Area of interest</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1-S1, S1-S2, S1 S3/S3*</td>
<td>Governance, Cooperation, Coordination</td>
<td></td>
</tr>
<tr>
<td>S2-S1, S2-S3</td>
<td>Coordination, Cooperation</td>
<td>Positive and negative issues found regarding the inter-organisational interactions of sub-systems</td>
</tr>
<tr>
<td>S3-S1, S3-S2, S3-S4</td>
<td>Governance, Cooperation, Coordination</td>
<td></td>
</tr>
<tr>
<td>S4-S3, S4-S5</td>
<td>Governance, Cooperation, Coordination</td>
<td></td>
</tr>
<tr>
<td>S5-S4</td>
<td>Governance, Cooperation, Coordination</td>
<td></td>
</tr>
</tbody>
</table>
Figure 5.8 Example Coding and Theme Identification Strategy. *The following themes are a small sample of what has been identified. This is just to illustrate the strategy we took in identifying relevant themes.

**Some themes are limited to only high-level themes. For instance, “Urgent problem solving” which is a part of coordination mechanisms cannot be encompassed under communication, and therefore the theme is limited to that level which we consider to be a high level.
Although some variability was seen in the two phases in what concerned the analysis and the coding structure, both followed the following phases depicted by Braun and Clarke (2006). First, the familiarization was done through prior knowledge of the cases and re-reading the transcripts. Second, the coding process followed an iterative approach accommodating positive and negative governance, cooperation and coordination issues found in these projects for phase 2 (see Chapter 7). However, for phase 2 the viable alliance model did frame the analysis in terms of sub-systemic interaction by highlighting the main interactions between different sub-systems. Themes were identified accordingly and ascribed to their related systemic interaction and units of analysis. Then themes were reviewed against the entire data set and corrections were made where necessary. In the later stages, themes were defined and named to depict the overall analysis. The themes generated from the two phases as key mechanisms were used in the third phase to analyse the interplay of governance, cooperation and coordination.

5.10 Reliability and Validity

“Physical concepts are free creations of the human mind, and are not, however it may seem, uniquely determined by the external world. In our endeavour to understand reality, we are somewhat like a man trying to understand the mechanism of a closed watch. He sees the face and the moving hands, even hears its ticking, but he has no way of opening the case. If he is ingenious he may form some picture of a mechanism which could be responsible for all the things he observes, but he may never be quite sure his picture is the only one which could explain his observations. He will never be able to compare his picture with the real mechanism and he cannot even imagine the possibility or the meaning of such a comparison.” (Einstein and Infeld, 1950)

Qualitative research and constructivism epistemology are acknowledged among realists to be unreliable and not valid. According to Patton (1990), there are neither formulas nor tests for assuring the significance of reliability and validity. As there are multiple ways of knowing and multiple perspectives on assessing the events transcribed. Drisko and Maschi (2015) suggest the terms of Credibility and Trustworthiness in place of validity. Accordingly, qualitative studies seek to be rich in the context of the cases under...
study rather than their generalizability, however, confirmability and completeness are important in qualitative research (Drisko and Maschi, 2015). To ensure the quality of social research in case study research, four tests are commonly used (Yin, 2013). Yin (2009) argued that validity is categorised under construct, internal and external validity. Reliability ensures that similar results would be obtained in the next research given the same sub-systemic description of research steps (Yin, 2009). As the cases used here were based on secondary data, validity and reliability were achieved initially in previous research when it comes to the quality of data. In terms of validation of the analysis, this was undertaken through external sources of evidence which encompassed the artefacts and reports from the case studies while also having cross-validated findings through the different phases.

5.11 Summary of The Research Methodology

This chapter provided the foundation on which this research is laid. First, the philosophical stance that this research follows has been discussed. A constructivist approach to epistemology was adopted given the contextual embeddedness of IOPs and the constructed social reality of different actors. Second, an abductive research approach was used to allow the use of VSM theory in IOPs alliances. It was a necessary endeavour to adopt such approach given the nature of the study which takes into consideration theoretical and empirical aspects. Third, the research process was briefly described which consisted of three phases. The first phase encompassed the first development and characterisation of the Viable Alliance Model (VAM) which was used to analyse the second phase. The second phase involved the analysis of secondary data consisting of six embedded projects (case studies) within three alliance networks. This has helped in better shaping the VAM through the analysis of IOPs within the three alliance networks. The development of the VAM framework has helped to analyse and unpack the interplay of governance, cooperation and coordination leading to theoretical contribution. The third phase involved a card assorting exercise revealing the key mechanisms of governance and coordination, and cooperation behaviours. This allowed to validate the previous findings and understand the nature of the interplay of the three factors. Fourth, research strategy and methods were discussed
highlighting the nature and means of the datasets collected. Fifth, the sampling rationale was justified in each of the three phases. Lastly, the validity and reliability of the data and analysis were discussed. The next chapter depicts the analysis process of each phase.
Chapter 6. Phase 1 - Viable Alliance Model Framework
Development of Governance Cooperation and Coordination

6.1 Introduction

This chapter unpacks the first phase of this study. It tackles the process of developing the viable alliance model (VAM) framework, and its related systemic characteristics of governance, cooperation, and coordination through 10 set of semi-structured interviews (n=6) and informal workshops (n=4) with a number of participants (Appendix 3 provides more details about the interviews). First, it presents the model developed for alliances and then depicts the key dimensions of governance, cooperation, and coordination across systemic boundaries. In doing so, a better understanding of what governance mechanisms and dimensions consist of in alliances and where they are placed across sub-systemic boundaries. Further, it explores the interplay of alliance governance, cooperation, and coordination. Therefore, aiming to develop a viable alliance model while generating the key dimensions and mechanisms of inter-organisational governance, cooperation and coordination enacted within sub-systems, which in turn underpins the subsequent analysis.

6.2 Development of Viable Alliance Model Framework

6.2.1 Initiation Interviews to Gain Insights into the Adoption /Adaptation of the VSM

The viable system model is a framework of organising that limits the hierarchies within organisations and allows for autonomy (Beer, 1981). The framework consists of multiple sub-systems interacting with each other through a set of sub-system roles. The VSM is generally conceived to be framed depending on the context of the organisation (Lowe et al., 2021). Therefore, it is necessary to frame the model in a way that is consistent with inter-organisational alliances. Interviews with four participants experienced in project governance and VSM helped shaping the initial VAM framework. The selection of these
participants were based on their accessibility and experiences especially in project
governance, having worked or consulted in alliance networks. The interviews took place
between April 2019 and January 2021, and were undertaken as follows:

1- One-hour informal discussion with a VSM practitioner and consultant to gain
more insight into how VSM is applied (n=1)

2- Two one-hour semi-structured interviews with the head of quality, governance and
assurance in a client organisation that had adopted an alliance approach with its
supply chain (n=1)

3- Two hours semi-structured interview that involved informal discussion on inter-
organisational governance design with two management consultants working on a
major railway project (n=2)

The following Table 6.1 shows the participants' roles and organisations working in.

<table>
<thead>
<tr>
<th>Participant code</th>
<th>Organisation</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>A client organisation adopting an alliance perspective with the integrator and its supply chain. The alliance is involved in construction of multiple projects and operations of an airport</td>
<td>Head of quality, governance and assurance</td>
</tr>
<tr>
<td>A2</td>
<td>A top tier consultancy organisation that is involved in designing an inter-organisational project governance for a rail megaproject.</td>
<td>Partner</td>
</tr>
<tr>
<td>A3</td>
<td>A top tier consultancy organisation that is involved in designing an inter-organisational project governance for a rail megaproject.</td>
<td>Associate</td>
</tr>
<tr>
<td>A4</td>
<td>Management consultancy firm with knowledge on VSM application</td>
<td>Manager</td>
</tr>
</tbody>
</table>

A detailed view of the viable system model for inter-organisational alliances was built from these perspectives. A one-hour interview (A4) with a VSM
practitioner/management consultant was useful in making sense of the operationality of the VSM and clarifying any questions about VSM framing. Each interview included a discussion of one long-term alliance. A1 belongs to a client organisation, and another two participants (A2 and A3) working on the inter-organisational design of a joint venture for a megaproject in the rail sector. The theoretical framing of the VSM was explained to the participants, then they mapped out the alliance roles of each system. As such, abductive reasoning aims to modify the logic of general theory to the contextual idiosyncrasies of alliances (Ketokivi and Choi, 2014). For instance the VSM framing (Peirce, 1960) was re-framed to address the contextualities of inter-organisational arrangement (i.e., joint ventures or strategic alliances). All shared common features within each sub-system, and a set of roles and responsibilities (Beer, 2001). The recursive nature of the VSM was discussed (e.g., System 1 may have another five sub-systems nested within it) as in Beer (1981). The following Figure 6.1 depicts the viable alliance model (VAM) constructed through the workshop, interviews. This model was the result of iterative approach between the data analysed and the VSM. It represents a typical alliance framework. The VAM consists of an alliance network model of governance, which incorporates various organizations as sub-systems based on the functionality of each organization within the alliance. This differs from Beer's VSM (1981), as the VSM concentrates on a single organization and its key departments. Additionally, the VAM specifically focuses on the concepts of governance, cooperation, and coordination. These concepts are illustrated in the characteristics of each sub-system, as shown below in Figures 6.2 to 6.4.
To systematically understand the interplay and interaction of inter-organisational governance, cooperation, and coordination the VSM can help identify unique characteristics (known as functionalities). Commonalities and distinctions were mapped out, providing a micro-analytical view of each sub-system and the interaction of mechanisms (Williamson, 1985). These interviews validated the VSM sub-systems and roles and indicated the need for its customisation to develop a Viable Alliance Model (VAM).

6.2.2. Interviews to Establish the Characteristics of a New VAM Methodology

A set of semi-structured interviews (n=6) with practitioners working in alliance networks supported the characterisation of the VAM. Table 6.2 provides the list of participants and their roles. Participants provided their perception of governance,
cooperation and coordination given their sub-systems roles in the network. These characteristics were based on the workshop and semi-structured interviews that the researcher had with participants. During the workshop the participants were asked to identify what characteristics each sub-system had in terms of governance, cooperation, and coordination. This was based on their experience of working in different sub-systems and projects.

Details of the semi-structured questions protocols are contained in Appendix 2. Due to the sample at this stage, S4, S3 and S2 interactions were observed, while S1 and S5 interactions were not.

### Table 6.2 List of Participants' details of Semi-structured Interviews

<table>
<thead>
<tr>
<th>Participants codes</th>
<th>Roles</th>
<th>Organisation type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A5</td>
<td>Head of quality</td>
<td>Client organisation</td>
</tr>
<tr>
<td>A6</td>
<td>Associate director</td>
<td>Contractor/integrator</td>
</tr>
<tr>
<td>A7</td>
<td>Quality Manager</td>
<td>Contractor/integrator</td>
</tr>
<tr>
<td>A8</td>
<td>Delivery director</td>
<td>Client organisation</td>
</tr>
<tr>
<td>A9</td>
<td>Managing director</td>
<td>Management consultancy</td>
</tr>
<tr>
<td>A10</td>
<td>Managing director</td>
<td>Contractor</td>
</tr>
</tbody>
</table>

#### 6.2.3 S4 Characteristics of Governance, Cooperation and Coordination

Like (Beer, 2002; Jackson, 1988), participants characterised the governance of S4 in setting out the strategy and future planning. Governance incorporated *the appraisal* that guides the alliance to plan projects, *risk management* (e.g. risk assessment and allocation), the *form of contract* which plays a role in determining how alliances are structured and controlled, and finally *the strategy and principles*. The cooperation included *collaborative standards, alignment and purpose, trust and relationships* which were key to addressing
systemic interaction. The coordination involved *engagement* with different stakeholders and *early planning and consultation*. Figure 6.2 represents S4 characteristics.

![Figure 6.2 S4 Characteristics of Governance, Cooperation, and Coordination](image)

Table 6.3 provides some supporting verbatim comments made by participants and illustrates the applicability of the model. As such, it shows how participants mentioned these governance, cooperation and coordination characteristics. For instance, appraisals were a governance characteristic as mentioned by one of the participants A5.
Table 6.3 Comments from Participants for S4 Characteristics

<table>
<thead>
<tr>
<th>S4 Characteristics</th>
<th>Comments from participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance: Appraisals</td>
<td>“[Organisation X] runs a reasonably rigorous project gateway process. The project is driven by regular gateway reviews which are reported out to management within [Asset].” A5 Head of quality</td>
</tr>
<tr>
<td>Governance: strategy and principles articulation</td>
<td>“they (owner organisation) look at portfolio level, so above programme level, because you may have multiple programmes running. Effectively, they work at portfolio level. One, the first thing is having a clear strategy, so you can design in all the principles from early on in the process” A10 Contractor.</td>
</tr>
<tr>
<td>Cooperation: Alignment and purpose</td>
<td>“…create an open culture so they’re not hiding stuff like I mentioned earlier on sharing virgin sharing costs and profits so there’s no hidden agenda there’s nobody trying to.” A8 Delivery director.</td>
</tr>
<tr>
<td>Cooperation: Trust</td>
<td>“But when we talk about cooperation, we’re talking about three particular elements in the psychometric, which are trust, openness to ideas and empathy. And then we have a balancing point, which is working with others.” A9 Managing director</td>
</tr>
<tr>
<td>Coordination: Engagement</td>
<td>“I think that’s expectation, more than anything really it’s about the stakeholder communication is around you know.” A8 Delivery director</td>
</tr>
<tr>
<td>Coordination: Early planning and consultation</td>
<td>“…just think you have to bring them into the product team early and get them on board” A8 Delivery director</td>
</tr>
</tbody>
</table>

6.2.4 S3 Characteristics of Governance, Cooperation, and Coordination

Like Beer (2002) S3 is the senior management of operations that govern what the organisation produces. In terms of inter-organisational alliance governance, this includes the structure, resources allocation, objective alignment, incentives, ownership and accountability, roles and responsibilities, requirements articulation, and leadership. Figure 6.3 represents the S3 characteristics.
Examples of comments made by participants in interviews shine a light on the key sub-system 3 characteristics are shown in Table 6.4.
Table 6.4 Comments from Participants for S3 Characteristics

<table>
<thead>
<tr>
<th>S3 Characteristics</th>
<th>Comments from participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance: Structure</td>
<td>“I think, when you’re talking about governance, the need to drive effective process and structure, that then drives governance, is something that a lot of alliances don’t do very well.” A9 Managing director</td>
</tr>
<tr>
<td>Governance: Requirements</td>
<td>“And I think, when it comes to the process point that you’re talking about, I think, around what we call sub-systems – so work sub-systems rather than IT sub-systems, although it encompasses both – the difficulty in effective alliancing comes when those parents drive governance requirements that aren’t value-added to the alliance’s outputs, but they are there to support the parent’s corporate governance or whatever.” A9 Managing director</td>
</tr>
<tr>
<td>Cooperation: Alignment and purpose</td>
<td>“…They really worked extremely proactively to drive a collaborative model and the behaviours that make a collaborative model work. That’s the way the second five years worked. Hopefully... The outcome of that was so positive, I’m sure they will carry on doing that in future.” A8 Delivery director.</td>
</tr>
<tr>
<td>Cooperation: Trust</td>
<td>“I think that most people in the construction industry want to do a good job and they believe they have the skills to do a good job. For me, it’s just a healthy human relationship to say, “I trust you to do your job. I’m going to check it every now and then but, nevertheless, I broadly trust you to do your job, you go and do it.” For me, that’s fundamental.” A5 Head of quality</td>
</tr>
<tr>
<td>Coordination: Early contractor involvement</td>
<td>“…But having that gateway process and those those sort of governance points and those communication channels Um? I think that allows everybody to be informed at the point they need to be informed.” A6 Associate director</td>
</tr>
<tr>
<td>Coordination: Process standardisation</td>
<td>“…I think it does, yes, and the reason it does is because it’s a standardized approach, whereas if we come in as a main contractor, our approach may be different to another contractor and another [man].” A6 Associate director</td>
</tr>
</tbody>
</table>

6.2.5 S2 Characteristics of Governance, Cooperation, and Coordination

S2 has a coordination functionality of all the activities across S1s to ensure their integration (Beer, 1981). Its role is limited to coordination and cooperation – it has no authority to influence S1. S2 inter-organisational alliance cooperation and coordination were evident from participant empirical descriptions. Cooperation characteristics include
relationships and how they interact, and collaborative planning, while coordination characteristics included communication, process and contract administration. Figure 6.4 represents the S2 characteristics.

![Figure 6.4 S2 Characteristics of Governance, Cooperation and Coordination]

Examples of empirical comments that relates to S2 made by participants in interviews are shown in Table 6.5

<table>
<thead>
<tr>
<th>S2 Characteristics</th>
<th>Comments from participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation: Relationships</td>
<td>“…But when we talk about cooperation, we’re talking about three particular elements in the psychometric, which are trust, openness to ideas and empathy. And then we have a balancing point, which is working with others.” A9 Managing director</td>
</tr>
</tbody>
</table>

Table 6.5 Comments from participants for S2 Characteristics
6.3 Confirmation and Adoption of a New Model

This chapter has developed a VAM model that allows the understanding of governance, cooperation and coordination in IOPs. Therefore, contributing to a common methodology for analysis across IOPs. As such, this chapter detailed how the VAM model has been rigorously developed using the VSM, literature of governance, cooperation and coordination, and data as a founding basis. The VAM model developed through the theoretical premises of VSM on one hand but also relied on the empirical data addressing contextual elements of alliances and IOPs. This has led to a unique model that represents IOPs involving multiple organisations. The next chapter shows how this new model has been applied to the assessment of six case study projects, embedded within three alliance network organisations.
Chapter 7. Phase 2 Case Study Analysis

7.1 Introduction

The following analysis tackled three alliance network frameworks namely A, B, and C on 6 projects (2 each) and data were collected in June 2015 as part of a study investigating innovations and factors contributing to project success (Mills, 2018). The data was collected through interviews from two projects within three alliance network frameworks with different outcomes (one positive and the other negative depicting the upper and lower level of success respectively) named by each of their relative infrastructure owner programme directors. Interviews ranged from 17 to 119 minutes. Two of the owner frameworks (A and B) have been implementing an alliance scheme in the last 5 years whereas owner C has initiated and implemented an alliance framework within the last 15 years. All three networks were considered strategic alliances. The data is therefore re-analysed and framed under the research questions presented in this study.

The two levels of analysis were carried out; the first level targeted the interplay of governance, cooperation and coordination across sub-systems interaction (on a project level); the second is a specific sub-systemic interaction that follows a more scrutinized aspects of governance, cooperation and coordination, for example between S3 and S1. It is worth noting that each of the alliance cases analysed is different in their sub-systemic arrangements (see Appendix 4 for the network structures). That is, each sub-system depicts either an organisation or an integrated team different from other organisations, except for system 1 as it deals with the teams that deliver the project (Beer, 1981) which are in here the consultants, suppliers, contractors, and subcontractor depending on the level of recursion. A more detailed elaboration of this is provided for each of the cases in the following sections.
7.2 Case Description

The following sections will entail the description of the alliance networks and their high and low-performing projects. The high and low-performing projects were selected by the alliance networks programme managers based on their performance in terms of cost, time, and achievement of their objectives. This was then verified through project documents and artefacts. A summary of these cases is shown in Table 7.1.

Table 7.1 Projects description for Alliance network A, B and C

<table>
<thead>
<tr>
<th>Network A</th>
<th>Cost</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood Defense (Coastal)</td>
<td>Project A</td>
<td>£29.2 million A coastal defense scheme covering 2.4 km. It involved installing a rock revetment, shingle beach, timber groynes, vehicle ramps and extension to designated environmental site and live firing range.</td>
</tr>
<tr>
<td>Flood Defense (River)</td>
<td>Project A</td>
<td>£6.5 million A new river flood defense scheme. This scheme was the third phase. It consisted of steel sheet piles with precast concrete cladding units, raised embankments, precast concrete walls, and wetland environments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Network B</th>
<th>Cost</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail (Station Refurbishment)</td>
<td>Project B</td>
<td>£14.5 million A refurbishment of a station including M&amp;E services, information sub-systems and finishes to improve customer service and make them safer to operate and cheaper to maintain.</td>
</tr>
<tr>
<td>Rail (Platform Extension)</td>
<td>Project B</td>
<td>£3.4 million An investment to extend and widen platforms at an inner-city railway station. The scheme consisted of site clearance, sheet piling, ground works, capping beam and in-situ concrete.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Network C</th>
<th>Cost</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Recycling Centre</td>
<td>Project C</td>
<td>£22 million The installation of a pumping station and eight new treatment tanks. Delivered to a tight 10-month construction deadline and came in £9 million below the budget.</td>
</tr>
<tr>
<td>Water Treatment Centre</td>
<td>Project C</td>
<td>£8 million The construction of a new water treatment plant on an existing decommissioned site. It was a emergence of regional water supply and demand issues.</td>
</tr>
</tbody>
</table>

7.2.1 Alliance Network A Case

The first case represents an integrated supplier framework initiated in 2013 that constructs and operates coastal and waterways projects. Their framework structure
involves a Joint Venture (JV) with outsourced suppliers through design and build contracts. 17 semi-structured interviews ranged from 19 to 74 minutes. Interviews were conducted on two projects A⁺ (Coastal defence) and A⁻ (River flood defence). The contracts on the both projects were a mixture of Framework Agreement and target cost NEC Option C.

Project A⁺ It consists of a coastal defence scheme. The scheme covers the 2.4 kilometres of beach from The Suttons, Camber to the western boundary of Lydd Ranges, and includes the following scope:

• Installation of a new 1.8km long rock revetment with attendant wave wall and widened promenade

• Increasing the amount of shingle on the beach (70,000m³ over 700 linear meters)

• Installing 8 new 60m timber groynes to stabilise the recharged beach

• Construction of 6 steps of access steps and two new vehicle ramps from the new promenade to the beach.

• Extending the original scheme by 130m, protecting additional properties.

The outcome of the project aims to reduce flood risk for 14,500 homes, improve numerous businesses, provide a nuclear power station, and deliver significant areas of designated habitat and 2 Ministry of Defence firing ranges. The coastal defence scheme aims to directly protect approximately 1,300 homes and over 100 businesses. Also, it will increase the standard of protection from coastal flooding to the area from 1 in 20 years to 1 in 200 years, taking into account predicted sea level rise.

The extension was within a heavily designated environmental site and live firing range, and was devised, approved, designed, consented and built during the construction phase and without affecting the construction programme. This resulted in significant efficiencies.
Project A consisted of a river flood defence in Warrington involving steel sheet piles with precast concrete cladding units, raised embankments, precast concrete walls, and wetland environments, costing around £6.5. The project had three phases spread across three geographical sites Paddington Bank, Twiggeries and Cinnamon Brow. The project aims to improve the standard of protection to prevent flooding from 1% Annual Exceedance Probability (AEP) event and provide 5 hectares of Biodiversity Action Plan (BAP) habitat. The + and – signs designate the ranking of projects by the owner programme director as a higher level of success and a lower level of success respectively.

7.2.2 Alliance Network B Case

The framework of alliance network B was introduced to allow direct contracting with specialist contractors delivering on-site surveying and station refurbishment. Therefore, allowing the owner to have an integrative function, by buying in the consultancy services including project management, design, commercial management and other support services to add to the existing in-house capabilities. Although there were some contract variabilities between programmes and projects, cost-reimbursable contracts were dominant across suppliers and used for fast delivery. Two projects were studied one B+ (station refurbishment) costing £14.5 million consisting of refurbishment of a station including M&E services, information sub-systems and finishes to improve customer service and make them safer to operate and cheaper to maintain. The other B− project consisted of a platform extension at an inner-city railway station consisting of site clearance, sheet piling, groundworks, capping beam, and in-situ concrete costing £3.4 million.

7.2.3 Alliance Network C Case

Alliance C was initiated in 2004 and is deemed to be one of the longest-running in the UK infrastructure sector. It was formed through an alliance contract by which the owner, advisors, contractors and suppliers formed a special-purpose vehicle (SPV) for the delivery of new build and greenfield sites, refurbishment and extensions, water and wastewater networks and process plants. This alliance has demonstrated a high level of maturity in its
governance and operations processes as will be seen later in the analysis which was also attested by the participants of the study. The alliance consisted of seven member organisations including that of the owner who exhibits the integrator role providing sub-systems integration capability across projects. The business plan and programme targets were set, and project investment costs were agreed upon by all parties involved in the delivery of the required outcomes. This has been done under a common outperformance-based commercial model. It is worth noting that suppliers who are part of the long-term framework were also invited early on to manage horizontal and vertical interfaces and to advise on planning.

7.3 Analysis 1 – The Interplay of Governance, Cooperation and Coordination in Projects of Networks A, B and C

The following analysis 1 consists of the interaction between governance, cooperation and coordination in sub-systemic interaction across higher and lower-performing projects in networks. Having said that, the interaction is evaluated from an overall inter-organisational project across sub-systemic perspective – a macro perspective, and between sub-systemic interaction representing what is happening in such interaction in terms of governance, cooperation and coordination – a micro perspective.

7.3.1 Alliance Network A Project A

Sub-systemic Interaction Perspective for Project A

From a micro perspective, the interaction between S1 and other sub-systems from a governance perspective between contractor and subcontractor/designer the interaction is deemed positive with good monitoring and clear requirements circulating. Nevertheless, there were issues pertaining to coordination between S1 (contractor) - S1 (designer) in terms of design, and communication:

“…During the construction of it, getting our messages across to the contractor was difficult.” [Design Integrator – 10, S1-S1 Coordination]
Concerning the interaction between S1 (Contractor) – S3 (Owner Integrator) issues such as no incentives (cooperation) were apparent

“...because there's very little financial reward for achieving those outcomes that are set up within the contract and very little incentivisation in terms of repeat work that is generated and through the framework these days” [Supplier – 11, S1-S3 Cooperation]

While compensation events (coordination) also influence the project negatively. Regarding the interaction between S2 (owner site supervisor and project management consultant) and other related sub-systems S1 and S3. S2-S1 exhibits issues in relationships (Cooperation) in terms of blaming and distrust. For S2-S1 coordination, issues of the process were observed as being complex, while communication was positive. For S2-S3 the complex process had a negative effect on coordination. The following Table 7.2 highlights the positive and negative characteristics for Project A

Table 7.2 Alliance Governance, Cooperation and Coordination Characteristics (Positive and Negative) Through VAM Framework for Project A. Note: (+) And (−) Signify A Positive or Negative Characteristics.

<table>
<thead>
<tr>
<th>Project A’</th>
<th>Governance</th>
<th>Cooperation</th>
<th>Coordination</th>
</tr>
</thead>
</table>
| S4-S3 (Programme directors – Owner PM/Owner integrator) | • Appraisals (+)  
• Establishing long-term strategy (+)  
• Lack of owner integration and unity of demands (−)  
• Form of contract influencing (−) | • Engagement (+)  
• Early Planning and Consulting (+) | |
| S3-S1 (PM/Owner integrator – Supplier/Designer) | • Resources (+)  
• Leadership (+)  
• Objective alignment and shared vision (+)  
• Requirements (−) | • Relationships (−)  
• Alignment and purpose (−) | • Early contractor involvement (+)  
• Urgent problem solving (+) |
| S3-S2 (PM/Owner integrator – Contractor/Site supervisor) | | | • Contract administration (+) |
The interactions between owner integrator S3 and other sub-systems S1 and S2 show negative issues when it comes to governance and cooperation. For instance, S3-S1 cooperation highlights negative issues of trust in the relationship between both sub-systems.

Owner integrator discussed the relationship with the contractor:

*On this contract the site agent from the contractor had quite a bad experience working for the [Client] in another area...they’d lost monies and I mean perhaps he got into some trouble within his organisation for how things had turned out”. “...essentially he came to this contract with that ...sort of resentment towards the [client] and lack of trust towards us and we were in a difficult starting point to try and establish that trust and co-operation and team-working mentality that you would typically like to see on a framework project. So I think that was part of the problem ”.*[Owner-Integrator PM – 13, S3-S1 Cooperation]

Nonetheless, there was to some extent a good allocation of resources, leadership, motivation and objective alignment with a shared vision in governance. In cooperation, negative influences were predominant in the interaction between S3 and S1 in terms of relationships and alignment and purpose. Concerning coordination, good practice was found from the S3-S1 in terms of early contractor involvement, requirements, and urgent problem solving. The owner project manager added

“...There is a mechanism there within the contract, that as soon as the problem’s identified, there will be an early warning meeting [to] discuss what the options are
to deal with it in the most timely and cost-effective manner” [Owner PM – 12, S3-S1 Coordination].

Additionally, in relation to S3-S2 coordination, positive outcome has been found in contract administration.

When it comes to sub-systemic interaction between S4 (Programme directors) and other sub-systems S3 and S5 (the owner/client executives) concerning governance, some issues influence negatively which first was the lack of owner integration and unity of demands. Second, the form of the contract had a negative impact on the project overall.

The designer integrator revealed that:

“We’ll sit down with the operations clients and they’ll tell you actually you need additional access points here and here or operationally we’ve got trouble with these sorts of structures so we want something else designing...then we’ll get a ring through from the area client saying, yes; and then we’ve had feedback from these residents and they don’t want this particular type of structure here...[so we] do some re-design work to accommodate that” [Designer Integrator – 14, S4-S3 Governance].

However, there were also some positive elements when it comes to the appraisal process and establishing long-term relationships (S4-S3). For coordination, S4 was proactively applying engagement with stakeholders and having early planning and consulting.

Cross Sub-Systemic Interaction Perspective for Project A

From a macro level perspective, one can notice the negative issues related to cooperation across sub-systems within the project. This mainly related to the previous bad relationships between the contractor and the owner integrator and the choice of contract which did not incentivise the project teams and had a negative effect on alignment and purpose. From a governance perspective across the project, issues in requirements, lack of
owner integration and unity of demands, and the negative influence of the contract have had an impact on the overall project which has affected both cooperation (relationships and lack of alignment) and coordination (compensation events and design).

For instance, the lack of owner integration and unity of demand, and the choice of contract (governance structure) did not incentivise the project teams and had a negative effect on alignment and purpose.

“...I think certainly the form of contract did influence things – they were a little bit more cautious when there’s change because they want to make sure that they are going to get paid for this change and it’s – where the risk for those costs lie” [Owner Integrator PM – 13].

Also, the governance issues in S3-S1 in terms of requirements articulation had an effect on coordination down the supply chain S1s in terms of design and compensation events.

“...What [the client] wanted was all the precast to match, but [the designer] hadn’t put that in their works’ information, so that led to massive compensation events” [Contractor-Supplier – 11].

This has also affected cooperation in having misalignment of purpose:

“...The contractor who was there to deliver the works wasn’t really interested in any other outside things that might change things, that might be reported to the client, he was just going to do his job and if things changed and we were looking to instruct initial works he was like, “Oh, do I have to do that?” And appeared to be playing games all the time” [Owner Integrator PM – 13]

Project A’s issues were found between S4 and S3 in terms of governance such as the lack of owner integration and unity of demands and form of contract negatively influencing. In terms of coordination such as early planning and consulting, S3-S1 and S1-S3 systemic interaction have also suffered from issues in requirements (governance), relationships,
opportunism, alignment and purpose and no incentives to cooperation (cooperation). Coordination issues were limited to the compensation events which are related to issues in requirements (governance). Issues were also happening between S2-S1 as bad relationships (cooperation). S2-S3 has also suffered from process issues (coordination). The requirements issue had its effect on coordination with design changes as one of the suppliers declared:

“Design changes, and it was real poor works’ information...where do I start?
There were four areas on the scheme and they used [contractor] for three of them and they used [consultant] for another one” [Supplier – 11]

7.3.2 Alliance Network A Project A+

Sub-systemic Interaction Perspective for Project A+

As presented in Table 7.3, the S1-S1 interaction (contractors and sub-contractors/suppliers) exhibit shared values and culture which highlights a good aspect of governance. Similarly, in terms of cooperation, the contractor and subcontractor have good working relationships. For coordination, there is one negative influence in communication that is related to the remote designer causing communication to take time. On the other hand, there were some positive influences on coordination pertaining to alignment of suppliers and pricing coordination between contractor and subcontractor.

In relation to S1-S3, the only noticeable issue was that there was no early engagement with the client prior to the project.

“Very little input at all [to the early stages of the project]”. “we priced to place the rocks armour and to do excavations...we did not go to any progress meetings, we only met with [Contractor] to discuss progress and any variations” [Supplier – 8, S1-S3 Coordination].

Moving to S2, in terms of cooperation there was an alignment between S2 and S1 regarding alignment and purpose. Nevertheless, issues of coordination were found
between both sub-systems mainly related to complex processes, and communication in the late timing of responses due to remote designer.

For instance, the consultant integrator mentioned:

“*We did have some issues with design details...those could have probably been resolved quicker and more efficiently, some of those were left to drag on*”. Slow speed at which *design issues were resolved*” [Consultant integrator PM – 2, S2-S1]

For S2-S3 coordination, there was a negative influence of the long process between the PM consultant and the owner.

*Table 7.3 Alliance Governance, Cooperation and Coordination Characteristics (Positive And Negative) Through the VAM Framework for Project A+. Note: (+) And (−) Signify A Positive or Negative Characteristics*

<table>
<thead>
<tr>
<th>Project A+</th>
<th>Governance</th>
<th>Cooperation</th>
<th>Coordination</th>
</tr>
</thead>
</table>
| S5-S4 (Executives/CEO – Programme directors) | • Project strategy and programme (+)  
• Establishing good relationship with the community (+)  
• *Lack of decision making alignment and clear points of contact (−)* |                           |                                   |
| S4-S3 (Programme directors – Owner PM/Owner integrator) | • Appraisals (+)  
• Form of contract influencing (+) |                           | • Engagement (+)  
• Early planning and consulting (+) |
| S3-S1 (PM/Owner integrator – Supplier/Sub-contractor) | • Resources (+)  
• Structure (+)  
• Requirements (+)  
• Leadership (+)  
• Objective alignment and shared vision (+)  
• Risk management (+) | • Alignment and purpose (+) | • Early contractor involvement (+) |
| S3-S2 (PM/Owner integrator – Contractor/Site supervisor) |                           | • Contract administration (+) |                                   |
The interaction of S3 with other sub-systems S1, S2 and S4 looked overly positive. For governance, S3 exhibits good objective alignment and shared vision; resource allocation; leadership; requirements; risk management and structure.

For instance, the consultant integrator mentioned the objective alignment and shared vision:

“The [Client] and the contractor, they definitely wanted everyone to see this as a success, this project”. “It wasn’t... I don’t think [the contractor]...seeing it as a, “Let’s just make some money and run”. They wanted to spend more on it, but be seen as a... for it to be seen as a sort of exemplary project” [Consultant integrator PM – 1, S3-S1 Governance]

For cooperation, there was an alignment and purpose between S3 and S1. In terms of coordination, there was a good articulation of requirements, and early contractor

<table>
<thead>
<tr>
<th>S2-S1 (Integrator – Supplier)</th>
<th>• Alignment and purpose (+)</th>
<th>• Project management and cost consulting (+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2-S3 (Integrator – PM/Owner integrator)</td>
<td>• Process (-)</td>
<td>• Communication (-)</td>
</tr>
<tr>
<td>S1-S3 (Supplier – PM/Owner integrator)</td>
<td>• No early engagement with client (-)</td>
<td></td>
</tr>
<tr>
<td>S1 (Supplier) – S1 (Supplier)</td>
<td>• Shared values and culture (+)</td>
<td>• Good working relationships (+)</td>
</tr>
<tr>
<td></td>
<td>• Pricing coordination (+)</td>
<td>• Alignment of suppliers (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Communication (-)</td>
</tr>
</tbody>
</table>

---

The interaction of S3 with other sub-systems S1, S2 and S4 looked overly positive. For governance, S3 exhibits good objective alignment and shared vision; resource allocation; leadership; requirements; risk management and structure.

For instance, the consultant integrator mentioned the objective alignment and shared vision:

“The [Client] and the contractor, they definitely wanted everyone to see this as a success, this project”. “It wasn’t... I don’t think [the contractor]...seeing it as a, “Let’s just make some money and run”. They wanted to spend more on it, but be seen as a... for it to be seen as a sort of exemplary project” [Consultant integrator PM – 1, S3-S1 Governance]

For cooperation, there was an alignment and purpose between S3 and S1. In terms of coordination, there was a good articulation of requirements, and early contractor
involvement was present in terms of S3-S1. Also, there was a positive contract administration, project management and cost consulting in the interaction between S3 and S2. This has shown how well-governed, integrated, and collaborative S3 is with other sub-systems.

For the interaction S4 and S3 in terms of governance, there was a positive appraisal process, and the use of contract (ECC Option C) has positively influenced the overall project. Concerning coordination, an engagement with stakeholders and the project team alongside the early planning and consultation was observed.

As the owner integrator project manager added:

“*That was a good scheme*. Which is why I suggest it has been. *I think aided by us setting up a decent contract in the first place and that’s hugely important to me*”
[Owner integrator PM – 4, S4-S3 Governance]

When it comes to S5 interaction with S4, positive governance outcomes were observed such as a good strategy and programme of projects and establishing a good relationship with the community. However, there was a misalignment in the owner decision-making structure and a lack of clear points of contact between the project team, the owner and the asset management, as there were no proper lines of communication and definition of roles and responsibilities.

**Across Sub-systemic Interaction Perspective for Project A**

Overall, project A exhibits positive outcomes of governance, cooperation and coordination across sub-systems. The good practice found in the governance of S5-S4 and S4-S3 has influenced the governance of S3-S1. For instance, good appraisal mechanisms and form of contract (S4-S3) had a positive effect on managing risks and requirements. As the consultant integrator mentioned:
“It was also considered too big a risk to pass directly onto the contractor, so, basically, it was left at the management of the materials within the site was a contractor risk, but the management of materials, the materials that had to go outside of the site, was a client risk”. “…we had quite clear goalposts in terms of who was responsible for what” [Consultant integrator PM – 2]

Also having a clear strategy and programme of projects (S5-S4) has led to objective alignment and shared vision and clear requirements (S3-S1) and made the project team having alignment and purpose (cooperation). As the consultant integrator mentioned:

“…the [client] and the contractor, they definitely wanted everyone to see this as a success, this project”. “It wasn’t… I don’t think [the contractor] …seeing it as a, “Let’s just make some money and run”. They wanted to spend more on it, but be seen as a… for it to be seen as a sort of exemplary project. In terms of public engagement” [Consultant integrator PM – 1]

Further, S2 seemed to have issues in terms of coordination with respect to its interaction with S1 and S3. This has shown some disintegration between S1 and S3 in terms of the process which was complex and affected the engagement between S1-S3 and the communication between S1-S1. As one of the suppliers mentioned:

“Very little input at all [to the early stages of the project]”. “we priced to place the rocks armour and to do excavations…we did not go to any progress meetings, we only met with [contractor 1] to discuss progress and any variations”. “we might have met with [name] from [contractor 2], or [name] or [name] from [contractor 1]… but we were not invited to any other meetings and would not have attended” [Supplier S – 7].

7.3.3 Alliance Network B Project B
**Sub-systemic Interaction Perspective for Project B**

As presented in Table 7.4, the interaction between S1 (contractor/consultant/suppliers) and their counterparts from S1 have had good working relationships which highlights a good cooperation outcome. In terms of coordination, there were issues related to design mostly attributed to late design information. Nevertheless, the project team showed a good degree of adaptability when it comes to adjusting the workflow. Regarding S1-S3, an environment of trust and good working relationships (cooperation) was manifested. As the consultant integrator mentioned.

“...trust got built very early on. I’m quite an upfront kind of guy and any problems that came I will go to ...you know, I didn’t hold back any of the information so I build up a trusting relationship with [name] quickly” [Consultant integrator CI – 31, S1-S3 Cooperation]

Nonetheless, an issue that appeared to S1-S3 coordination is that some of the suppliers have not been engaged early on with the client. In terms of S2 (PM consultant/site supervisor) interaction with other sub-systems, only good monitoring of S1 (suppliers/contractors) was observed.

Concerning S3’s interaction with other sub-systems (S1 and S2), S3-S1 exhibits good governance mechanisms in terms of motivation, effective control and risk. Nonetheless, leadership was an issue - more particularly in terms of recognition - and resources as there was a continuous change of management when it comes to the governance of S3-S1. For instance, one of the suppliers mentioned:

“A tricky job in its own right from the offset that had been ill-planned and etc. that wasn’t going very well, was made even more problematic when you were swapping and changing management all the time” [Supplier S – 30, S3-S1 Governance]

Regarding S3-S1 cooperation, there was collaborative planning, alignment and purpose through the supply chain and good relationships allowing for trust. When it comes to coordination, issues of documentation and paperwork were found nevertheless, there was
urgent problem solving between both sub-systems. When it comes to S3 (Owner PM/owner integrator) - S2 (PM consultant/site supervisor) interaction, it was found that there was continuous changing of resources which has affected the interaction of S2 with other sub-systems S1.

When it comes to S4 (programme directors) interaction with S3 (owner project manager, and integrator) there was early planning and consultation (coordination) before giving the go-ahead on site.

Table 7.4 Alliance Governance, Cooperation and Coordination Characteristics (Positive and Negative) Through VAM Framework for Project B-. Note: (+) And (−) Signify A Positive or Negative Characteristics.

<table>
<thead>
<tr>
<th>Project B</th>
<th>Governance</th>
<th>Cooperation</th>
<th>Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5-S4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Executives/CEO – Programme directors)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S4-S3 (Programme directors – Owner PM/Owner integrator)</td>
<td></td>
<td></td>
<td>Early planning and consulting (+)</td>
</tr>
<tr>
<td>S3-S1 (PM/Owner integrator – Supplier/Sub-contractor)</td>
<td>• Effective control (+)</td>
<td>• Alignment and purpose (+)</td>
<td>• Problem solving (+)</td>
</tr>
<tr>
<td></td>
<td>• Motivation (+)</td>
<td>• Collaborative planning (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Risk (+)</td>
<td>• Relationships (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Resources (−)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Leadership (−)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3-S2 (PM/Owner integrator – Contractor/Site supervisor)</td>
<td>• Resources (−)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2-S1 (Integrator – Supplier)</td>
<td></td>
<td></td>
<td>Monitoring (+)</td>
</tr>
<tr>
<td>S2-S3 (Integrator – PM/Owner integrator)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1-S3 (Supplier – PM/Owner integrator)</td>
<td>• Trust and good working relationships (+)</td>
<td></td>
<td>No early engagement with client (−)</td>
</tr>
</tbody>
</table>

Table 7.4 Alliance Governance, Cooperation and Coordination Characteristics (Positive and Negative) Through VAM Framework for Project B-. Note: (+) And (−) Signify A Positive or Negative Characteristics.
S1 (Supplier) – S1 (Supplier)

• Good working relationships between contractor and subcontractor (+)
• Joint problem solving (+)
• Design (−)

**Across Sub-systemic Interaction Perspective for Project B**

Despite some issues of coordination found across sub-systems, the governance and cooperation in this project have mostly shown good practice as positive attributes were found in these two units across the project. Nonetheless, issues of resources and leadership were found in governance due to continuous changes of resources in management and the lack of recognition for some suppliers.

This may have affected issues in coordination such as design, lack of early engagement with clients, and in documentation and paperwork. For instance, one of the suppliers mentioned governance in terms of risk management affecting coordination.

“During the actual construction process, yeah, it was up to the stage of 5 o’clock sometimes on a Friday where we didn’t, where we had still not had clear instruction whether we were meant to be working the weekend possession. It was up to 5 o’clock on other Fridays where we were meant to be working the weekend possession but [the delivery team] still hadn’t got the relevant method statements and risk assessments approved...” [Supplier S – 30]

Further, the external environment has influenced the project outcomes due to some challenges found in the ground (soil and sheet piles). Also, it must be noted the limitations of the analysis here, as the data for this project were limited to a sample size of 4 which explains why the tables below are not that populated.
7.3.4 Alliance Network B Project B+

**Sub-Systemic Interaction Perspective for Project B+**

As presented in Table 7.5, the interaction between S1 (contractor/consultant/suppliers) and their counterparts from S1 have had good working relationships between contractor and subcontractor which highlights good cooperation. In terms of coordination, there were issues related to design mostly attributed to late design information. Nevertheless, the project team showed a good degree of adaptability when it comes to adjusting the workflow. Regarding S1-S3, there were a stable workforce and committed teams from S3 responding to the enquiries and managing the work with S1. Indeed, this has fostered the cooperation between S1-S3 as an environment of trust and good working relationships was manifested. For instance, one of the suppliers mentioned

“Again, it was [client] had the same management maybe throughout the project; we had the same supervisor, the same project management. You build relationships, and sometimes it takes time to build relationships and trust, and I think we’d built our relationship and trust very quickly by showing what we could actually do and what we were all about” [Supplier S – 23, S1-S3 Cooperation]

Nonetheless, an issue that appeared to S1-S3 coordination is that some of the suppliers haven’t been engaged early on with the client.

**Table 7.5 Alliance Governance, Cooperation and Coordination Characteristics (Positive and Negative) Through The VAM Framework for Project B+. Note: (+) And (–) Signify A Positive or Negative Characteristics.**

<table>
<thead>
<tr>
<th>Project B⁺</th>
<th>Governance</th>
<th>Cooperation</th>
<th>Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5-S4 (Executives/CEO – Programme directors)</td>
<td>● Form of contract influencing (+)</td>
<td>● Engagement (+)</td>
<td></td>
</tr>
<tr>
<td>S4-S3 (Programme directors – Owner PM/Owner integrator)</td>
<td>● Appraisals (–)</td>
<td>● Early planning and consulting (+)</td>
<td></td>
</tr>
<tr>
<td>Relationship</td>
<td>Positive Factors</td>
<td>Negative Factors</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td></td>
</tr>
</tbody>
</table>
| S3-S1 (PM/Owner integrator – Supplier/Sub-contractor) | Resources (+)  
Leadership (+)  
Effective control (+)  
Motivation (+)  
Risk (−)  
Structure (−)  
Requirements (−)  
Commercial pressure due to low cost (−) | Alignment and purpose (+)  
Collaborative planning (+)  
Cooperation improvement (−)  
Advising on buildability (+)  
Auditing and monitoring (−)  
Documentation and paperwork (−) |
| S3-S2 (PM/Owner integrator – Contractor/Site supervisor) | Contract administration (+)  
Lack of integration (−)  
Lack of formulized responsibilities (−)  
Incomplete planning (−) | Monitoring (+)  
Communication (+)  
Contract administration accessibility (+)  
Coordination with multiple contractors (+)  
Lack of sequencing of the workflow (−)  
Process (−) |
| S2-S1 (Integrator – Supplier) |  
*Blaming suppliers for inefficiencies in work (−)* | Monitoring (+)  
Communication (+)  
Contract administration accessibility (+)  
Coordination with multiple contractors (+)  
Lack of sequencing of the workflow (−)  
Process (−) |
| S2-S3 (Integrator – PM/Owner integrator) | Lack of alignment of requirements (−)  
Lack of commercial integration (−) | |
| S1-S3 (Supplier – PM/Owner integrator) | Stable workforce/resources (+)  
Committed teams (+)  
Trust and good working relationships (+) |  
No early engagement with client (−) |
| S1 (Supplier) – S1 (Supplier) | Good working relationships between contractor and subcontractor (+) | Adaptability (+)  
Design (−) |
When it comes to S2, one issue was found related to the cooperation between S2 and the project team of contractor and consultant integrator (the commercial part) in terms of blaming for inefficiencies in work.

In terms of the coordination between S2 and S1, there was good monitoring of the work and easy contract administration accessibility (through a unified MIS) which in turn allowed complex coordination with many contractors. Nonetheless, there were issues with the process and no clear sequencing of the workflow. For instance, the consultant integrator discussing the process of compensation events

“NCE is a Notification of Compensation Event and a CRF is a Change Request Form, yeah. So we’d have to do all those processes because the spec hadn’t [got it in]... the CRFs and the NCEs were the extra paperwork that was quite unnecessary”. “If I need to put this light up in here and there’s no power for it and I realise well after I’ve left the room but need to come back in there is always going to be an element of non-productive working” [Consultant integrator CI – 19, S2-S1 Coordination]

Regarding S2-S3, there were no alignment of requirements and a lack of commercial integration. This can be explained as a coordination issue of S2 across sub-systems (S1 and S3).

Concerning S3, issues of governance and coordination were found between S3-S1 and S3-S2. As such, from a governance perspective, there was some commercial pressure due to low cost, requirements (unclear requirements, design issues, and continuous change requests), no formal structure, and an unclear risk-sharing mechanism. The supplier discussed how risk mechanisms were not effective.

“Everybody’s human and everybody makes mistakes. If there was a mistake and somebody tried to say, ‘Right, that’s disallowing costs. That wasn’t in the contract. [the client] were taking the risk; take the cost element risk out of your schedule of
your rates’. So, we took that risk element out and then they started to come back and say, not on a massively scale because we did very little wrong, but I know a few companies had a massive problem with this, and they were suddenly going, ‘You’ve done it wrong. We’re not paying you; that’s a disallowed cost’ [Supplier S – 23, S3-S1 Governance]

However, some positive aspects of governance were found regarding resource management, team motivation and leadership along with effective control. From a coordination viewpoint, although suppliers/contractors were advising on buildability, there were some issues with communication, documentation and paperwork in auditing and monitoring. Despite this, collaborative planning and alignment and purpose in terms of teams’ cooperation between S3 and S1 are observed, however opportunistic behaviour also was observed. The owner-integrator project manager discussed how suppliers benefited from compensation events

“...But the thing that stops me completely raving about them is then on compensation events they would do the odd thing that stops me completely raving about them... applying blanket percentage uplifts for no reason, that sort of thing” [Owner integrator PM – 21, S3-S1 Cooperation]

For S3-S2, coordination issues were found such as a lack of integration and formalized responsibilities along with incomplete planning.

In terms of S4 and interaction with its counterparts of sub-systems, it must be noted that the form of contract has had an influence on project teams (contractors/suppliers) which is mostly positive. Nevertheless, there was an unrealistic price plan found in the appraisal process which affected contractors and suppliers. As the consultant integrator mentioned

“There was no way of putting inefficiencies and where you wanted to do works together; so the cost plan cost was not realistic and they were sort of held to that cost. And also there was a lot of scope from the specification document that didn’t
make it across to the cost plan because it was put together by Commercial Managers; they did the best they could. There was a lot of pressure to hit the site”

[Consultant integrator CI – 19, S4-S3 Governance]

**Across Sub-systemic Interaction Perspective for Project B⁺**

There were issues of governance related to the structure, requirements formulation and articulation, risk sharing (S3-S1) and low pricing appraisal (S4-S3). These have also affected the coordination of sub-systems in making processes more complicated, having an unclear sequencing of the workflow, misaligning requirements, no formalisation of responsibilities, and lacking integration and auditing and monitoring across sub-systems. For instance, the suppliers discussed the lack of formalisation of responsibilities and misalignment of requirements.

“The Project Manager is instructing you to do additional work, and then, and I’ll never forget, it’s as clear as day, the Construction Manager, saying, ‘I want you to do X, Y and Z and just get it done and I want ten blokes here this weekend because we’ve got to meet these dates. It’s a cost-reimbursable contracts and do as I say and you’re going to get paid anyway.’ Whereas the Commercial take on it is work is seen to be properly instructed through their process and the resources justify”

[Supplier S – 23, Coordination]

“[the client] is quite broad…you’ve got the project team, which is the PM and APM, and then you had the commercial team, and the two seem to be quite demarcated, they’ve got slightly different requirements” [Supplier S – 18, Coordination]

In terms of cooperation, project teams were mostly collaborative and there was a sense of commitment and trust across in Project B⁺ team, despite some blaming that was found from the commercial team towards the suppliers for inefficiency in their work. The issues of governance highlight two main challenges that are found in supplier network B⁺; the first was the separation of entities between the owner integrator (S3) and the consultant
integrator (S2) (whom in these data were the commercial teams) which has shown clearly the disintegration of the work.

The second was that of owner integrator (S3) and contractors and suppliers (S1). As the capabilities in governing the project when it comes to S3-S1 interaction were poor and this is mainly structural in terms of risk sharing mechanisms, allocation of responsibilities and requirements to name a few. One of the suppliers mentioned

“Yeah so any time we would have raised queries on specification and looked for advice on it there was a lot of confusion of who the final person was to make any calls and decisions on it. And it did take time for some areas for us to get a decision made on it”. [Supplier S – 26, Governance]

On another note, the cooperation of project teams was the highlight of this project which is visible across the subsystem despite one data point where there was some blaming for inefficiencies which comes from S2 (consultant integrator) which indeed fortifies the explanation behind the disintegration between S3 (owner integrator) and S2 (consultant integrator).

7.3.5 Alliance Network C Project C

Sub-systemic Interaction Perspective for Project C

As presented in Table 7.6, the S1’s interaction with other sub-systems S1, S2, and S3, had issues in coordination. For instance, S1-S1 have had a good cooperative environment highlighting good working relationships between contractors and subcontractors. However, in terms of S1-S2 coordination was not at its best. This is mainly due to the continuous changing of resources where S1 had to coordinate the work with different personnel. This has also caused some clashes in design having different design drawings. Nonetheless, there was good coordination with the owner supervisor onsite. When it comes to the interaction of S1 with S3 there was early involvement of contractors, however, some issues have emerged in compensation events in case of changing requests as reported by one of the suppliers
“…And basically, they said, “You should have been all collaborating together. This shouldn’t have happened and we’re not paying it.” And the reason we had issue with that was they placed the fee order separately before” [Supplier S – 40, S1-S3 Coordination]

Moving to S2, its interaction with S1 has also faced some issues when it comes to cooperation where there was some blaming. In terms of coordination, there was the presence of effective scheduling of suppliers through the 3D model used to identify the relevant tasks and who does what. However, good communication was not ubiquitous between S2 (Site supervisors) and S1 (suppliers). For instance, ambiguous design information was observed, however, issues of communication due to continuous changes in the main point of contact from the client team as one of the suppliers mentioned

“…And they’d probably end up delegating somebody and then two weeks later the same subject would come up again, that person might not be at the meeting for some reason or another, and they’d all sit there and look at each other again” [Supplier S – 42, S2-S1 Coordination]

When it comes to S3 and other sub-systems S1 and S2, some issues of governance emerged between S3 and S1. For instance, unclear articulation of requirements and increase in scope, and discrepancies in objective alignment and shared vision. As mentioned by the site manager

“… But the scope did increase so I don’t think it was a successful output for [client] but I don’t know.” [Advisor integrator A1 – 39, S3-S1 Governance]

Despite this, there was to some extent good leadership and adequate motivation mechanisms such as pain/gain share and incentives. When it comes to cooperation, there was evidence of collaborative planning. However, there were some issues in relationships as to some extent they were commercially driven. Also, there were some issues pertaining to alignment and purpose regarding having a sense of belonging, and opportunistic behaviour was observed. As the advisor integrator project manager mentioned
“...I think the teamwork was good. It was all really good until it started getting bad, so when things didn’t start to work, cracks started appearing in the teamwork and people’d revert to bolt-in clauses in contracts and things like that and it slightly went pear-shape” [Advisor Integrator PM – 38, S3-S1 Cooperation]

For coordination in S3-S1, there was continuous communication and engagement through meetings and the usage of Building Information Modelling (BIM). Nonetheless, the engagement of suppliers was considered minimal.

“So on a project not involving your suppliers – so what’s tended to happen in the Alliance till now, and still going on but it really needs changing and we’re trying to change but it is tough to turn: what we’ve done is we’ve done 80% of the design in-house...” [Advisor Integrator PM – 38, S3-S1 Coordination]

Moving towards S3-S2 interfaces, we can note here that there was some administrative coordination (in terms of project management and cost consulting) whereby the integrator project Leader (S3) was coordinating with the alliance project manager (S2) who raised any issue confronting him on site.

Table 7.6 Alliance Governance, Cooperation and Coordination Characteristics (Positive and Negative) Through VAM Framework for Project C. Note: (+) And (−) Signify A Positive or Negative Characteristics

<table>
<thead>
<tr>
<th>Project C</th>
<th>Governance</th>
<th>Cooperation</th>
<th>Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5-S4 (Executives/CEO – Programme directors)</td>
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<td></td>
</tr>
<tr>
<td>S4-S3 (Programme directors – Owner PM/Owner integrator)</td>
<td>• Appraisal (+)</td>
<td>• Leadership (+)</td>
<td>• Engagement (−)</td>
</tr>
<tr>
<td></td>
<td>• Strategy and programmes of projects (−)</td>
<td>• Resources (−)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Risk (−)</td>
<td>• Goal alignment (−)</td>
<td></td>
</tr>
</tbody>
</table>
| S3-S1 (PM/Owner integrator – Supplier/Sub-contractor) | • Leadership (+)  
• Motivation (+)  
• Requirements (−)  
• Objective alignment and shared vision (−) | • Collaborative planning (+)  
• Alignment and purpose (−)  
• Relationships (−)  
• Opportunism (−) | • Communication (+)  
• No early engagement of suppliers (−) |
<table>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>S3-S2 (PM/Owner integrator – Contractor/Site supervisor)</td>
<td></td>
<td></td>
<td>• Project management and cost consulting coordination (+)</td>
</tr>
</tbody>
</table>
| S2-S1 (Integrator – Supplier) | • Blaming suppliers for inefficiency in the work (−) | • Effective scheduling of suppliers (+)  
• Communication (−) |  |
| S2-S3 (Integrator – PM/Owner integrator) |  |  |  |
| S1-S3 (Supplier – PM/Owner integrator) |  | • Early involvement of contractors (+)  
• Compensation events (−) |  |
| S1-S2 (Supplier – Integrator) |  | • Coordination with owner supervisor on site (+)  
• Changing of resources (−)  
• Different design drawings (−) |  |
| S1 (Supplier) – S1 (Supplier) | • Good working relationships between contractor and subcontractor (+) |  |  |
The interaction between S4 and the integrated project management function S3 has experienced some issues in terms of governance including changing of resources, rushed risk analysis at an early stage, no goal alignment and lack of strategy and programmes of projects. As one of the advisor integrator mentioned

“...So that risk should have been picked up maybe in the design but the focus on planning the project and probably risk management of it, there was limited time to apply all that good thinking in the early stages because they were trying to get this project out the door.” [Advisor integrator AI – 39, Governance]

On the other hand, there was strong leadership and a formal appraisal through the gateway stages.

In terms of coordination between S4 and S3, there were issues in early engagement when coordinating with stakeholders on one hand and managing interfaces between suppliers and operators on the other. As the advisor integrator added

“…That engagement did happen, maybe a little too late because there is longer planning and considerations to be made so it would have been better with earlier engagement.” [Advisor integrator AI – 39, Coordination]

**Across Sub-systemic Interaction Perspective for Project C**

Two main issues across sub-systems were observed. First, there was a continuous changing of resources which affected the interfaces between S2 (site supervisor) - S1 (suppliers/subcontractors) and S3 (project manager) - S1 (suppliers/subcontractors). This has considerably affected other aspects of sub-systems interaction such as communication, requirements, and relationships (blaming game) despite effectively scheduling the suppliers. Second, the issues that appeared in goal alignment and the strategy of the project (S4-S3) have subsequently affected the objective alignment and articulation of requirements (S3-S1) in governance, and the alignment and purpose between S3-S1 in cooperation.
“I think it’s more about finishing the management plan and having this works available. But I do think in terms of a project and project 13, what is absolutely key is making sure that all the stakeholders really do want the works and all your goals are aligned because the difference between working on a scheme where everybody involved really wants that job to be in, compared with [Site] where they don’t really need the water, is different.” [Advisor integrator AI – 38, S4-S3 Governance]

The requirements between S3-S1 (governance) and the lack of early engagement of suppliers between S3-S1 (coordination) also affected the cooperation and coordination across sub-systems. For instance, different design drawings issue was observed

“Design-engagement and maybe not fully designing it all ourselves as on-site had a set of drawings, then the suppliers have come on to site with their own set of drawings and it was that thread of supplier-led design against our own design, so you had two designs and sometimes they didn’t quite marry up, which caused issues on site.” [Advisor integrator AI – 39, S4-S3 Governance]

7.3.6 Alliance Network C Project C+

Sub-systemic Interaction Perspective for Project C+

As presented in Table 7.7, the interaction of S1 with different sub-systems other S1s, S2, and S3. What was found through the interviews within the interfaces of S1-S1 is that project teams were having good working relationships between themselves (cooperation). In terms of coordination, S1-S1 demonstrated a well-integrated mechanism including joint problem-solving and communication in terms of sharing knowledge and coordinating the work. However, two issues emerged; first in terms of design issues as there were some clashes of different construction aspects. Second was the commercial coordination between contractors as they were placed within one contract by which a supplier is handling the work of another supplier. This has been overwhelming to the supplier handling the contract. As one of the suppliers mentioned
“I think that was there anyway, but because we were commercially stuck with the mechanical partner, we had to organise it, we had to drive it, but it was difficult...Which I thought was a little bit strange, why the contract was put with us, our contract value was about £900,000 and the project was £3.2 million, so the remainder of that, that £2.3 million was the mechanical, but the contract was placed with us.” [Supplier S – 32, S1-S1 Coordination]

Concerning S1-S2 there was proper coordination with the owner supervisor on site (coordination). For S1-S3 the contractors were involved early on (pre-construction phase).

Regarding S2's interaction with other sub-systems S1 and S3. S2-S3 exhibits a structured process when coordinating with each other. What was evident from the interviews is that the alliance had a very effective S2 working across S1s (suppliers and contractors) especially when it comes to coordination. For instance, S2 demonstrated good monitoring, effective scheduling of suppliers, proper task management, document control, and complex coordination with many contractors. As the advisor integrator project manager mentioned

“The site foreman of each partner has to work on this or whosoever is leading the particular supply chain partner on site along with our site manager and planner. So we had a site planner actually on the project and he would coordinate all of that along with the site manager” [Advisor integrator AI – 34, S2-S1 Coordination]

In terms of cooperation, S2-S1 had shared goals to work towards however blaming suppliers for their inefficiency in the work emerged from a prefabricated steel supplier who was not ready to deliver by the planned schedule as the site manager of advisor integrator mentioned

“In the sense that they would say, yes, we've got everything fabricated; yes, we're waiting; tell us when to go; tell us when to go. And then when we said, go, the engine stopped. To be honest, in that particular instance, we escalated that to our procurement team. We did have meetings with the supply chain in that instance. From that meeting I asked specifically for their fabrication schedule, because up to
that point they'd told us everything was made and it obviously wasn’t” [Site manager AI – 35, S2-S1 Cooperation].

Table 7.7 Alliance governance, cooperation and coordination characteristics (positive and negative) through the VAM framework for Project C+. Note: (+) and (−) signify a positive or negative Characteristic

<table>
<thead>
<tr>
<th>Project C+</th>
<th>Governance</th>
<th>Cooperation</th>
<th>Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5-S4 (Executives/CEO – Programme directors)</td>
<td>.</td>
<td>.</td>
<td>Engagement (+)</td>
</tr>
<tr>
<td>S4-S3 (Programme directors – Owner PM/Owner integrator)</td>
<td>• Risk management (+)</td>
<td>• Engagement (+)</td>
<td></td>
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<tr>
<td></td>
<td>• Appraisal (+)</td>
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<td></td>
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<tr>
<td></td>
<td>• Formal decision making structure (+)</td>
<td></td>
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</tr>
<tr>
<td>S3-S1(PM/Owner integrator – Supplier/Sub-contractor)</td>
<td>• Leadership (+)</td>
<td>• Collaborative planning (+)</td>
<td>• Early Contractor Involvement (+)</td>
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<tr>
<td></td>
<td>• Effective control (+)</td>
<td>• Alignment and purpose (+)</td>
<td>• Communication (+)</td>
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<td></td>
<td>• Resources (+)</td>
<td>• Collaborative ethos (+)</td>
<td>• Continuous planning (+)</td>
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<td></td>
<td>• Motivation (+)</td>
<td>• Relationships (+)</td>
<td>• Urgent problem solving (+)</td>
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<td></td>
<td>• Requirements (+)</td>
<td></td>
<td>• Auditing and monitoring (+)</td>
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<td></td>
<td>• Structure (+)</td>
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<td></td>
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<tr>
<td></td>
<td>• Risk management (+)</td>
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<tr>
<td></td>
<td>• Objective alignment and shared vision (+)</td>
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<tr>
<td></td>
<td>• Tendering (−)</td>
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<tr>
<td>S3-S2 (PM/Owner integrator – Contractor/Site supervisor)</td>
<td>.</td>
<td>• Monitoring (+)</td>
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<td></td>
<td>• Project management and cost consulting (+)</td>
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<tr>
<td>S2-S1 (Integrator – Supplier)</td>
<td>• Shared goals (+)</td>
<td>• Monitoring (+)</td>
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<tr>
<td></td>
<td>• Blaming suppliers for inefficiency in the work (−)</td>
<td>• Effective scheduling of suppliers (+)</td>
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<td>• Task management (+)</td>
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<td></td>
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<td>• Document control (+)</td>
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<td></td>
<td></td>
<td>• Complex coordination with multiple contractors (+)</td>
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<tr>
<td>Relationship</td>
<td>Positive Attributes</td>
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<tr>
<td>S2-S3 (Integrator – PM/Owner integrator)</td>
<td>Structured process (+)</td>
<td></td>
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<tr>
<td>S1-S3 (Supplier – PM/Owner integrator)</td>
<td>Early engagement with client (+)</td>
<td></td>
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<tr>
<td>S1-S2 (Supplier – Integrator)</td>
<td>Coordination with owner supervisor on site (+)</td>
<td></td>
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<td>S1 (Supplier) – S1 (Supplier)</td>
<td>Good working relationships between contractor and subcontractor (+)</td>
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<td>Joint problem solving (+)</td>
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<td></td>
<td>Communication (+)</td>
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<td></td>
<td>Design (–)</td>
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<tr>
<td></td>
<td>Commercial Coordination between contractors (–)</td>
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</table>

Regarding the interfaces between S3 and other sub-systems namely S1, S2 and S4, S3 interacted positively with other sub-systems reflecting overall good governance, cooperation and coordination. For instance, S3-S1 has demonstrated good governance in terms of the resources, clear requirements articulation, leadership (empowerment, allowing autonomy, and encouragement), motivation (to some extent there were pain-gain and incentive mechanisms), objective alignment and shared vision, risk (effective allocation and management of risks), structure (formalized escalation structure with clear accountability and protocols for sharing information), and effective control. As the project manager of the owner integrator and advisor integrator mentioned

“Once we had started to hone that down it became a more tide scope to say, right, this is where your battery are upstream and downstream, so this is the bit that we’re going to empower you to deliver” [Owner integrator PM – 33, S3-S1 Governance]

“So every high-performing team, within its function, has to have a clarity of objective and he set up something for us and I could translate that further down the chain. So we were led very ably from that point of view.” [Advisor integrator AI – 34, S3-S1 Governance]
However, there was an issue in tendering based on low price which reflected a bad quality outcome with one of the suppliers.

Similarly, for cooperation (collaborative planning, alignment and purpose, collaborative ethos and relationships in terms of openness and trust) and coordination (early contractor involvement, continuous planning, urgent problem solving, and auditing and monitoring) have shown positive outcomes. The project manager of owner integrator added

“\textit{So that was a bit that in terms of a win: win we gave them the opportunity to do more, they got more exposure from that, and what we got out of it was a subcontractor that was totally engaged, totally bought into working with us to achieve the goal, and it was a win: win.}” \text{[Owner integrator PM – 33, S3-S1 Cooperation]}

However, it must be noted here that there was some overstepping from the client side to the second-tier suppliers which caused some task-related coordination issues for the first-tier supplier.

For S3-S2 coordination, there was continuous monitoring and rescheduling of tasks accordingly, and project management and cost consulting in terms of verifying the commercial aspects of the contract.

For the sub-systemic interaction between S4 and sub-system S3 in regard to governance, there was a formal decision-making process for approving requests that are not presented initially within the plan. As the advisor integrator mentioned

“\textit{...So any of the things which are not business as usual will require approval from the project board or the investment committee}” \text{[Advisor integrator AI – 34, S4-S3 Governance]}

Also, it was seen that there was a proper risk management process between S4 (project board) and S3 (Owner PM). Not to forget the appraisal process which was on a stage gates basis.
Regarding coordination, it was found that there was an engagement of asset owners with the project team throughout the delivery of the project highlighting the integration of an end user early on. As the owner integrator project manager mentioned

“...It was the right thing for the project; so in terms of the operator at the end it’s not about giving them a wish list because if we give the operations colleagues everything they want – not everything they need, everything they want – could we have delivered it on time to the budget that we had allowed to the right carbon values; I would have questioned probably not. But it’s having those open and honest conversations about that in this sort of environment to explain” [Owner integrator PM – 33, S4-S3 Governance].

**Across Sub-systemic Interaction Perspective for Project C**

It is clearly shown that project C generally have performed well in terms of governance, cooperation and coordination across sub-systems with few issues that emerged but were well managed. The positive outcomes of governance between S4-S3 have affected S3-S1 governance. Also, it influences the coordination and cooperation across sub-systems, for instance good leadership have fostered trust in relationships. As the project manager of the owner integrator mentioned

“But it’s about I think there’s an element of trust, trust is quite a key part of this, and then it’s creating an environment for these sort of things. Given them, trust, direction and then the environment to flourish it is where I spend a lot of my time.” [Owner integrator PM – 33, Cooperation]

“And we went back to the team, we had a big team meeting, sat in a big meeting room, we went through every element of the scope. We went through the risks and opportunities, what were collated and what were presented and we realised some of the risks could be reduced because we kind of knew the site conditions.” [Advisor integrator AI – 34, Coordination]
However, some issues in tendering (governance) have led to commercial coordination between suppliers (coordination). For instance the owner-integrator project manager and supplier mentioned

“We procure our supply chain on the very cheapest price...So in a very simple example of what I mean by that, they didn’t have enough resource pool to deliver the project, and therefore we ended up having electricians installing pipework, which takes a lot longer than it would have done if you’d had a mechanical engineer or mechanical person installing pipework, because it’s not their core competency. So they ended up delivering elements late, not to the right quality, and it broke down because they were not honest.” [Owner integrator PM – 33, Governance]

“I think that was there anyway, but because we were commercially stuck with the mechanical partner, we had to organise it, we had to drive it, but it was difficult.” [Supplier S – 32, Coordination]

7.4 Analysis 2 – The analysis of Governance, Cooperation and Coordination as Either Positive (Successes) or Negative (Failures)

The Analysis 2 provides the positive and negative issues of governance, cooperation and coordination. From an analytical view of governance, cooperation and coordination across projects and alliances, it was found that issues in governance mechanisms would have influenced cooperation and coordination. The percentages calculated in this section are the result of the ratio of number of positive or negative over the total observed issues. This is done through counting the number of positive and negative issues happening in the sub-systemic interaction of the projects and dividing them by the total issues observed. The positive and negative issues in terms of governance, cooperation and coordination found in each project are shown in tables of section 7.3. The percentages of issues are presented in Table 7.8
Project A\'s issues in terms of governance such as requirements, lack of owner integration and unity of demands, contracts and opportunism were found (S3-S1 and S4-S3 with 33\% negative). Cooperation issues were found (100\% negative) in terms of relationships, alignment of purpose, as well as contractors not being incentivized. Coordination issues happened as well, in process, communication and design were found across sub-systems (S2-S1 and S1-S1 with 40\% negative). Similar findings were found for other low performing projects.

In projects that are considered at the upper success level (performing well), issues were rarely found in terms of governance which also has led to positive outcomes in terms of cooperation and coordination. However interestingly, project B\(^+\) had issues in terms of governance (46\% negative) which also affected both cooperation (20\% negative) and coordination (63\% negative). This shows that wherever governance issues are happening, cooperation and coordination would be affected across sub-systems. As seen in Table 7.8, the lower the percentage of governance issues the lower cooperation and coordination issues were present. For example, projects A\(^+\) and C\(^+\) have lower issues in governance (7-8\%), and lower issues in cooperation (0-14\%) and coordination (9–29\%). The only case where the percentage of governance issues was high and cooperation issues were negligible was in B\(^-\) which may be contributed to the lack of a dataset (4 interviews) compared to other projects. Lastly, two takeaways are seen in this analysis; first that the presence and higher issues of governance are linked with the presence of issues in cooperation and coordination as seen earlier, and with the performance outcome of the projects; second that there are varieties in percentages in what is being affected more than the other, which convey that different governance mechanisms affect cooperation and coordination in different ways.

Evidently, highly positive relationships between governance, cooperation and coordination were associated with project performance. As such, well-performing projects exhibited more positive governance, cooperation and coordination between sub-systems. The second analysis represents an important insight into the interaction between the three units of analysis governance, cooperation, and coordination, which implies the need to delve deeper
into the nature of mechanisms of governance and how they affect cooperation and coordination.

Table 7.8 Governance, Cooperation and Coordination Issues in Percentage

<table>
<thead>
<tr>
<th>Project</th>
<th>Governance issues in percentage</th>
<th>Cooperation in percentage</th>
<th>Coordination in percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A'</td>
<td>33%</td>
<td>33%</td>
<td>100%</td>
</tr>
<tr>
<td>A''</td>
<td>7%</td>
<td>0%</td>
<td>29%</td>
</tr>
<tr>
<td>B'</td>
<td>50%</td>
<td>0%</td>
<td>43%</td>
</tr>
<tr>
<td>B''</td>
<td>47%</td>
<td>20%</td>
<td>63%</td>
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<tr>
<td>C'</td>
<td>67%</td>
<td>60%</td>
<td>55%</td>
</tr>
<tr>
<td>C''</td>
<td>8%</td>
<td>14%</td>
<td>9%</td>
</tr>
</tbody>
</table>

7.5 Analysis 3 – Cross-case Analysis of The Six Case Studies Within The Three Alliance Networks

The analysis 3 provides a cross case comparison to understand the commonalities and differences of the interplay of governance, cooperation and coordination across inter-organisational boundaries. This can inform about such dynamics and can in turn help build theoretical premises (Yin, 2012).

Cross-case analysis of the 3 networks and their embedded projects have revealed some commonalities despite the differences in their arrangements and structure (Albers et al., 2016). The analysis of the six case studies was undertaken on sub-systemic interaction (micro) and across sub-systemic interaction (macro). That said the following analysis will follow the same method.

7.5.1 Sub-systemic Interaction Level Analysis

The sub-systemic interaction level provides a representation of positive and negative dimensions of governance, cooperation and coordination that happens between systemic interactions (Sx-Sy). The following sections gives an elaboration on key findings of projects' sub-systemic interaction in terms of governance, cooperation and coordination.
**Governance Sub-systemic Interaction**

From a governance perspective, Governance mechanisms were mostly observed in S3-S1 (particularly “resources”, “objective alignment”, “requirements” and “leadership”) and S4-S3 (“form of contract” and “appraisal”) in Projects A⁺, A⁻, B⁺, C⁺ and C⁻. While some of the dimensions were observed between S1-S1 and S5-S4. The most common dimensions found in S4-S3 interaction were contracts form and appraisals in Projects A⁺, A⁻, B⁺, C⁺ and C⁻. For example, in Project A⁺ the contract influence was apparent in S4-S3.

“I think certainly the form of contract did influence things – they were a little bit more cautious when there’s change because they want to make sure that they are going to get paid for this change and it’s... where the risk for those costs lie” [Owner Executive PM – 13]

Also in project A⁺ rushed appraisal was observed in S4-S3

“…a huge document for scrutiny by a panel of people [would have gone] through multiple iterations. And take several months to finesse”. “...instead was... through quite careful scrutiny of the governance rules that we’ve got, we found an alternative route that was still compliant with our governance systems, but was pretty non traditional. And that was to get the area management guys to sign off on it as an exceptional report as part of the business case, rather than a reiteration of the entire business case” [Owner Integrator PM – 4]

Other dimensions were observed yet varied across different projects. For instance, unity of demands issues was observed in Project A⁻ while risk management dimension was observed in Project C⁺ and C⁻. When it comes to S3-S1, the main observed dimensions include leadership, resource management, requirements, control and risks. For instance, negative issues in leadership were observed in Project B⁻ while Project C⁺ demonstrated a positive dimension of control. The governance sub-systemic interaction shows the peculiarities of each sub-system and its dimensions as seen in the difference between S4-S3 and S3-S1 interaction. As such, contracts and appraisals were present between S4-S3
interaction while risks, control, requirements, and resources were dominant in S3-S1. This indicates the multiplicity and variability of dimensions in different sub-systems.

In contrast, fewer governance mechanisms were observed in S5-S4 and S1-S1. Despite some commonalities in S4-S1 and S3-S1 sub-system interactions, several governance mechanisms were observed across different projects. For instance, for S4-S1, “unity of demands issues” were observed in Project A while “risk management mechanisms” were observed in Project C+ and C-. Regarding S3-S1, negative issues in “leadership” were observed in Project B, while Project C demonstrated a positive “control” mechanism as seen below respectively:

Yes, I mean towards the end it was, you know, to be fair there were people getting paid on the back of awards being handed out and all sorts of bits and pieces that I think, you know, to be fair, the right people didn’t get the recognition that they deserved for that job...there that should have got a lot more recognition than they did in my opinion”[Consultant Integrator SM–31]

There is always one or two who would probably not be able to align with your values or principles or not agree to it. They are not in the same place in terms of their maturity, in terms of the business model. And we had one of the supply chain partners like that and I had to raise my game basically, give it more attention. It did drag the whole team down focusing too much on one supply chain partner. But effectively if we had to deliver the project, we had to bring him on par with others otherwise the project would have suffered. [Key Advisor-Integrator – 34]

The analysis suggests that high-performing projects exhibited positive governance mechanisms, as seen in section 7.4.

**Cooperation Sub-systemic Interaction**

Cooperation was observed in S3-S1, in S2-21 and in S1-S1 interactions. Dimensions of cooperation observed were consistent across sub-systemic interaction. These included relationship descriptions, alignment and purpose, opportunism and blaming. Such consistency is mainly due to the behavioural nature of cooperation (Gulati et al, 2012). When it comes to S3-S1, projects A and C have faced issues in cooperation relating to
relationships, alignment and purpose and opportunism. While this was not the case for projects A⁺, B⁻ and C⁺ where cooperation was observed. For instance, in Project B⁻ good relationships were highlighted, as illustrated by the Owner integrator

“There was another team based in a different room in the same project office...there were interfaces where our work overlapped and stuff ... we had really good relationships with them, that could have been an absolute disaster.”

[Owner integrator PM – 21]

S2-S1 was more prone to issues of cooperation in all projects except project B⁻. Most issues evolved around blaming and bad relationships. For example, in project A⁻ bad relationships was observed

“....the only people who didn’t actually dial in was the (client) PM and the [consultant] PM. They had the invite but they weren’t sort of party to what change was being discussed”. “I’d probably say no [effective organisation and processes], because it goes back to the people...There wasn’t good relationships on the job, towards the end it was pretty poor to be honest”

[Contractor Supplier PM – 11].

This was observed even when other sub-systemic interactions were exhibiting cooperative behaviours. S1-S1 cooperation was deemed positive in all projects (except project A⁻ where this was not observed) irrespective of cooperation issues happening in other sub-systemic interactions.

**Coordination Sub-systemic Interaction**

Coordination sub-systemic interaction was observed across S4-S3-S2-S1. Coordination mechanisms similar to governance varied across sub-systemic interactions. For instance, S4-S3 interaction have demonstrated engagement and early planning and consulting in all projects.

“And so as a board we had the open discussion, and the operator said that they would like a tarmac road, it was their preferred preference; but as a board we agreed that as long as we can meet the outcome which was to provide safe
access around the site, we could put an alternative solution in” [Owner-integrator PM – 33]

For S3-S1 different mechanisms were present ranging from problem solving, communication or involvement of suppliers and contractors, and monitoring coordination. For instance, in project A+, B− and C+ problem solving coordination was observed. While early contractor coordination was also observed in projects A+, C− and C+. S3-S2 was concerned mostly with cost consultancy and contract administration as seen in projects A−, A+, B+, C− and C+. When it comes to S2-S1 coordination involved different dimensions were observed ranging from coordination of tasks, document control, contract administration and process in all projects. For example, a process coordination issue was observed in project A−

“...I don’t think we’re particularly slick or user-friendly to the actual people who are actually doing the job”. “...perhaps not taking on board enough about how things work when preparing over-arching processes”. “...it’s things like templates and things like that...to me that doesn’t help me do my job particularly well” [Owner Integrator PM – 31]

While S1-S1 coordination was related to compensation events, design, problem solving and communication.

7.5.2 Across Sub-systemic Level Analysis

The across sub-systemic level provides a representation of the overall interplay of governance, cooperation and coordination that happens across sub-systems in the six cases. The following section gives an elaboration on key findings of projects' sub-systemic interaction in terms of governance, cooperation and coordination.

**Governance Across Sub-systemic Level**

Across sub-systems, governance mechanisms at high sub-system levels appeared to filter down to dynamically impact lower sub-systems (typically down to lower supply chain roles). Referring to Table 7.4, in Project A− the “form of contract” and “unity of
demands” (S4-S3) had a negative downward influence on “requirements” (S3-S1), as illustrated by this supplier.

“What the [Owner] wanted was all the precast to match, but [The Consultant] hadn’t put that in their works’ information, so that led to massive CEs [Compensation events]” [Contractor-supplier PM – 11]

The downward influence of governance mechanisms from higher-order sub-systems was also evident in Project A where clear project and programme strategy (S5-S4) had a positive influence on objective alignment (S3-S1). For Project B issues in appraisals (S4-S3) affected both requirements and risks (S3-S1) further down the sub-systems.

And also there was a lot of scope from the specification document that didn’t make it across to the cost plan because it was put together by commercial managers; they did the best they could. There was a lot of pressure to hit the site” [consultant integrator PM – 19].

“Right that’s not on our scope.” And the manager was saying, “Well it’s on my scope. This is what we want you to do.” We says, “Well this is what we priced it on. This is what our budget is. If you want us to do this, this is going to have to be instructed.” So they’re just, “No it’s on our scope” [Contractor- Supplier E – 27].

Project C formal decision-making (S4-S3) positively filtered down to create accountability and objective alignment (S3-S1). Project C governance issues of rushing planning, risk management, lack of engagement and stakeholders (S4-S3) negatively had a knock-on effect down to influence requirements and caused alignment issues (S3-S1).

Cooperation Across Sub-systemic Level

Cooperation cross-subsystems analysis varied between different sub-systemic interactions in all projects. As such, some issues of cooperation that happened to be in S2-S1 or S3-S1 did not have an impact on other systemic relationships S1-S1. This was observed in projects B C and C for example, in project C issues in relationships were
observed between S3-S1 interaction and blaming between S2-S1, while S1-S1 exhibited good working relationships as demonstrated in the following quotes

“So the issue is another supplier without the forward-thinking about future schemes with [client] and the business that could be there, could have detrimentally affected [project C] because they could have been kinder, not playing ball or not interested as such.” [Advisor integrator PM – 38]

“The relationship on site went very well, my site supervisor got on with everybody and I don’t think we had any major issues.” [Supplier S – 42]

Coordination Across Sub-systemic Level

When it comes to coordination, issues have shown a filtering down effect across sub-systemic interactions in all projects. For example, in Project A+, a lack of early planning and consulting coordination with suppliers has caused compensation events and design coordination issues. Project A+ have exhibited positive coordination – engagement with suppliers (S3-S1) had a downward influence on communication (S2-S1 and S1-S1). In contrast, in Project A− lack of coordination in early planning and consulting with suppliers (S4-S3) caused a downward influence on compensation events and design coordination issues in lower sub-systems (S1-S1). While for Project B− the lack of early engagement of suppliers in S3-S1 have contributed to design issues between S1-S1

“So again I think earlier on there should have been a sit round the table earlier on than physically chucking somebody on site and then trying to fight fires on site…I wasn’t involved that early on; it [design responsibility] had already been agreed” [Consultant-integrator SM – 31]

“The original design was not sheet piling, it was gabion baskets and screw piles…That didn’t work because of the state of the ground and the move, etc, so we needed something far more robust… So they were engaged fairly late and fairly on the hoof” [Contractor-integrator CM – 28]

Project B+ have also suffered from issues in integration and monitoring in S3-S1 which also was shown in S3-S2 in terms of integration and incomplete planning. This has negatively influenced design coordination in S1-S1. Project C− had an issue in engagement with operations in S4-S3. This has affected the design coordination between S2-S1. While
project C+ the positive engagement with operator in S4-S3 has allowed for continuous planning in S3-S1, effective scheduling in S2-S1 and structured process in S2-S3.

“sort of broad brush doesn’t do it justice, it was more than that, but it doesn’t have every detail in it. So what we did was every three weeks we did an eight-week look ahead with a lot, lot more detail, and awful lot more detail in there, so we really made sure” [Owner-integrator PM – 33]

“But what those sessions also gave us there was good input from everybody, again all disciplines. Whereas one discipline might say, I can do A, B, C; the second discipline would then be available to say, if you do A, B, C, you’re prolonging my work. So we then looked at the issues rather than [Client] looking at what works for him to give him his cheapest option” [Key advisor- integrator SM – 35]

Lastly, it must be noted that projects that were on a higher level of success were performing well in terms of the three units of analysis across systemic boundaries.

7.5.3 Interplay of Governance, Cooperation and Coordination Across Sub-systems

Having stratified governance, cooperation and coordination within and across sub-systems and analysing their interaction, a pattern has emerged in their interplay.

Governance influenced cooperation across sub-systems. In Project A+ the form of contract and unity of demands (Governance) in S4-S3 negatively influenced alignment and purpose (Cooperation) and caused a lack of incentivisation of contractors (Cooperation)

“There’s been previous schemes before... so they’d written the works’ information for the precast element of the works, [but] it wasn’t all there, and what was there was open to debate, it was open to sort of questions”. [Supplier PM –11]

“We worked quite hard, especially... before Christmas... to enhance the [Client]’s reputation to demonstrate we are committed. Then after we’d done all that the [Client] turned round and said we didn’t ask you to do it, we’re not paying you any extra. That then will lead on to the next project you go off the... and that’ll be in the back of your mind. It’s not really a positive thing” [Supplier PM –11]

In Project A+ the clear strategy and programme of projects (Governance) in S5-S4 positively influenced alignment and purpose in S3-S1 (Cooperation). Governance mechanisms in higher sub-systems appeared to affect lower sub-systems. For instance,
Project C suffered from a lack of strategy and issues in programmes of projects (Governance) in S4-S3 and continuous change of resources (Governance) in S3-S1 which influenced relationships and alignment and purpose in S3-S1 (Cooperation).

“because of the amount of staff churn and the different people involved with projects that don’t work, and also this governance and project control so having the client fully aligned with what we’re trying to do, I think certainly on (the project) it’s felt like we weren’t completely aligned, and that is massive because it doesn’t matter how great work you’re doing if you’re coming up with something that people don’t necessarily want at the end and you’re unveiling it and you’re saying, ‘Here you go,’ then it doesn’t work. [Key Advisor-integrator PM – 32]

Further, Governance mechanisms influenced coordination across multiple sub-systems. This was observed in all projects. For example, Project A° suffered from compensation events (CE) (Coordination) due to the form of contract issue (Governance) in S4-S3. While for Project A° appraisals, contracts and requirements (Governance) positively influenced pricing (Coordination). Project B° and B° issues in requirements (Governance) in S3-S1 influenced design coordination (Coordination) in S1-S1.

“…So this date was getting close in our programme to start and we hadn’t had a design, so …they decided that they would instruct us…to do the … design. So I said, ‘Okay we need to know your requirements…they said ‘don’t worry about that, just do …. design for your stuff…so we did, but it turns out that all this stuff still had to be provided for...And [then it was] ‘why didn’t you design it?...Know one could ever make their minds up what they wanted down there” [Supplier S– 24]

For Project C° issues in requirements (Governance) negatively influenced design and compensation events (Coordination). While Project C° issues in tendering (Governance) in S3-S1 affected S1-S1 in terms of commercial (Coordination).

“We procure our supply chain on the very cheapest price...So in a very simple example of what I mean by that, they didn’t have enough resource pool to deliver the project, and therefore we ended up having electricians installing pipework, which takes a lot longer than it would have done if you’d had a mechanical engineer or mechanical person installing pipework, because it’s not their core competency. So they ended up delivering elements late, not to the right quality, and it broke down because they were not honest.” [Owner-Integrator PM – 33]

“I think that was there anyway, but because we were commercially stuck with the
mechanical partner, we had to organise it, we had to drive it, but it was difficult.” [Key Supplier S – 32]

Cooperation and coordination mechanisms influenced each other within specific sub-systems, such as S2-S1 and S2-S3. This was the case in Project A\textsuperscript{+}, A\textsuperscript{+}, B\textsuperscript{+}, C\textsuperscript{+} and C\textsuperscript{+}. For example, Project B\textsuperscript{+} suffered from “blaming” (Cooperation) in S2-S1 due to a “lack of engagement” (Coordination) during the project.

“The commercial people accused us of not working ...efficiently. ...This should have been raised by your project team [during not at the end] if I’d have put 30 blokes down there we’d have been falling over each other. So what we did, we split it...we utilised it to what we thought was most effective...they bought into it” [Supplier S – 24].

This analysis provides a deeper understanding of the inter-organisational context, beyond assuming uniform positioning of governance, coordination and cooperation across sub-systems. As such different mechanisms can be co-existing each with different outcomes.

7.6 A Complex Interplay of Governance, Cooperation and Coordination

In this chapter, various levels of analysis have been presented concerning governance, cooperation, and coordination, specifically focusing on the sub-systemic and project levels. In doing so, a more complex view of the interplay of governance, cooperation and coordination appears to be emerging across the six cases. The analysis, which involves exploring various governance, cooperation, and coordination mechanisms and characteristics, has provided a more nuanced understanding of how these three factors interact with each other. Also, it has explored the influence of governance, cooperation and coordination on project performance outcomes across the six projects. Consequently, it was observed that the dynamics of governance and coordination extend beyond multiple sub-system boundaries, exerting a filtering-down effect that impacts cooperation. Moreover, although cooperation's influence seems confined to specific subsystem boundaries, it remains susceptible to governance mechanisms operating at higher sub-system level. Moreover, there seems to be a reciprocal relationship between cooperation and
coordination, where they positively or negatively influence one another in a reinforcing cycle.
Chapter 8. Phase 3 – Validation of the Interplay of Governance, Cooperation and Coordination Mechanisms Across Multiple Projects

8.1 Background to the Phase

This phase involves 6 semi-structured interviews gathered through practitioners working in alliance organisations undertaking infrastructure projects. A card sorting technique was adopted for this phase.

Participants were informed about the background of the study and shown a board where a list of cards was grouped under governance, cooperation, and coordination. The lists were based on the findings of the first two phases mentioned earlier whereby mechanisms and behaviours of the aforementioned factors are highlighted in an electronic card-sorting platform. The participants were asked to identify their role (which system they belong to) in two projects; one more successful and another less successful they worked in. Then, they were asked to identify key governance mechanisms listed on the list alongside cooperation and coordination mechanisms that were found on each project. Afterwards, they were asked to discuss more about these mechanisms and behaviours and highlight their relationship if any. This adds to the previous studies another layer of analysis whereby the approach here is different from the previous ones in determining the relationship between governance, cooperation, and coordination from one side and understanding key mechanisms for governance, cooperation and coordination.

8.2 Validation of the Key Themes and Mechanisms

To be able to do so, the findings from the previous studies were grouped under generic themes that list governance, cooperation and coordination mechanisms. In other words, the categories identified in previous phases (Phases 1 and 2) and from the literature
were listed and then refined under major relatable themes that represented the key mechanisms. The themes and categories are shown in Table 8.1 and were used in the analysis of Phase 3. Participants were presented with the list of governance, cooperation and coordination mechanisms to choose from in each project identified. Most of the mechanisms are self-explanatory (semantic themes) as they depict the categories themselves such as risk, resources, requirements, monitoring, and alignment and purpose. Other mechanisms were abstracted and rectified from the categories found in previous phases depicting the cyclic nature of the process (Vaismoradi et al., 2016). As such, Vaismoradi et al. (2016) present multiple stages in theme development. These are initialization, construction, rectification, and finalization. The current analysis evokes constructing and rectifying generic themes from categories previously interpreted. As categories were identified earlier belong to different analytical settings where projects were taken as case studies and analysis was leaned towards highlighting key issues and successes in mechanisms and behaviours, on successful and less successful projects.

The main latent themes for governance from the previous analysis and literature are appraisals, requirements, contracts, structure, leadership, and strategy. Appraisals were used as a theme to group and represent “tendering”, “lowering cost for long-term relationships” and “long appraisal process”. Evidently, all represent appraisal mechanisms and processes. Contracts were also used as a theme to depict “rewarding mechanisms”, “form of contract influencing”, and “opportunism and collective incentives”. “Rewarding mechanisms” and “collective incentives” fall into the contractual aspect of pain/gain share. Also, contracts are used in many instances to control “opportunism”. For the “form of contract influencing”, the category reveals the effect of the contract in governance on projects in the second study. Structure is used as a generic theme to encompass the structural and mechanistic aspects of governance. As such, the “stage gate process”,

31 The themes rectified from previous analysis were more detailed to some extent as to highlight the issues found on each project in details which allow to better understand the interaction between the units of analysis and systematic interaction in the projects. These were grouped under the higher order themes for the sake of simplification and to depict the literature and sub-systemic characterisations.
“aligning and understanding roles and responsibilities”, and “decision-making structure” were the main categories falling into the structure. **Leadership** considers all mechanisms related to the relational and soft aspects of governance. For instance, “motivation”, “objective alignment and shared vision”, “Leadership” and “ownership’ are all mechanisms initiated by owner organisations and leaders that help to ensure the synergy of the alliance. **Strategy** was also a key theme for “strategy and program and projects”, “clear strategy and early articulation of principles”, and “agility and adaptability” categories. These categories all depict strategy mechanisms as having a proper strategy for the project and articulating it and being adaptable and agile when dealing with complexity and uncertainty.

For cooperation, the key themes identified were relationships, collaborative ethos, culture, and alignment and purpose. **Relationships** depict any mechanism that affects and describe inter-organizational relationships. For instance, categories such as “reciprocity” in relationships, “relationship management plan”, and “good working relationships” all fall under mechanisms that highlight the nature and guidance of these relationships. **Collaborative ethos** represents to act of collaborative planning and the ethos of the alliance. The theme is self-evident in explaining these mechanisms. **Culture** incorporates all elements related to the culture found in the alliance, from blaming to trust and cultural will for actions.

In coordination, the main themes were engagement, communication, process, contract administration, and task management. **Engagement** represents any activity or actions that involve different actors working together. For instance, “early involvement of contractors”, “advising on buildability”, and “early planning and consulting” all depict the engagement of actors while working on a task or activity. “Changing of resources” had its effect on the actor’s engagement and coordination, therefore it was grouped under engagement. **Communication** is a key theme in coordination as many mechanisms revolve around transmitting and receiving information. As such, aspects like “information sharing”, “documentation and paperwork information”, “design information” and “requirements” evolve around communicating information between organisation actors. “Co-location” was
also grouped under communication as it was an important factor in affecting communication. **Process** is also considered a main theme involving what and how to mechanisms in relation to activities. Mechanisms like “effective scheduling”, “formalized responsibilities” and “sequencing of the workflow” evolve around the processual aspect of coordination. Other mechanisms such as adaptability and autonomy represent the adaptable and autonomous function of processes. **Contract administration** represents any coordination mechanisms related to contract coordination including that of cost and commercial aspects of the contract. As such “commercial integration” and “project management and cost consulting” represent the coordination of contractual agreements. For instance, “Commercial integration” relates to the integration of the commercial team with the site team to ensure cost control
Table 8.1 Governance, Cooperation and Coordination Themes and Categories

<table>
<thead>
<tr>
<th>Governance mechanisms</th>
<th>Governance Categories (from dataset analysis of phase 1 and 2)</th>
<th>Cooperation mechanisms</th>
<th>Cooperation Categories (from dataset analysis of phase 1 and 2)</th>
<th>Coordination mechanisms</th>
<th>Coordination Categories (from dataset analysis of phase 1 and 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appraisals</td>
<td>Tendering&lt;br&gt;Lowering cost for long-term relationships&lt;br&gt;Appraisals</td>
<td>Relationships</td>
<td>Short-term relationships igniting opportunism&lt;br&gt;Long-term relationships improving negotiations&lt;br&gt;Pre-existing relationships Reciprocity Good working relationships</td>
<td>Engagement</td>
<td>Early contractor involvement&lt;br&gt;Early Planning and consulting&lt;br&gt;Advising on buildability Engagement</td>
</tr>
<tr>
<td>Requirements</td>
<td>Owner integration and unity of demands (consistent requirement)&lt;br&gt;Requirements articulation</td>
<td>Collaborative ethos</td>
<td>Collaborative planning&lt;br&gt;Collaborative ethos</td>
<td>Communication</td>
<td>Communication&lt;br&gt;Design&lt;br&gt;Documentation and paperwork&lt;br&gt;Information sharing&lt;br&gt;Co-location</td>
</tr>
<tr>
<td>Resources</td>
<td>Stable workforce&lt;br&gt;Resources allocation&lt;br&gt;Changes of resources</td>
<td>Culture</td>
<td>Cultural will to cooperate&lt;br&gt;Openness&lt;br&gt;Trust&lt;br&gt;Blaming contractors for inefficiencies</td>
<td>Process</td>
<td>Complex Process&lt;br&gt;Effective scheduling&lt;br&gt;Formulized responsibilities&lt;br&gt;Adaptability&lt;br&gt;Sequencing of the workflow&lt;br&gt;Process standardization&lt;br&gt;Adjustment of processes and procedures&lt;br&gt;Autonomy</td>
</tr>
</tbody>
</table>
| **Contracts** | Rewarding mechanisms  
Form of contract influencing  
Opportunism  
Collective incentives | **Alignment and Purpose** | **Contract administration**  
Commercial integration  
Project management and cost consulting |
|-----------------|---------------------------------|--------------------------|------------------------------------------------|
| **Structure**   | Stage gate process  
Aligning and understanding roles and responsibilities  
Decision making structure | **Task management**  
Urgent problem solving  
Auditing and monitoring coordination | |
| **Leadership**  | Early engagement of stakeholders  
Leadership  
Motivation  
Objective alignment and shared vision  
Ownership | | |
| **Risk**        | Risk sharing  
Risk allocation | | |
| **Strategy**    | Strategy and Programme of projects  
Clear strategy and early articulations of principles  
Agility and adaptability | | |
| **Monitoring**  | Effective control  
Monitoring | | |
8.3 Generalising Sub-Systems Mechanism Impact on Project Success

The following Table 8.2 represents the participants, their roles and systemic belonging that participated in the card sorting (Trello Board) exercise.

**Table 8.2 List of Participants for Phase 3**

<table>
<thead>
<tr>
<th>Participants</th>
<th>Roles</th>
<th>Sub-systemic belonging</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Contract manager</td>
<td>S1</td>
</tr>
<tr>
<td>T2</td>
<td>Project management consultant</td>
<td>S3</td>
</tr>
<tr>
<td>T3</td>
<td>Alliance leadership manager</td>
<td>S4</td>
</tr>
<tr>
<td>T4</td>
<td>Managing director</td>
<td>S4</td>
</tr>
<tr>
<td>T5</td>
<td>Alliance manager</td>
<td>S4</td>
</tr>
<tr>
<td>T6</td>
<td>Region investment director</td>
<td>S4</td>
</tr>
</tbody>
</table>

Further, Table 8.3 presents the participants who recognized projects, along with the corresponding governance, cooperation, and coordination mechanisms they engaged in. The table encompasses projects of varying success levels, including both high and less successful ones. While also revealing the interplay of these mechanisms according to the participants.

**Table 8.3 List of Effective and Non-Effective Mechanisms Involved in High and Less Successful Projects and Their Interplay**

<table>
<thead>
<tr>
<th>Participant</th>
<th>High successful project</th>
<th>Less Successful project</th>
<th>Interplay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Risk mechanisms</td>
<td>Requirements mechanisms</td>
<td>Leadership [Gov] has positively influenced communication [Coord] in successful project</td>
</tr>
<tr>
<td></td>
<td>Leadership mechanisms</td>
<td>Leadership mechanisms</td>
<td>Requirements [Gov] have negatively</td>
</tr>
<tr>
<td></td>
<td>Strategy mechanisms</td>
<td>Pre-project appraisals</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>mechanisms</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>T1 (S1)</th>
<th>T2 (S3)</th>
</tr>
</thead>
</table>
| • Pre-project appraisals mechanisms  
  • Collaborative Ethos  
  • Culture  
  • Engagement mechanisms  
  • Communication mechanisms  
  • Process mechanisms | • Strategy mechanisms  
  • Relationships  
  • Culture  
  • Alignment and purpose  
  • Process mechanisms  
  • Engagement mechanisms |
|     | influenced and being influenced by the process and engagement mechanisms [Coord] |
| • Contract mechanisms  
  • Resource mechanisms  
  • Structure mechanisms  
  • Leadership mechanisms  
  • Relationships  
  • Alignment and purpose  
  • Culture  
  • Collaborative ethos  
  • Contract administration mechanisms  
  • Task management | • Change control mechanisms  
  • Risk mechanisms  
  • Through project monitoring mechanisms  
  • Alignment and purpose  
  • Collaborative ethos  
  • Contract administration mechanisms  
  • Communication mechanisms |
|     | Contracts mechanisms mainly incentives [Gov] have positively impacted cooperation and limited opportunism [Coop] |
| • Appraisals mechanisms  
  • Requirements mechanisms  
  • Resources mechanisms  
  • Structure mechanisms  
  • Contract mechanisms  
  • Leadership mechanisms  
  • Risk mechanisms  
  • Strategy mechanisms  
  • Monitoring mechanisms | • Appraisals mechanisms  
  • Requirements mechanisms  
  • Resources mechanisms  
  • Structure mechanisms  
  • Contract mechanisms  
  • Structure mechanisms  
  • Risk mechanisms  
  • Monitoring mechanisms  
  • Relationships |
|     | Contract mechanisms [Gov] influence and support alignment [Coop] |
|     | Weak appraisals mechanisms [Gov] affected the resource mechanisms [Gov] (wrong supply chain) |
|     | The loose requirements [Gov] have created opportunistic behaviours despite contractors were incentivised to engage early [Coop]. |
| T3 (S4) | • Relationships  
• Collaborative ethos  
• Culture  
• Alignment and purpose  
• Engagement mechanisms  
• Communication mechanisms  
• Process mechanisms  
• Contract administration mechanisms  
• Task management  | • Collaborative ethos  
• Culture behaviour  
• Alignment and purpose  
• Engagement mechanisms  
• Communication mechanisms  
• Contract administration mechanisms  |
|---|---|
| T4 (S4) | • Strategy mechanisms  
• Leadership mechanisms  
• Requirements mechanisms  
• Alignment and purpose  
• Relationships  
• Engagement mechanisms  
• Communication mechanisms  | • Requirements mechanisms  
• Contract mechanisms  
• Strategy mechanisms  
• Alignment and purpose  
• Collaborative ethos  
• Engagement mechanisms  | • Requirements and strategy mechanisms  
[Gov] influence alignment and purpose  
[Coop]  
• Contract mechanisms  
[Gov] influence the collaborative ethos and alignment and purpose  
[Coop]  
• Leadership [Gov] influence cooperation across different teams.  |
| T5 (S4) | • Strategy mechanisms  
• Risk mechanisms  
• Leadership mechanisms  
• Appraisals mechanisms  
• Resources mechanisms  
• Contract mechanisms  
• Alignment and purpose  
• Collaborative ethos  
• Relationships  
• Communication mechanisms  | • Strategy mechanisms  
• Risk mechanisms  
• Leadership mechanisms  
• Appraisal mechanisms  
• Resources mechanisms  
• Contract mechanisms  
• Alignment and purpose  
• Collaborative ethos  
• Culture  
• Relationships  | • Leadership mechanisms [Gov] positively influenced cooperation behaviours  
[Coop]  
• Leadership mechanisms [Gov] influenced positively communication mechanisms [Coord]  
• Communication mechanisms [Coord] negatively influenced the relationships [Coop]  |
The sorting exercise and related discussion across different sub-systems and types of projects outcomes (high and less successful) yielded some common observations. The relationship between governance, cooperation and coordination is complex. However, there was a high influence from governance towards cooperation, which to a lesser degree was seen with governance towards coordination. The following sections highlight the key observations found to validate the relationship between governance, cooperation and coordination.

8.2.1 Governance

For governance, key mechanisms that influenced cooperative behaviours were leadership (n=4), contract (n=3) and requirements (n=2) mechanisms. For instance, leadership have influenced the alignment and purpose of the supply chain as T4 conveyed

“...You know the key emphasis should be on creating the right environment and then partners and teams will respond accordingly. But then, but then within that
alliance, I can think of examples where teams have responded differently. It tends to more be a leadership issue then I think then” [T4 – Managing director]

Similarly, contract mechanisms such as incentives have influenced cooperative behaviours. For example, incentives have limited opportumism and allowed for alignment and purpose as mentioned by T2

“...when you look at the governance mechanisms we we the the first one I paid you will notice was contract mechanisms and and it and it helpfully they’re says it. You know, such as incentives. What happened during the project was the um, they introduced some contract based incentives. Which changed the culture and change their behaviours. Uh, and brought along a there already was alignment and purpose’’ [T2 – Project management consultant]

Requirements have also influenced the cooperation of the teams. For example, loose requirements have instigated opportunistic behaviour. As T3 alliance leadership team manager mentioned

“...Again, the requirements work so loose. The people weren't clear on what was expected of them both at individual level and organizational levels. So it was I think you'll struggle to have a project where they were missing entirely, but it was at a level that was too high, and didn't provide the level of clarity and articulation needed...when it came to the end of the design process. They didn't accept it, they said we. It's not our design and we want to go away and redesign it again. So although it sounds completely ridiculous, that is the scenario we can get where you pay for someone to get involved” [T3 – Alliance leadership manager].

Governance has also influenced coordination as well as cooperation. For instance, leadership mechanisms had a positive influence on communication, as T5 declared

“...So, so if, if I can I can look, I mean so interactive So if you look at leadership mechanisms all of that goes into all of your Cooperation...It underpins all of that and also actually effective communication mechanism as well because communication, you need to have an incentive to communicate and sometimes we found that that incentive wasn't a financial incentive, it was actually a personal relationship incentive.” [T5 – Alliance manager]

It must be noted that different governance mechanisms have influenced different coordination mechanisms. Also, governance mechanisms have effects on other governance mechanisms. For instance, weak appraisal mechanisms have negatively affected the resource mechanisms while requirements mechanisms have also negatively affected the
contracts mechanisms making them ineffective. The regional investment director T6 mentioned

“...Uhm, you might have a really good contractual mechanism, but if you're not really clear on your requirements, you should send in a position where actually the contract working really well, but it just means at £50 million schemes suddenly cost you £100 million, but the contract work well because the contracts done what it said it drink.” [T6 – Region investment director]

Also, the alliance leadership manager T3 conveyed

“...so in terms of the appraisal mechanism it was there, but it was weak. The problem is that elements of all of those will be there, but they were weak. there was appraisals mechanism, but it was a weak appraisals mechanism and we ended up with the wrong supply chain because the the mechanism for assessing did not focus on the outcomes he wanted to achieve” [T3 – Alliance Leadership manager].

This highlights the cascading effect of governance mechanism across sub-systems and inter-organisational boundaries which in turn depict the dynamics of governance in IOPs.

8.2.2 Cooperation

Cooperation was mostly influenced by governance and coordination mechanisms. However, there was a reciprocal effect between coordination and cooperation as both influenced each other. For instance, communication and alignment affect each other as T2 mentioned

“...The two cooperation items have I've I've gone where the alignment and and the ethos as you know, they're sort of almost wrapped up with communication.” [T2 – Project management consultant]

Additionally, cooperation appears to influence different coordination mechanisms when there is some difficulty in adopting a certain process across different organisations, as mentioned by T6

“...if you had the things which were right, you could overcome other issues structural issues, because people would work around them. So if they had the right behaviours and you didn’t have the right process for transferring information from one party to another new find that somebody to answer i’m not going to do it that
Further, it was revealed by T4 that alignment and purpose need to be translated further down to the supply chain (across inter-organisational boundaries) highlighting the need to focus on each interface when creating alignment and depicting the confinement of cooperation between specific interactions.

“...alignment and purpose so that lifts the relationship to a different level, but but also, you know uh outcomes of the only place that you can create true alignment if you're trying to crack alignment further down. And then you know you're introducing handoffs and interfaces.” [T4 – Managing director]

T1 also added that cooperative culture was missing in their own inter-organisational boundary despite being present in other boundaries showing the co-location of cooperation issues within specific boundaries

“I think so [a lack of cooperative culture]. Some of its other people might disagree. I mean, we've achieved a lot in now in the time and that and you can't do anything without some sort of willingness and cultural behaviour, but. I'm just talking about in in my little silo. Really, what we're trying to deliver on on the assurance side of things. So I think there is a there is a lack of understanding there.” [T1 – Contract manager]

### 8.2.3 Coordination

Coordination mechanisms influenced cooperation (x2). For example, communication mechanisms have negatively influenced the relationships as T5 mentioned

“...Major thing was information flow forward planning trust and efficiency with the main main things which affected the relationship in terms of it so and trust trust was a huge feature in terms of of this which comes down to.” [T5 – Alliance manager]

Also it appears that contract administration mechanisms also negatively impacted cooperation as revealed by

“Contract administration was poorly done ...We went to adjudication because. Uhm, we didn't comply with the NEC three contracts at the time, so there are various time scales where if if someone submits a program, the client has to respond within a certain time frame or it's accepted, and when can compensation
events have to be responded to. That wasn't ministered in the in the right time, and therefore that's partly why we went to adjudication.” [T3 – Alliance leadership manager]

Not to mention the reciprocal effect the communication had on cooperation which was discussed in the previous section 8.2.2, and how governance influenced coordination. It must be noted however, that some coordination mechanisms can influence the applicability and efficiency of governance mechanisms. As revealed by T1

“...the gate gateways and after tears and all that. That's not that's not clear, so the process mechanisms and the articulation (of requirement) clarity. I think those two are aligned as a problem. and also then the other one engagement and the pre project. Appraisals and early involvement. I think those two aligned as well.” [T1 – Contract manager]

8.3 Significance and Generalisability Sub-System Mechanisms Across Multiple Projects

The analysis yields important findings that underscore the significance of both relational and structural governance mechanisms in shaping cooperation. Additionally, it highlights the pervasive influence of governance on both cooperation and coordination. As previously mentioned, the impact of governance on cooperation outweighs its effect on coordination. Furthermore, a reciprocal relationship between cooperation and coordination is evident in certain instances, wherein they mutually affect each other. The analysis also reveals the cascading influence of governance and coordination, as they can permeate various levels of operation. Lastly, it is essential to note that participants' verification of governance, cooperation, and coordination mechanisms confirms their characterization in prior studies.
Chapter 9. Discussion

9.1 Introduction

This chapter aims to elaborate on the findings of the analysis and discuss it in relation to the literature. Following the main objectives of this study and its methodological direction, this chapter, therefore, brings together and synthesises the major findings from the data analysis. The three data phases collected for this thesis and addressed in Chapter 6, 7 and 8 are tackled. As such, the interplay between governance, cooperation and coordination across sub-systemic levels and the sub-systemic characterisation of governance, cooperation and coordination is addressed in this chapter. Further, the multi-level approach is also investigated as an approach to analyse the viability of project-based alliance networks in terms of governance, cooperation and coordination. Lastly, the chapter also focus on the use of Viable Alliance Model as a diagnostic tool showing a common framework to assess the three unit, and highlight the relationship between performance and governance, cooperation and coordination in alliances. In doing so, it examines its relationship with existing literature presented in Chapters 2 and 3. Therefore, this contributes to the theoretical discussion of project management and inter-organisational relationship governance literature.

9.2 Interplay of Inter-organisational Governance, Cooperation and Coordination Across Sub-systems

This section highlights the interplay of governance, cooperation, and coordination across sub-systems. To be able to do so, the section starts first discussing how mechanisms of governance, cooperation and coordination are interacting across the sub-systems, and then it discusses their interplay across sub-systems.

9.2.1 Governance Across Sub-systems

As was discussed earlier, the governance mechanisms and dimensions differentiate from one sub-system to another, and that differentiation is evident in previous analysis and
literature (Kujala et al., 2020). It has been found from the second and third phases that governance mechanisms and dimensions have effects on each other. For instance, in the second phase, the lack of unity of demands in project A between S4 and S3 has negatively influenced the requirements articulation between S3 and S1. Also, issues in the appraisals (S4-S3) in project B have caused commercial pressure due to low cost and issues in requirements (S3-S1). In the third phase, for T6 (S4) in a less successful project, issues of requirements have negatively affected the use of contractual mechanisms down in the supply chain. For T3 (S4) the weak appraisal mechanisms have negatively affected the resource mechanisms ending up with the wrong supply chain.

The three phases of this research have shown that governance dimensions or mechanisms affect each other, and such effect cascades across sub-systems. In other words, the filter down effect is observed whereby issues can cascade from S4 down to S3 and S1. This means that an issue in governance mechanisms that happens to be in higher level sub-systems such as strategy planning (which is usually being undertaken by alliance network decision makers such as alliance board) has an effect on other governance mechanisms down the lower sub-systems such as monitoring mechanisms. It appears that the dynamics of governance mechanisms follow a top-down approach rather than bottom-up one. This was also evident in Kujala et al. (2020) study where the type of tendering can affect project’s team capability and learning. This has implications for how governance mechanisms are analysed. First, a generic analysis of contractual and relational governance between two or more organisations cannot comprehensively describe what dimensions or mechanisms affect the other. For example, a macro-level of analysis in IOPs may find that contractual governance has a large effect on the project while relational has a limited effect. While from a micro-level perspective, this would not be the case as it may be that for instance leadership in S4 is affecting the decision-making structure and disincentivising teams across the sub-systems S3 and S2. This echoes the need to unpack the analysis of governance in IORs on a multi-level perspective to overcome what is called a “blind spot” in inter-organisational relationships (Lumineau, 2018). Second, another shortfall in analysing governance is that one may confuse the root cause mechanism affecting the overall governance of the alliance network. For example, at a sub-system S3 level,
requirements may be seen as ambiguous and issues of governance would only be attributed to requirements while ignoring the root cause of making the requirements ambiguous which was the appraisals in project B⁺. The findings have revealed how governance mechanisms interact on a multi-level perspective and how diagnosing issues of governance at a singular level can easily be mistaken for the root cause of such issues. This is due to the filter-down effect of governance from the upper level of inter-organisational alliances down to the supply chain.

9.2.2 Coordination Across Sub-systems

Different coordination mechanisms and characteristics were found across sub-systems. Most of the coordination issues were attributed to either contractual issues (i.e. compensation events or contractual administration coordination) or to other characteristics involving communication, synchronization, integration or alignment of action (Okhuysen and Bechky, 2009). Sobrero and Schrader (1998) have distinguished coordination as either contractual or procedural types. Each sub-system in different projects (phase 2 and phase 3) exhibited issues in both coordination types. For instance in phase 1, Project A⁺ suffered from complex processes and issues in compensation events coordination (contractual coordination). Whereas project A⁺ suffered from communication and complex process in S1-S1, S2-S1 and S2-S3.

Similarly, in Phase 3 there were mechanisms related to both to contractual provisions and other procedural ones such as communication or process. For example, T2 and T3 highlighted the importance of contractual administration mechanisms and other key mechanisms such as engagement or task management in their projects. This highlights the contractual (Malhorta and Lumineau, 2011; Cao and Lumineau, 2015; Kujala et al., 2020) and procedural dimensions (Gulati et al., 2012; Albers et al., 2016; Whyte and Davies, 2020; Castañer and Oliveira, 2020) of coordination across sub-systems, and posit that coordination takes many forms as also confirmed in the literature. However, either coordination took more of a contractual provision functionality (Cao and Lumineau, 2015) or more procedural type, it is important to acknowledge that inter-organisational
coordination is multidimensional, and studies of inter-organisational coordination should consider both types of coordination across different levels. This explains the difference in definitions and views of coordination in the literature and posits the importance of both (Oliveira and Lumineau, 2017).

While the interplay of both aspects of coordination is contingent upon the project phase (Oliveira and Lumineau, 2017), it is also contingent upon the sub-systemic role as some sub-systems exert specific mechanisms of coordination that differentiate from others.

Phase 2 showed that coordination seems to exhibit a filter down effect across sub-systems. For instance, Project C had issues in coordination between S3-S1 (no early engagement of stakeholders) which influenced communication in S2-S1 and compensation events between S1-S3. Similarly, Project A had issues in the process (S2-S3) and compensation events (S1-S3) which also influenced the issues of design coordination (S1-S1). This is also true for projects that were at the upper level of success. For instance, in project B issues of coordination were observed from S3 down to S1. While both positive and negative coordination outcomes were visible, still issues had cascaded across inter-organisational boundaries. However, in project C the positive outcomes of coordination were observed across sub-systems despite coordination issues found between S1-S1. Issues of coordination in terms of design and communication were present in all projects in Study 2 except Project C. This highlights the importance of supply chain integration and depicts the need to focus also on the S1s integration. Having said that, the coordination issues can cascade down to the supply chain in IOPs. However, even in positive outcomes coordination issues may appear within sub-system interaction as seen in project (C\(^+\)). Although the effect of coordination cascades down to different sub-systems, some sub-systems remain more prone to coordination issues, this is especially the case of S3-S2-S1 systemic interaction, where much more coordination is needed.

9.2.3 Cooperation Across Sub-systems

Similar Cooperation observations appear across sub-systems in phases 2 and 3. Interestingly, cooperation issues are more confined within systemic interaction and do not
cascade across different sub-systems. For instance, in Project C there were some issues in relationships and alignment and purpose between S3 and S1 while there were good working relationships between S1-S1. Also, despite positive cooperation outcomes in projects B+ and C+ blaming was appearing between S2-S1. In fact, most of the cooperation issues were shown in S3-S1 or S2-S1. This highlights the role of S3 and S2 in maintaining good relationships with their systemic interaction between each other and with S1. In other words, although ethos and culture can be set out in higher sub-systems such as S4 and S5 and may influence the behaviour of cooperation (i.e. Limiting opportunistic behaviour), cooperation remains more confined to the systemic interaction. Therefore, each sub-systemic interaction has its cooperative outcome that does not affect other sub-systems. As such, to ensure positive cooperative outcomes the focus should not be only on the alliance or network level but also on each systemic interaction. In light of this, the analysis of the relationships between different organisations should not be on a single level given the multiplicity of outcomes across different sub-systems (Lumineau and Oliveira, 2018). Hence the assumption of alliance network cooperative outcome is not limited to the outcome of a dyadic relationship but to the relationships within projects and across different organisations. In other words, to be able to understand how alliances are performing in terms of cooperation, an understanding of the relationships within IOPs and sub-systems is needed. Therefore, to ensure cooperation the focus must be placed on each sub-systemic interaction.

9.2.4 Interplay of Governance, Cooperation and Coordination in IOPs

The relationship between governance, cooperation and coordination appear to be complex. The three factors appear to be correlated. As such, it is apparent from the previous analysis in phases 2 and 3 that governance affected both cooperation and coordination, however to different degrees. Governance mechanisms appear to highly influence the cooperative behaviours of actors which confirms many studies in inter-organisational relationships (Williamson, 1975; Poppo and Zenger, 2002; Ahola et al., 2014; Cao and Lumineau, 2015). For instance in phase 2, in Project A the lack of integration and unity of demands, and the lack of incentives (Governance) have affected the alignment and purpose
of the team (Cooperation). Similarly in Project C, the lack of a clear strategy and programme of projects (Governance) have affected the alignment and purpose of the project team. Leadership mechanisms (Governance) also influenced cooperation as seen with T4, T5 and T6 participants in phase 3. Governance affects coordination but also gets influenced by it. As seen in project B, the continuous changes of resources (Governance, S3-S2) have influenced the engagement with the owner (Coordination). Leadership mechanisms (Governance) influenced positively communication mechanisms (Coordination) as mentioned by T5. According to T2 monitoring and change control (Governance) had a negative effect on contract administration (Coordination). However, coordination does influence governance to a lesser degree. For example, according to T1 requirements (Governance) is being influenced by the process and engagement mechanisms (Coordination). Also, in Project C the engagement of suppliers (coordination) had a reciprocal effect on requirements (Governance). For coordination and cooperation, both factors seem to have a reciprocal effect on each other. As highlighted by T2, communication mechanisms (Coordination) affect and get affected by the alignment and purpose of project actors (Cooperation). Also, T5 highlighted that communication mechanisms (Coordination) had influenced the relationships (Cooperation).

As mentioned earlier, governance influences both cooperation and coordination. However, it is apparent that governance mechanisms highly influence cooperation while to a less degree towards coordination. Interestingly while it is not significant, it has been found that coordination may also affect governance more particularly in terms of engagement between different sub-systems. This is found through the influence of engagement mechanisms on governance in both phases. This highlights the role and importance of coordination in IOPs (Oliveira and Lumineau, 2017). While cooperation did not seem to affect governance as seen from the previous analysis. Further, coordination and cooperation appear to affect each other, confirming the view of the interdependent model of cooperation and coordination (Gulati et al., 2012). From the analysis, it was found that cooperation and coordination follow the logic of complementarities and mutual incremental reinforcement. As complementarities both cooperation and coordination can enhance each other. While reinforcing more positive outcomes of cooperation would
increment the positive coordination outcomes and vice versa. However, as seen in the analysis such dynamics can be affected by the nature of the cascading effect of coordination and governance across sub-systems. For example, coordination within one sub-system can be affected by cooperation happening within the sub-system while also being influenced by coordination mechanisms found on a higher level. Also, cooperation outcomes within a lower sub-system may be a result of an influence of the governance mechanism that happens to be found in a higher sub-system.

The relational and contractual mechanisms also appear to follow the rule of complementarities (Poppo and Zenger, 2002). Given what has been seen in the analysis of the six projects in three different alliance networks and the responses from participants working in different alliance networks, it has been found that both relational and contractual mechanisms are needed and both act as complements. For instance, leadership mechanisms have influenced cooperative behaviours, while also contractual incentives helped in improving the cooperation of the project team. Also, given the cascading effect of governance mechanisms on each other, relational and contractual may be affecting each other. Although it was not clear in the analysis how leadership for example can affect contractual mechanisms and vice versa, it would be interesting to investigate such a relationship between these mechanisms across sub-systems on different levels. Lastly, as seen from the analysis, it is important to adopt a multi-level approach to unpack the interplay of these three units.

9.3 Sub-systemic Characterisation of Governance, Cooperation, and Coordination

The analysis in section 6.2 identified key characteristics of governance, cooperation and coordination across different sub-systems mainly S4, S3 and S2. As mentioned earlier such characterisation was based on the theoretical aspect of the VSM (Beer, 1981)

[^32]: Due to the limited data, the characterisation of systems was limited to S4, S3 and S2 (See Section 9.2.1). For S1 it is a replication of the sub-systems S5-S2 on a second level of recursion (Beer, 1981).
and the empirical data collected (from the three studies). The characteristics of each sub-system varied across sub-systems in terms of governance and coordination, while cooperation, stayed the same given its behavioural feature. For instance, S4 governance characteristics include *appraisals, risk management, form of contracts and clear strategy and principles articulation* while S3 includes *structure, requirements articulation, and resource allocation* to name a few. This shows how different sub-systems exhibit different governance dimensions and mechanisms and posits an important understanding of where the different theoretical basis for governance is located and can influence the most (Müller, 2011; Ahola et al., 2014). Nevertheless, some of the characteristics are replicated across different sub-systems. For example, *leadership* is not solely a characteristic of S3. S4 can also exhibit leadership. This is much more noticeable in coordination. For instance, *process coordination* can be found in S3 and S2. While *early contractor involvement* (or *planning and consultation*) is mutually existent within S3 and S4. This has also been found while analysing the three alliance networks and their respective projects. For instance from the phase 2 analysis, in project A early planning and consulting (S4-S3) and early contractor involvement (S3-S1) were observed. Despite the presence of mutual characteristics across sub-systems, there still exists some variability which highlights the uniqueness of each of the sub-systems. For instance, in S4 the main coordination mechanisms found were related to *engagement* and *planning and consulting* while in lower sub-systems such as S2 the mechanisms or characteristics are more related to *process* and *contract administration*. This variability highlights the multifaceted nature of coordination and what entails (Gulati et al., 2012; Oliveira and Lumineau, 2017), and posits the need to focus more overtly on certain characteristics in each sub-system. The characterisation of each sub-system shows an approximal independence in their attributes given their saliency in terms of governance and coordination (Simon, 1962). Interestingly, cooperation characterisation remains to some extent the same across sub-systems with key characteristics including *relationships, alignment and purpose, and collaborative planning/standards*. This is mainly due, as

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33 Simon describes the hierarchy of complex systems as nearly-decomposable and redundant in such a way that each subsystem within the hierarchy exhibit a salient feature (aggregated properties of the part) entering into “the description of these parts”
mentioned earlier, to the interpersonal behaviour nature of cooperation (Castañer and Oliveira, 2020).

The following Table 9.1 summarizes the key characteristics of each sub-system from the three studies analysed earlier:

<table>
<thead>
<tr>
<th>Sub-system</th>
<th>Governance</th>
<th>Cooperation</th>
<th>Coordination</th>
</tr>
</thead>
</table>
| S4         | • Appraisals  
            • Risk management  
            • Contracts  
            • Clear strategy and principles articulation  
            • Unity of demands  
            • Goal alignment  
            • Leadership  
            • Decision making structure | • Collaborative standards  
            • Alignment and purpose  
            • Relationships | • Engagement  
            • Early planning and consultation |
| S3         | • Structure  
            • Resource allocation  
            • Objective alignment and shared vision  
            • Incentives and tendering  
            • Ownership and accountability  
            • Roles and responsibility  
            • Requirements articulation  
            • Leadership and motivation  
            • Risk  
            • Effective control | • Collaborative standards  
            • Alignment and purpose  
            • Relationships | • Early contractor involvement  
            • Requirements coordination  
            • Co-location  
            • Process standardisation |
| S2         | • Relationships  
            • Collaborative planning | • Monitoring  
            • Communication  
            • Process  
            • Contract administration |

The variability of governance and coordination across different sub-systems demonstrates that both governance and coordination are multi-faceted (Kujala et al., 2020; Oliveira and Lumineau, 2017). This confirms the multiplicity of governance theories found in the literature (Müller, 2011) and posits the need to view inter-organisational project governance from multiple theoretical lenses, in turn stressing the importance of identifying
mechanisms and key dimensions of governance from a sub-systemic in analysing inter-organisational relationships. For instance, stakeholder theory explains the importance of engagement while transaction cost economics (TCE) explains the role of contract as a governance mechanism influencing inter-organisational projects and relationships (Williamson, 1975). The presence of leadership plays an important role in governing relationships, being part of relational mechanisms (Poppo and Zenger, 2002), it explains the role of stewards in governing projects (Davis et al., 1997). While the presence of incentives highlights the agency and opportunistic behaviour that such incentives aim to tackle, thus adopting TCE (Williamson, 1975) and agency (Jensen and Meckling, 1976) approach. Furthermore, as mentioned earlier, the variability of governance mechanisms in different sub-systems shows where different theoretical underpinnings come into play. As such, the theoretical premises of governance theories can be identified with respect to each sub-system. These premises may vary from one sub-system to another. For instance from TCE perspective, the decision to buy or make is found in S4 where strategy is laid out, while monitoring against opportunistic behaviour is found in S3 and S3*. Similarly, for stakeholder theory, different stakeholders are managed differently across levels. This has an important implication on how governance is designed, analysed and enacted (Sanderson, 2012).

Equally for coordination, similarities exist nevertheless there are some variabilities across the sub-systems. For example, the main coordination characteristic of S4 is stakeholder engagement and early planning and consultation while for S3 is more about process standardization and requirements coordination. Thus, demonstrating the multi-faceted nature of coordination from integration (Whyte and Davies, 2021) to communication mechanisms (Kujala et al., 2020). As such, focusing on the dominant characteristics of each sub-system can greatly influence and help solve coordination issues.

34 While the focus of this study is structural in the sense of sub-systems characterisation, it is important to acknowledge that these mechanisms can happen at different point in time.
However, when it comes to cooperation, the characteristics of cooperation remain the same across sub-systems.

It must be noted however that the characteristics found in one sub-system do not affirm that it only exists in that sub-system. However, it means that such characteristic is highly manifested within the designated sub-system. For example, obviously, communication is essential in any interaction and found across different sub-systems through the communication channels (Beer, 1981), however, in S2 the communication mechanisms are highly apparent and needed given the nature of sub-system 2 which aims to integrate different S1s (Espinosa, 2006).

The characterisation of the sub-systems has shown that each sub-system exhibits some unique attributes in terms of governance and coordination that distinguish it from other sub-systems. Although similarities were found across sub-systems, the variability of attributes has demonstrated the multiple theoretical lenses used in the literature explaining governance and coordination (Müller, 2011; Gulati et al., 2012; Ahola et al., 2014; Kujala et al., 2020). This helps address multiple theoretical lenses given the characterisation and uniqueness of sub-systems (Ahola et al., 2014). This also targets recent calls to address a detailed view of different governance dimensions by unpacking relational and contractual mechanisms (Cao and Lumineau, 2015).

9.4 Multi-level Approach of Project-Based Alliance Networks in Governance, Cooperation and Coordination

The VAM has allowed for a common frame of analysis overcoming the issues and challenges of disordering boundaries in the analysis (DeFillippi and Sydow, 2016). Also, it has enabled the cross-comparison between alliance networks irrespective of the variability in their structure (Sydow and Braun, 2018). By using sub-systems as a way to address the differences and blurriness of inter-organisational boundaries from one project to another, a multi-level (between sub-systems and across sub-systems) approach was adopted. The first level of analysis is through sub-systemic interaction which in turn informed the second level of analysis which is the project level (across sub-systems). While
the governance structure varies from one project to another (Provan and Kenis, 2008; Ahola, 2018), the sub-systemic interaction helps address the variability not only across projects but also across networks. While most studies in IOPs and IORs governance focus on dyadic relationships overlooking the whole alliance network (Ahola et al., 2014). They usually give a partial understanding of these relationships especially that in alliance networks multiple organisations are involved (Cao and Lumineau, 2015; Lumineau and Oliveira, 2018). For example in the second study, project C had issues in terms of cooperation between S3-S1 (opportunism) while S1-S1 had a positive cooperative outcome (good working relationships). A dyadic view of the interaction between the owner and contractor that reveals opportunistic behaviour would in turn obscure the relationship between the contractor and sub-contractor which was characterised by a good working relationship. In practice, this can be seen that the overall relationships in IOPs are opportunistic, leading to inadequate actions that affect the overall network.

That said, the analysis of governance, cooperation and coordination between sub-systems and their interplay across sub-systems in IOPs has shown the importance of adopting a multi-level approach in understanding and analysing alliance networks and their respective IOPs (Sydow et al., 2018; Lumineau and Oliveira, 2018; Sydow and Braun, 2018). The following sections shine a light on how and why a multi-level approach is needed to be able to assess alliances.

**9.4.1 Sub-systemic Interaction Level in IOPs**

The sub-systemic level interaction through the viable alliance model has revealed how sub-systems interact with each other in terms of governance, cooperation and coordination. The analysis shows that different sub-systemic interactions had positive and negative co-existing issues in terms of governance, cooperation, and coordination. This first suggests the importance of multi-valence analysis (positive and negative interactions) when analysing inter-organisational relationships as not all interactions are purely positive or negative (Lumineau and Oliveira, 2018). As such, these interactions can vary across the lifecycle of the project and the alliance, which in turn reveals the need to be adaptable.
Therefore, shifting from a purely an ex-ante governance-by-design approach towards a governing as a process approach (Sanderson, 2012).

Further, sub-systemic interaction can assist in addressing key issues in terms of governance, cooperation and coordination. Here different remedies of coordination (Gulati et al., 2012) can come into effect in addressing such challenges signalling a shift to project actualities (Cicmil, 2006; Sanderson, 2012). From a cybernetics perspective, this reflects the usefulness of the concept of variety and its associated law of requisite variety (Ashby, 1947) in addressing and responding to issues as they arise.

The data revealed how each sub-systemic interaction is important and may affect other sub-systems. For example, issues found in governance between S4-S3 cascade down to S3-S2, S3-S1 and S2-S1 (project A’ and C’). Further, the differences in the characterisation of each sub-system shine a light on the diversity of mechanisms and characteristics that are enacted within each sub-system. As such, it shows how one mechanism can affect the other mechanisms happening in other sub-systems. While it has been noticed in the six IOPs how governance and coordination manifest a filter-down effect across sub-systems, it is crucial to ensure that these elements are being designed adequately at higher sub-systemic levels, particularly in S5 and S4. This highlights the role of the owner and key partners embedded within these sub-systems in maintaining a good governance and coordination design (Miller, 2006). Organisation design (Mintzberg, 1979) can play a vital role in maintaining good governance practices and coordination outcomes. Also reflecting the importance of boundary spanners in addressing these issues.

The analysis does also show that cooperation must be tackled and managed in each sub-system interaction. While the role of the contract in maintaining good cooperative behaviour and usually enacted at the upper sub-systemic level (Poppo and Zenger, 2002), still the behaviour of the team is also affected by the specific sub-systemic interactions. For example, project C’ had good relationships between S1-S1 while issues were found in terms of relationships, opportunism and alignment and purpose between S3-S1, and blaming between S2-S1. This explains the role of the social-structural (Coleman, 1988) and social-psychological perspective (Schoorman, Mayer and Davis, 2007) in maintaining
cooperative behaviours which happen to be bounded in a sub-systemic interaction. Further, most of the cooperation issues were found within the system-in-focus (S3-S2-S1) interaction. This was due to the number of interactions within these sub-systems and the number of organisations involved.

A sub-systems interaction level approaches the analysis not by the centrality of actors and their interactions per se, but through the functionality of each sub-system (Beer, 1981). Here, the sub-systemic interaction is the focus whether it is consisting of a single actor making the decisions or a more integrated approach in governing. The sub-systemic perspective can accommodate the differences in governance approach, its associated mechanisms and their effect across inter-organisational boundaries.

9.4.2 Inter-organisational Projects Level Perspective

On a project level, it is obvious that IOPs were affected by governance, cooperation and coordination. As seen earlier (see section 9.2), the performance of the project was influenced by the effectiveness of governance mechanisms which influenced cooperation and coordination outcomes. As seen in phase 3, highly successful projects have been associated with positive governance, cooperation and coordination. Similarly, less successful projects were associated with issues in these three areas. Indeed, most studies of IOPs governance shed light on how governance mechanisms (contractual or relational) could affect the overall performance of the project (Olsen et al., 2005; Müller, 2011; Ahola et al., 2014), or how they interact across the project lifecycle. However, they remain subtle on how governance mechanisms interact with cooperation and coordination between different organisations. For example, in phase 3 according to T5 leadership mechanisms positively influenced cooperation behaviours and communication mechanisms. According to T3, contractual mechanisms have influenced and supported the alignment of organisations in a highly successful project. Such analysis or view have been widely discussed in the literature (Poppo and Zenger, 2002; Ahola et al., 2014; Cao and Lumineau, 2015) while addressing its limitations especially when targeting only dyadic arrangements (Ruuska et al., 2011; Ahola et al., 2014; Ahola, 2018). The level of analysis that happens
to be in the literature is limited to such an arrangement given the overly focus on dyadic roles between the project owner/client and the integrator (Ahola, 2018). This overlooks the interaction of different organisations involved (i.e., suppliers and sub-contractors). The across sub-systems analysis (project level) is enabled through sub-systemic interaction, which helps tackle the limitation of dyadic arrangements (Ahola et al., 2014; Lumineau and Oliveira, 2018). Perhaps the only theoretical framing that covers the multi-level inter-organisational arrangements is that of networks (Ahola, 2018; Provan and Kennis, 2008). However, the focus of such a level of analysis is also limited to the descriptive explanation or comparison of relational configuration between the nodes (Provan and Kennis, 2008). Further, the hierarchical structuring of these mechanisms and the multiplicity of their dimensions cannot be depicted through network theory (Cao and Lumineau, 2015) especially given the disparity of IOPs in their governance structure and actors.

Moving towards the context of cooperation and coordination from an IOP perspective. IOP coordination and cooperation have been widely discussed. For example through the use of contractual mechanisms in the sense of coordinating the relationships and limiting opportunistic behaviour (Lumineau and Oliveira, 2017; Cao and Lumineau, 2015; Ruuska et al., 2011) which in turn affects cooperative outcomes. For coordination, studies did acknowledge the role of integrators as either complementary or substitutive (Atkinson et al., 2006; Cao and Lumineau, 2015; Oliveira and Lumineau, 2017). For example, the study of Oliveira and Lumineau (2017) discussed the interplay of coordination mechanisms of integration with that of contracts, while focusing on the contingent aspect of both types of mechanisms. The analysis of the second and the third phases did highlight both types of mechanisms and how they are interacting within the project. Although, it is not clear how such mechanisms interplay, what has been found is that coordination mechanisms in general terms do influence each other which may signify that both types (integration and contracts) mentioned are influencing each other which confirms the study of Oliveira and Lumineau (2017). Further, it seems that integration mechanisms are more present in the lower sub-systems, especially in the system-in-focus S3-S2-S1 where the need for day-to-day coordination is higher. Contractual coordination mechanisms such as contract administration and project management are found between the S3-S2 interface while the
S2-S1 interface is more focused on integration. Locating mechanisms across different sub-systemic interactions has an important effect on how one can adapt to the coordination needs throughout the project (Oliveira and Lumineau, 2017). This sheds light on the important role of S2 in meeting such coordination needs on a situational basis (Beer, 1981). Further research into this would be instrumental given how S2 coordinates different functions of these mechanisms. For Cooperation, the analysis has shown that cooperation is an important element in not only predicting how successful the project (through the presence of cooperation issues in less successful projects) is but also the level of cooperation on other projects given that pre-existing experiences can affect how teams cooperate on future projects (Wang et al., 2017). In turn, it will affect the overall cooperation of the alliance networks, given the amalgamation of projects and its cooperative outcomes. Nevertheless, cooperation can take different outcomes across sub-systemic interactions, which brings to the front the importance of multi-valence (positive and negative) in analysing interactions (Lumineau and Oliveira, 2018). For example, issues in cooperation may be found between S3-S2 while cooperation is present between S2-S1. This stipulates the need to ensure cooperation between each sub-systemic interaction.

9.4.3 Alliance Networks Level Perspective

When it comes to the alliance network perspective and its related governance arrangements, the literature has been focusing on how such arrangements are being structured. As such, an alliance network is perceived as both hierarchical and non-hierarchical that hinges on understanding the nature of exchanges and relationships across projects (Jones et al., 1997). Evidently, the analysis shows that the success of such arrangements can be influenced by the contextualities of projects as observed in the six IOPs of the three alliance networks A, B, and C. This means despite the consistency of governance arrangement and structure on a network level, variability is found in governance mechanisms across projects. This in turn also affects the cooperation and coordination of participating organisations. Additionally, some networks are subjected to a different governance arrangement for different projects within, as observed in different studies. For example, Ahola (2018) distinguished IOPs structure into three typological
forms; the market-driven network, the dyad-driven network and the integrated core network. The rationale behind adopting one form or another is affected by different antecedent factors such as the uniqueness of the deliverable or structural embeddedness (Ahola, 2018). Given the differentiation of mechanisms enacted in each project let alone the change of structure and arrangement within the same network, projects end up with varied performance outcomes within the same network. Furthermore, the blurred boundaries on the network level (between permanent organisations) and the project level can raise ambiguities of roles across projects (DeFillippi and Sydow, 2016). This in turn can analyze alliance performance myopic. Moreover, the unique characteristics of IOPs result in contextualities that can affect project performance (Grahber, 2004). For instance, complex task and time pressures are part of exchange conditions which influence how the network governance is operated (Jones et al., 1997), whereas this variability in inter-organisational governance is limited or minimal in operational milieu (see Keller et al., 2021 for a case in changing governance arrangements). One factor that induces complexity is the multiplicity and continuous change of actors (suppliers and contractors) in different projects as not all actors within the alliance network are consistent (Ahola, 2018). Another factor is the timeframe of alliances, that is whether the nature of the alliance is strategic spanning over decades or temporal. This can also affect the dynamics of participating partners and eventually governance arrangements and vary from one project to another.

These characteristics postulate the need for a multi-level analysis to holistically understand the inter-organisational relationships of alliance networks and their governance. In other words, the alliance network performance should be understood at the IOPs level (cross sub-systemic level), which in turn can be analysed at a sub-systemic level as seen in the analysis in Chapter 7. In doing so, alliance networks gain better insight across multiple projects as comparison can be achieved through common sub-systemic framing.

Previous studies have tackled the multi-contractual arrangements that happen on an alliance network level which is responsible for enacting high levels decisions (Provan and Kenis, 2008; Ahola, 2018). While the structural aspects of alliance network governance are considered important (Albers et al., 2016), especially of the filter down effect observed, still networks must be analysed on the project level taking into consideration the
idiosyncrasies of each project, as some mechanisms that are deemed effective in one project may not be in another within the same network. These idiosyncrasies of each project (e.g., different actors, roles and contracts) make them different in how they are governed and structured. Therefore, to analyse the alliance network and its performance, a micro-analytical view that is based on a common framework of analysis is needed. This is due to the uniqueness of each project in terms of actors, structure, and other factors (DeFillippi and Sydow, 2014).

Although this study does not highlight how such mechanisms and arrangements change over time after, it stresses the need to view the performance and analyse alliance networks on a project and sub-systemic level. While remarking dynamical shift in IOR in different studies tackling IOR governance (Das and Teng, 2001; Faems et al., 2008; Gulati et al., 2012; Keller et al., 2021), a multi-level approach (Lumineau and Oliveira, 2017) for analysis is not only important but needed to ensure how different partners are performing and to understand what went wrong. Further, what has been observed from a project and sub-systemic level of analysis, especially in terms of how governance, cooperation, and coordination interplay across different sub-systemic interactions can be insightful in predicting how these mechanisms interplay in a higher level (network level). Although this study does not highlight how network level can affect the project level governance, it does shed light on how the projects in phase 2 have witnessed filter down effects in governance and coordination from a higher sub-systemic level (S5-S4/S4-S3) down to other sub-systemic levels.

9.5 Viable Alliance Model Framework as A Diagnostic Tool and Common Frame of Analysis

The Viable Alliance Model (VAM) framework developed through phases 1 and 2 has served to highlight the sub-systemic issues in terms of governance, cooperation and coordination. As such, each sub-system has its characterisation which can assist in identifying what issues are happening and address them accordingly. Although such characterisation may assume a nature of an ex-ante design of governance, cooperation, and coordination, however, it does highlight a method to shift towards spontaneous governing.
(Sanderson, 2012). Essentially, most studies have focused on pre-designed forms of governance such as contracts and structures overlooking a micro-analytical view of day-to-day activities (Sanderson, 2012). Most of the governance in IOPs is designed under the assumptions of static conditions that do not reflect the actual nature of the project environment, which is shaped by uncertainty and risks (Atkinson et al., 2006; Jones and Lichtenstein, 2008; Sanderson, 2012). Such assumptions lay the focus on forms of organising that span over the project lifecycle without looking into the dynamics of change that happens between partners. Having said that, emerging arguments about the need to distance from rationalistic assumptions in project management into a more situational dynamic approach to project organising have started to gain popularity (Söderlund, 2004; Ivory and Alderman, 2005; Blomquist et al., 2010). Therefore, shifting towards the need to understand projects through their practices as complementary to the traditional approach which focuses on the best model design (Blomquist et al., 2010). The Viable Alliance Model (VAM) framework does provide a complementary approach to both streams by shifting the focus towards a project-as-practice approach in governing (Hällgren and Söderholm, 2011) through diagnosing governance, cooperation and coordination while adopting a priori systemic design. For example, in terms of design, each sub-system depicts a certain role within the IOP and network. Similarly, an issue for example in resource allocation between S3-S1 can highlight the need to address such concerns. Similarly, as an example, issues in risk mechanisms can affect coordination and cooperation. As such, managers can investigate how influential such mechanisms can be across project teams and act accordingly. Stressing the key issues and their location in systemic interaction can assist practitioners with any arising issues and their root causes which can help adapt to uncertainty. In the same vein, the use of the VAM framework can shed light on what has been done correctly and where it was. In doing so alliances would be able to learn and share lessons as projects move forward. This is essentially important in alliance networks as it serves to predicate any issues that may arise in future projects given the prior experience and lessons they learned in these areas. Furthermore, the change in coordination mechanisms across the project lifecycle as depicted by Oliveira and Lumineau (2017) hinges on the need to view coordination in inter-organisational arrangements as a process.
of contractual and integrating mechanisms. This shows how different mechanisms come into play during different stages of the project. Therefore, an analysis of such mechanisms should be viewed from a project-as-practice standpoint to ensure the proper use of “coordination mechanisms to meet coordination needs” (Oliveira and Lumineau, 2017 pp. 32). Through the application of VAM coordination mechanisms between systemic interactions can be identified and adjusted to suit the coordination needs depending on the situation at hand. Although the study presented did not look into the dynamics as the study was cross-sectional, further research in this stream looks promising. Moreover, the VAM can serve as a framework that can be replicated across projects irrespective of how these projects are structured and who the actors are. As seen earlier, this enables cross-comparison between projects within the same network.

9.6 Performance of Inter-organisational Projects through Governance, Cooperation and Coordination

Following the literature review presented in Chapter 3 on inter-organisational governance, cooperation and coordination and the analysis undertaken to understand the viability of inter-organisational projects in alliance networks, this section elaborates on how issues of governance, cooperation and coordination are linked with the project performance. Although, the correlation between project governance and performance is not new (Chen and Manley, 2014). The analysis in sections 6 and 7 (Study 2 and 3) shows the relationship between governance, cooperation and coordination in higher and lower successful projects have confirmed that correlation. Project performance has been key in understanding success criteria in project management studies (Turner et al., 2013). In the case of this analysis, the success criteria were measured against cost, time, relationships (i.e. opportunism) and the degree of achieving key outcomes of programmes.

While it is widely known across the literature that governance - contractual or relational- affects performance outcomes (Cao and Lumineau, 2015). The analysis highlights the degree of association between these three factors. For instance, the higher the governance issues were in projects, the higher the degree of cooperation and
coordination issues found. This also confirms previous studies highlighting the influence of governance on cooperation (Turner and Simister, 2001; Adami and Verschoore, 2018) and coordination (Gulati et al., 2012). As a result, this confirms the evidence of the correlation found in the literature between governance, cooperation and coordination on project performance (Eriksson and Westerberg, 2011; Chen and Manley, 2014) and between each other (Poppo and Zenger, 2002; Gulati et al., 2012; Castaner and Oliveira, 2020).

9.7 Summary

This chapter has discussed the main findings from the three studies in this thesis. It tackled the interplay of governance, cooperation and coordination across sub-systems. Further, it addressed the systemic characterisation of governance, cooperation, and coordination. Moreover, the chapter argued for a need for a multi-level approach that incorporates network, IOPs and sub-systemic levels to ensure a holistic analysis of inter-organisational relationships within the alliance network. Later, the chapter discussed how VAM can be adopted as a common framework of analysis and a diagnostic tool for governance, cooperation and coordination. Lastly, it highlighted how the performance varies according to governance, cooperation and coordination.

The next Chapter 10 highlights the conclusions and recommendations of this research. In Chapter 10, the research aims and objectives are revisited while highlighting the conclusions reached against them. The chapter also elaborates on the limitations of this research as well as the contributions to knowledge and practice while providing future areas for research.
Chapter 10. Conclusions

This chapter lays out the key conclusions reflected throughout this thesis. The research aim and objectives are re-introduced and linked to the conclusions and findings that have been derived from the literature review and empirical analysis. Further, research limitations and opportunities for future research are discussed.

10.1 Achievement of Research Aim and Objectives

This research aims to investigate how governance, cooperation and coordination in IOPs interplay across different sub-systemic boundaries and what are the key characterisation of governance, cooperation and coordination across these boundaries. As such, this thesis provides a holistic approach to understanding the interplay that goes beyond dyadic relationships. Through Phase 1 a Viable Alliance Model framework with key systemic characterisation was developed. Phase 2 used the VAM to highlight key issues in terms of governance, cooperation and coordination within alliance networks operating multiple projects across different sub-systems, which allowed for a better understanding of such interplay. Phase 3 takes a different approach by generally understanding the interplay of governance, cooperation, and across different projects, hence providing another perspective of such interplay. The following Table 10.1 shows the process of answering the research question and achieving the main aim, through the achievement of key objectives.
Table 10.1 Research Objectives and Achievements

<table>
<thead>
<tr>
<th>Research Objectives</th>
<th>Achievement of Research Objectives</th>
</tr>
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<tbody>
<tr>
<td>To explore and understand different characteristics and mechanisms of governance, cooperation and coordination</td>
<td>The literature review of governance, cooperation and coordination provided the foundation for achieving this objective. As such, this thesis has reviewed and synthesised different governance mechanisms employed in IOPs, and key coordination and cooperation characteristics in IORs. This was later employed and investigated more particularly through phases 1 and 3 of this research. Generally, the literature showed that governance, cooperation and coordination are multi-faceted and as a result it has different characteristics or dimensions. Unpacking these different characteristics allow for a better understanding of how they are employed and interact.</td>
</tr>
<tr>
<td>To explore the Viable System Model (VSM) as a governance framework for IOPs</td>
<td>This thesis provided a review of VSM and investigated its application as a governance framework through its provenance, its previous application to the field of project management in the literature and through semi-structured interviews in phase 1. Given the constructivist epistemological basis of the VSM, its key systemic characteristics with clear communication channels and interactions, and the nested structure, the VSM is seen to be fit yet with the need to be re-designed to suit IOPs.</td>
</tr>
</tbody>
</table>
To develop the Viable Alliance Model (VAM) as a governance framework for IOPs

The VAM was developed as a governance methodological framework for IOPs by adopting an abductive approach allowing to merge between the theoretical aspects of the literature of governance, cooperation, coordination and VSM. This while investigating key characteristics and mechanisms from empirical data through the semi-structured interviews and workshops undertaken in the first phase of this research. Key governance, cooperation and coordination mechanisms and characteristics were laid out against each system within the VSM. Expert workshops allowed to better understand the operationalisation of these mechanisms and characteristics across different sub-systems. As such key sub-systems (S4, S3 and S2) of the VSM were characterised again by governance, cooperation and coordination. The characterisation provided an enriched view of these factors and highlighted their differentiation from one system to another, more particularly in terms of governance and coordination.

To assess governance, cooperation and coordination across different inter-organisational levels through the VAM

Multiple case studies consisting of six projects embedded within three alliance networks are explored. Each of the alliance network has two projects, one that is highly performing and the other less performing. The VAM was applied to understand inter-organisational interactions and highlight key issues (positive and negative) that happened in each project in terms of governance, cooperation and coordination. Thematic analysis was employed to highlight the issues and categorise them while referring to the literature. The issues happening between sub-systemic
interaction enabled a better understanding of how governance mechanisms are employed and interacted with each other and showed the interplay of governance, cooperation and coordination across sub-systemic boundaries.

| To analyse and explore the interplay of governance, cooperation and coordination mechanisms in different IOPs | Phase 2 and 3 of this research enabled to comprehend how governance, cooperation and coordination interact. Through highlighting key issues in terms of governance, cooperation and coordination that happened in the six IOPs (3 successful and 3 less successful) of phase 2 in this thesis, also by employing a card sorting exercise through semi-structured interviews that allowed participants to choose key mechanisms and characteristics of governance, cooperation and coordination for each project they worked on (one that is successful and another less successful). This provides two perspectives to explore the interplay, first through a case study design that investigates three alliance networks and another through participants and their experience with specific IOPs they worked in. As such, enriching the analysis and exploration of the interplay of the three factors. |

**10.3 Summary of Conclusions**

As the research objectives are being achieved, this study has drawn key conclusions from its review of the literature and empirical analysis.
The key propositions are summarized as follow

1) **Governance and coordination mechanisms exhibit unique characteristics while cooperation has the same across different sub-systems.**

Through the VAM, different sub-systems exhibit different mechanisms of governance and coordination. Although, it must be noted that some similarities were found across different sub-systems still key differentiations were observed. This uniqueness sheds light on the multi-faceted nature of governance and coordination and shows how one theoretical lens is insufficient in addressing all governance or coordination issues. Further, it showed that to be able to understand how governance mechanisms interact and are employed and how they affect cooperation and coordination, one needs to dive deeper into the specifics of each mechanism and locate it within the related sub-system. Governance frameworks such as VAM can help identify key mechanisms and characteristics which would allow to carefully monitor governance across projects within alliances and throughout their lifecycle.

2) **Governance and coordination mechanisms have a cascading (filter down) effect across sub-systems while cooperation is confined between sub-systemic interaction**

It was found through phase 2 of this research that governance and coordination have a filter down effect across sub-systems. This highlights the importance of not only focusing on sub-systemic interaction but also investigating the top-down approach (higher level) governance mechanisms as the root cause of governance issues may lie there. For example, issues may be found between two organisations (suppliers or sub-contractors) to be relational and attributed to relational mechanisms, however, the root cause is related to contractual mechanisms that were employed by the client organisation towards these organisations which cascaded down to affect the relational mechanisms. The same goes for coordination which also exhibits as mentioned earlier a
cascading effect. Nevertheless, cooperation is more confined to sub-systemic interaction. This is attributed to the peculiarities of each sub-system which lead to a certain cooperative outcome. It must be noted that while governance affects cooperation, the cascading effect of governance can influence the cooperative outcome down the chain.

3) **The interplay of governance, cooperation and coordination appears to be complex, however, governance does influence cooperation and coordination.** Also, cooperation and coordination appear to influence each other in a mutually reinforcing loop.

Through phases 2 and 3 of this research, it was found that governance influences cooperation and coordination differently. Although the degree of influence varies from one project to another, it is evident that governance does directly affect cooperation outcomes. Whether contractual or relational mechanisms are being employed, cooperation appears to be correlated to how these mechanisms are employed. This confirms previous studies in showing how governance influences cooperation. It must be noted however that governance highly affects cooperation outcomes, the degree of influence varies from one project to another and that is attributed to different factors such as pre-existing relationships. When it comes to governance and coordination, it was found that governance does influence coordination but to a lesser degree than cooperation. This highlights how good governance can positively influence planning and other project management processes. Additionally, it was apparent in the study that both cooperation and coordination influence each other and confirm previous studies' view of both factors as following the logic of complementarities and mutual incremental reinforcement. As such, from a complementarity perspective coordination and cooperation can enhance each other while from a reinforcement perspective, a positive outcome of coordination has an incremental positive effect on cooperation and vice versa. In short, the interplay of these three factors appears to be complex but an understanding of how they appear to influence each
other can help in comprehending the dynamics of their different mechanisms and behaviours which in turn can help in the process of governing and governance design.

4) A multi-level approach provides a holistic assessment of project-based alliance networks in terms of governance, cooperation and coordination, and gives a more rigorous view of alliance network performance.

The previous conclusions have unpacked the dynamics and interplay of governance, cooperation and coordination from a sub-systemic perspective. The filter down effect of governance and coordination across sub-systemic interaction, the confinement of cooperative outcomes within the sub-systemic interaction, and the complex interplay of these three factors shined a light on how these factors interact across multi-level alliance networks. As such, this study argues for the multi-level view when analysing alliance networks; namely alliance network level, project level and sub-systems level. The dynamics and complexity of the interplay unveiled that to be able to understand how alliance networks are performing, a study across different levels is needed. Given such interaction, the sole focus on dyadic interaction cannot give a holistic picture of the performance of IOPs and network governance. This has also been advocated for in other studies. In other words, a nested governance framework such as VAM is needed to address all the dynamics across these different levels. Further, as seen previously in the analysis, the root cause of governance issues within sub-systemic interaction can be attributed to governance and coordination mechanisms being employed at the alliance network level. While for cooperation, a focus on each level is needed to ensure a positive outcome. Therefore, an understanding and analysis could not be achieved from an alliance network-level perspective alone as it appears that on one project governance, cooperation and coordination are seen to be successfully implemented whereas on another one issues are arising. As seen earlier, positive and negative issues are co-founded within each project. This highlights two main issues; the first is
that one project governance and its mechanisms can be different from another
given the uniqueness and complexity of each project; the second is regarding the
locus where governance, cooperation and coordination issues are happening and
how can be tackled accordingly. In adopting a multi-level approach to understand
the performance of IOPs and alliance networks, practitioners and scholars can
merge the different stances of project governance (internal and external to the
project) into one analysis framing while also addressing multiple theoretical
perspectives that may emerge across different levels.

10.4 Research Limitations and Future Research

As with any research, this research does come with limitations given the limited
resources, time and the COVID-19 impact. The following presents the limitations of this
research.

1) This study adopts a cross-sectional analysis that tackles IOPs from a singular point in
time. This is a well-known limitation in IOR studies, given the time consumption that
longitudinal studies take, and the resources needed to perform such analysis. While
this study tackles most of the issues of analysis in IORs such as multi-level approach
and co-existence of positive and negative issues within inter-organisation interaction,
it does not tackle the dynamics of interaction across the project lifecycle which is
deemed important and key in guiding the process of governing. Also as seen
particularly in phase 2 of the study, the cooperation and coordination issues can
change over time, especially in making organisations and teams adapt to each other
towards the end of the project for instance. Such dynamics are very important to
understand, however this research does serve as a platform to guide further research
in this area. Therefore, scholars can investigate governance, cooperation and
coordination dynamics across time through the methodological application of VAM
that is laid out. In doing so, a much richer explanation of the interplay of these three
factors and processes can be provided.
2) The sub-systemic characterisation made for each sub-system is not well elaborated on. While it gives a detailed view of the specifics of each sub-system, it does not claim that it has all characteristics laid out. What it does unveil however is that each system is different in terms of its characteristics, especially when it comes to governance mechanisms. This sheds light on the need to see and understand the peculiarities of each sub-system which enables to dive into the specifics of each mechanism and how they are operated. Although such mechanisms can differentiate from one alliance to another, it does highlight a specific view of how each sub-system uniqueness with its own set of mechanisms being enacted. This view can enable scholars to focus on each sub-system and elaborate more on these characteristics and help in governance design.

3) The use of data from across sub-systems comes with some sample and stratification limitation. The data does highlight the key issues in terms of governance, cooperation and coordination, however, some of the data were limited in certain projects (project B’) and limited to certain sub-systems (S4-S3-S2-S1) given the type of the dataset. Further research is needed to tackle more projects within alliance networks with more participants across different organisations.

4) The nature of this study follows a constructivist approach which may be seen to be biased toward the author’s perceptions. However, the multiple phases of this thesis, and the supporting evidence from other sources (reports, project datasheets about costs and time, contracts used) ensure the reliability and validity.

5) Another limitation to take into consideration is the informants’ biases that may have affected the information presented to the researcher. Given that this study is cross-sectional, the informants may have missed or forgotten useful information about the projects. Also, the informants may have given their perception of successes overlooking some failures that happened during the projects. While the author tried to gain different perspectives from the interviews of different actors which aim to provide a holistic view of the situation, still the description of issues in governance, cooperation and coordination is not exhaustive.
10.5 Contribution to Knowledge

This research provides a novel way in analysing IOPs governance and addressing the IOR research limitations. It provides the following contribution to knowledge that has been described in three sub-parts:

1) The interplay of governance, cooperation and coordination is tackled in detail and across sub-systems. This helps in understanding how these mechanisms interact across inter-organisational boundaries. Previous studies have shown the impact of governance on cooperation or coordination from a generic view such as the impact of contractual and relational governance on trust or cooperative outcomes, or coordination. The main focus of these studies is on dyadic relationships. Despite their insightful findings, they provide a partial view of the relationship between the three factors. As such, this study unpacks the dimensions of different governance mechanisms and their relation to cooperation and coordination. Therefore, providing an enriched and in-depth analysis of such interplay. This in turn shows how different project management processes and their coordination can be influenced by governance mechanisms. As seen earlier, their effectiveness is related to the effectiveness of governance mechanisms.

2) This research also provides a characterisation view of different sub-systems for IOPs and shows how mainly governance differentiates from one system to another. Previous studies have focused on a set of characteristics and mechanisms irrespective of where such mechanisms are being employed. This study adopts an organisation theory perspective in addressing where such mechanisms are being employed. Such differentiation has shined a light on the importance of not only what are the key governance mechanisms but also where they are employed and who is employing them. As such, analysis can be much more focused when governing the IOPs. In doing so, each sub-systems can exert unique characteristics pertaining to projects such as cost and quality.
This research reveals the importance of a multi-level view when analysing alliance networks irrespective of the variability of structure and actors in IOPs within the network. There is a paucity of empirical research that adopts a multi-level view in analysing inter-organisational relationships and their governance. By understanding the dynamics of governance, cooperation and coordination mechanisms on two levels (sub-systemic and project level), this research provides a multi-level view of governance, cooperation and coordination. It also adds to the current discussion of the necessity of adopting such a view to ensure a holistic and rigorous analysis.

The development of a governance VAM framework can be applied to IOPs in the form of sub-systems. Such a framework adopts an organisation theory and Cybernetics perspective and tackles different levels of organisations involved in projects and alliance networks. The VAM framework provides clear interaction/communication channels and a way to model different organisations within multiple sub-systems that are nested. Previous studies have either provided a well-defined structure between the main entities of the participant organisations such as the client, owner and contractors without any integrated framework or show an eco-system view, guided by functionalities, of IOP governance. The framework helps tackle the issues of blurriness in inter-organisational boundaries and the continuous changes of actors and organisations within the network guided by functionalities of sub-systems rather than inter-organisational boundaries. Therefore, this leads to a clear identification of different project management processes against each sub-system. This also allows to cross-compare projects within the network by their sub-systemic belonging.
10.6 Contribution to Practice

The practical implication of this work is in two main areas: the first in governance design and the second in analysing governance, cooperation and coordination. Firstly, through the VAM framework and key systemic characteristics practitioners can design IOPs accordingly. This would allow them to identify where the focus is in each sub-system and how different mechanisms are being employed. In project terms, this can be identifying to which sub-system quality management belongs. It would also facilitate the process of governing across the project lifecycle and across different networks. Secondly, the VAM framework and methodology used especially in the second phase of this thesis allow practitioners to use VAM as a diagnostic tool that enables them to identify key issues in terms of governance, cooperation and coordination. That said, the diagnosis of these factors can help in addressing the root causes of issues happening and their dynamics across the project lifecycle which in turn helps in improving project performance and outcome.
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Danermark, B. (2001), Explaining Society: An Introduction to Critical Realism in the Social Sciences, Routledge, Florence, KY.


Sterman, J. (1992), System dynamics modeling for project management, MA: MIT.


Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. *How to Choose a Sampling Technique for Research (April 10, 2016)*.


Appendix 1 Additional Information for Study 2

<table>
<thead>
<tr>
<th>Research Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a Interview Protocol</td>
</tr>
<tr>
<td>The interview protocol is shown below. The following interview questions were completed by a sample of project owner, consultant, integrator and supplier participants.</td>
</tr>
<tr>
<td><strong>Section 1 – Background to Your Project Role</strong></td>
</tr>
<tr>
<td>1. Could you explain the project roles?</td>
</tr>
<tr>
<td>2. What was your role / that of your organisation within the project team?</td>
</tr>
<tr>
<td>3. Who were you directly involved with (which members of the team), and key project stakeholders?</td>
</tr>
<tr>
<td>4. What were the key objectives and goals of this project?</td>
</tr>
<tr>
<td>5. What were the key project challenges? And how were they dealt with?</td>
</tr>
<tr>
<td>6. What went very well and what could have been improved?</td>
</tr>
<tr>
<td><strong>Section 2 – Project Relationships and Network Success</strong></td>
</tr>
<tr>
<td>7. What were the process/product innovations on this project?</td>
</tr>
<tr>
<td>8. What were the mechanisms that drove project success (e.g. team features)?</td>
</tr>
<tr>
<td>9. What were the consequences on your organisation and was this project typical?</td>
</tr>
<tr>
<td>10. How were suppliers involved in the various project stages? What was the rationale?</td>
</tr>
<tr>
<td>11. How were consultants involved in the various project stages? What was the rationale?</td>
</tr>
<tr>
<td>12. Could you say anything more about the engagement (outside of a contract)?</td>
</tr>
<tr>
<td>13. Can you explain collaboration on the project?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2b Supporting data and observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three method development workshops (360mins). Workshops including 10 tier two and three suppliers, six contractors and consultants, and six clients. They provided narratives, discussed potential units of analysis, sample design and research methods.</td>
</tr>
<tr>
<td>Three programme director initiation interviews (180mins). Programme directors from each network (A, B and C) were asked to identify two projects. They explained project governance mechanisms, and gave their interpretation of the level of cooperation and coordination.</td>
</tr>
<tr>
<td>Project background data analysis (n=6, project managers performed a desk study). Project managers completed a spreadsheet giving details on project cost, key dates / stages, objectives and organisational roles.</td>
</tr>
<tr>
<td>Supply chain data analysis (n=167 advisors, integrators and suppliers identified in desk study). Project managers completed a spreadsheet on supply chain organisation type, service, project role, contract type, length of relationship, contract value and time scales of their project involvement (e.g. pre-project, options development, design and construction).</td>
</tr>
<tr>
<td>Online Project Questionnaire (n=78 participants). A sample of project owners, consultants, integrators and suppliers accessed the project outcomes and innovations of network projects.</td>
</tr>
<tr>
<td>Ongoing discussions with programme directors (Network A – 240mins, Network B – 300mins, and Network C – 200mins). Discussion of interim report and emerging results.</td>
</tr>
<tr>
<td>Programme director review of final network report (Network A – 90mins, Network B – 120mins, Network C – 120mins). A structured meeting to review findings, test phrasing and agree recommendations.</td>
</tr>
</tbody>
</table>
Programme director review of final network report (Network A – 90mins, Network B – 120mins, Network C – 120mins). A structured meeting to review findings, test phrasing and agree recommendations.

Steering and community events (n=16 major client organisations, 120mins). The emerging findings were discussed at industry events with various participants invited by 16 major client organisations.

Two network comparison workshops (360mins) Six programme and project directors from Networks A, B and C discussed their reports and made benchmark comparisons.
## Appendix 2 Network A,B,C details and interview participants

<table>
<thead>
<tr>
<th>Sector</th>
<th>Project</th>
<th>Role, Function</th>
<th>System</th>
<th>Time in minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flood</td>
<td>Consultant, Project Manager (PM)</td>
<td>S2</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>Flood</td>
<td>Consultant-Integrator, PM</td>
<td>S2</td>
<td>64</td>
</tr>
<tr>
<td>3</td>
<td>Flood</td>
<td>Owner, PM Executive</td>
<td>S3</td>
<td>74</td>
</tr>
<tr>
<td>4</td>
<td>Flood</td>
<td>Owner-Integrator, PM</td>
<td>S3</td>
<td>65</td>
</tr>
<tr>
<td>5</td>
<td>Flood</td>
<td>Consultant-Integrator, Site Supervisor</td>
<td>S2</td>
<td>53</td>
</tr>
<tr>
<td>6</td>
<td>Flood</td>
<td>Designer-Integrator, Architect</td>
<td>S1</td>
<td>53</td>
</tr>
<tr>
<td>7</td>
<td>Flood</td>
<td>Contractor-Supplier</td>
<td>S1</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>Flood</td>
<td>Supplier</td>
<td>S1</td>
<td>41</td>
</tr>
<tr>
<td>9</td>
<td>Flood</td>
<td>Contractor-Supplier, Engineer</td>
<td>S1</td>
<td>49</td>
</tr>
<tr>
<td>10</td>
<td>Flood</td>
<td>Designer-Integrator, Architect</td>
<td>S1</td>
<td>58</td>
</tr>
<tr>
<td>11</td>
<td>Flood</td>
<td>Contractor-Supplier, PM</td>
<td>S1</td>
<td>59</td>
</tr>
<tr>
<td>12</td>
<td>Flood</td>
<td>Owner-Integrator, PM</td>
<td>S3</td>
<td>60</td>
</tr>
<tr>
<td>13</td>
<td>Flood</td>
<td>Owner-Integrator, PM Exec</td>
<td>S3</td>
<td>54</td>
</tr>
<tr>
<td>14</td>
<td>Flood</td>
<td>Designer-Integrator, Architect</td>
<td>S1</td>
<td>36</td>
</tr>
<tr>
<td>15</td>
<td>Flood</td>
<td>Supplier, materials</td>
<td>S1</td>
<td>19</td>
</tr>
<tr>
<td>16</td>
<td>Flood</td>
<td>Contractor-Supplier</td>
<td>S1</td>
<td>36</td>
</tr>
<tr>
<td>17</td>
<td>Flood</td>
<td>Supplier, offsite manufactured panels</td>
<td>S1</td>
<td>34</td>
</tr>
<tr>
<td>18</td>
<td>Rail</td>
<td>Supplier, electrical</td>
<td>S1</td>
<td>65</td>
</tr>
<tr>
<td>19</td>
<td>Rail</td>
<td>Consultant-Integrator, PM</td>
<td>S2</td>
<td>104</td>
</tr>
<tr>
<td>20</td>
<td>Rail</td>
<td>Owner, PM Executive</td>
<td>S3</td>
<td>52</td>
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<tr>
<td>21</td>
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<td>Owner-Integrator, PM</td>
<td>S3</td>
<td>54</td>
</tr>
<tr>
<td>22</td>
<td>Rail</td>
<td>Consultant-Integrator, QS</td>
<td>S2</td>
<td>55</td>
</tr>
<tr>
<td>23</td>
<td>Rail</td>
<td>Supplier, tiling</td>
<td>S1</td>
<td>70</td>
</tr>
<tr>
<td>24</td>
<td>Rail</td>
<td>Supplier, electrical</td>
<td>S1</td>
<td>117</td>
</tr>
<tr>
<td>25</td>
<td>Rail</td>
<td>Consultant-Integrator, Quantity Surveyor</td>
<td>S2</td>
<td>54</td>
</tr>
<tr>
<td>26</td>
<td>Rail</td>
<td>Supplier, painting and decorating</td>
<td>S1</td>
<td>63</td>
</tr>
<tr>
<td>27</td>
<td>Rail</td>
<td>Owner, Site Manager</td>
<td>S2</td>
<td>40</td>
</tr>
<tr>
<td>28</td>
<td>Rail</td>
<td>Contractor-Integrator, CM</td>
<td>S3</td>
<td>115</td>
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<tr>
<td>29</td>
<td>Rail</td>
<td>Supplier, ground works/foundations</td>
<td>S1</td>
<td>46</td>
</tr>
<tr>
<td>30</td>
<td>Rail</td>
<td>Supplier, piling</td>
<td>S1</td>
<td>36</td>
</tr>
<tr>
<td>31</td>
<td>Rail</td>
<td>Consultant-Integrator, Site Manager</td>
<td>S2</td>
<td>44</td>
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<tr>
<td>32</td>
<td>Water</td>
<td>Key Supplier (electrical and new mechanical)</td>
<td>S1</td>
<td>88</td>
</tr>
<tr>
<td>33</td>
<td>Water</td>
<td>Owner-Integrator, PM</td>
<td>S3</td>
<td>72</td>
</tr>
<tr>
<td>34</td>
<td>Water</td>
<td>Key Advisor-Integrator, PM</td>
<td>S2</td>
<td>89</td>
</tr>
<tr>
<td>35</td>
<td>Water</td>
<td>Key Advisor-Integrator, Site Manager</td>
<td>S2</td>
<td>75</td>
</tr>
<tr>
<td>36</td>
<td>Water</td>
<td>Key Supplier, pumps and valves</td>
<td>S1</td>
<td>57</td>
</tr>
<tr>
<td>37</td>
<td>Water</td>
<td>Key Supplier, electrical controls and software</td>
<td>S1</td>
<td>68</td>
</tr>
<tr>
<td>38</td>
<td>Water</td>
<td>Key Advisor-Integrator, PM</td>
<td>S2</td>
<td>53</td>
</tr>
<tr>
<td>39</td>
<td>Water</td>
<td>Key Advisor-Integrator, Site Manager</td>
<td>S2</td>
<td>73</td>
</tr>
<tr>
<td>40</td>
<td>Water</td>
<td>Key Supplier, offsite kiosks and onsite install</td>
<td>S1</td>
<td>68</td>
</tr>
<tr>
<td>41</td>
<td>Water</td>
<td>Supplier, switching and controls</td>
<td>S1</td>
<td>41</td>
</tr>
<tr>
<td>42</td>
<td>Water</td>
<td>Supplier, onsite electrical</td>
<td>S1</td>
<td>68</td>
</tr>
</tbody>
</table>

**Total** | **2,507**
Appendix 3: Additional Information for Study 1 and 3

Semi-Structured interviews for study 1
1- Can you tell me more about your role within the organisation?
2- Can you describe the work you do and whom you interact with from different organisations?
3- Can you tell me more about the coordination and flow of information between you and other organisations?
4- Can you tell me about the current governance approach?
5- Can you tell me more about the cooperation with suppliers and contractors or client/owner
6- What issues you face in term of cooperation and coordination with the organisations you interact with?

Participants and results for study 3

<table>
<thead>
<tr>
<th>Participants</th>
<th>Roles</th>
<th>Systemic belonging</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Contract manager</td>
<td>S1</td>
</tr>
<tr>
<td>T2</td>
<td>Project management consultant</td>
<td>S3</td>
</tr>
<tr>
<td>T3</td>
<td>Alliance leadership manager</td>
<td>S4</td>
</tr>
<tr>
<td>T4</td>
<td>Managing director</td>
<td>S4</td>
</tr>
<tr>
<td>T5</td>
<td>Alliance manager</td>
<td>S4</td>
</tr>
<tr>
<td>T6</td>
<td>Region investment director</td>
<td>S4</td>
</tr>
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</table>
T1 S1 Results
T2 – S2 Results
T3-S4 Results
## T4 – S4 Results

<table>
<thead>
<tr>
<th>Int 1, HE – S2 - Governance, Coordination and Cooperation</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance</td>
<td>Coordination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cooperation</td>
<td>Coordination</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collaborative ethos (i.e. Team based collaborative behavior)</td>
<td>Process mechanisms (i.e workflow, sequencing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Culture (i.e Willingness, mentality)</td>
<td>Contract administration mechanisms (i.e compensation events, cost consulting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication mechanisms (i.e information sharing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contract administration mechanisms (i.e compensation events, cost consulting)</td>
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<tr>
<td></td>
<td></td>
<td>Task management</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditing and monitoring mechanisms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project 1 - Successful</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Governance</td>
<td>Coordination</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategy mechanisms (i.e program of projects, adaptability)</td>
<td>Process mechanisms (i.e workflow, sequencing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leadership mechanisms (i.e motivation, principles and values)</td>
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<td>Task management</td>
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<td>Auditing and monitoring mechanisms</td>
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T5 – S5 Results
T6- S4 Results
Appendix 4: Networks Structure

Sub-systems VAM Functions

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Network A

Network B

Network C

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Sub-system interaction (Sx-Sy)
Inter-organisational interaction (Note: For clarity of the figure not all inter-organizational interaction were presented)