



The Role of Governance within the Sustainability Performance of Public-Private Partnerships



A comparative case study: between two Dutch PPPs in the water channel maintenance sector

Master Thesis (Final Version)

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Abstract

Currently, the United Nations are promoting Public-Private Partnerships (PPPs) as a promising tool for accomplishing the Sustainable Development Goals (SDGs). However, the actual contribution of PPPs to sustainable development remains inconclusive, because the sustainability considerations appear to be difficult to integrate at the PPP project-level. Governance is determined to be important within this integration, yet the empirical research on the direct influence of governance elements on PPP sustainability performance is rather limited. This has resulted in a deficient understanding about governance of sustainable-oriented PPPs, by PPP policymakers and practitioners. In order to gain a more adequate understanding about the influence of governance on the PPP sustainability performance, this study developed a conceptual PPP Sustainability Governance Framework (SGF), based on the collaborative governance framework (CGF) of Liu et al. (2022). Subsequently, it utilized this SGF to be able to conduct a comparative research approach, that has analysed the governance elements and sustainability performances, of two Dutch PPPs of the water channel maintenance sector. On the one hand, the findings indicate that structural governance elements form the starting point for integrating sustainability within PPPs, and that process governance elements have the ability to make further developments to this integration. While, on the other hand, the structural elements also determine to what extent the process elements can utilize this ability for further developments. Theoretical and practical implications are composed based on these findings. In the end, it is concluded that more in-depth research is required, about the influence of governance on PPP sustainability performance, to accurately determine if PPPs are indeed a suitable solution for achieving the SDGs.

Keywords: Public-Private Partnerships, Sustainability Performance, Governance, Structural elements, Process elements.

Colophon

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List of abbreviations

Allocated capacity – S4
Business partner – P1
Business environment – P4
Collaborative Governance Framework – CGF
Dutch Ministry of Infrastructure and Water Management (IenW).
Economic Cooperation and Development countries – OECD
Formal institutions – S2
Informal institutions – P2
Milieu Kosten Indicator – MKI
Policy maker – S1
Process management – P3
Project management – S3
Public-Private Partnerships – PPPs
Rijkswaterstaat – RWS
Rijkswaterstaat Oost Nederland A vaarwegen – ON A Vaarwegen
Sustainable Development Goals – SDGs
Sustainability Governance Framework – SGF

Chapter 1: Introduction

1.1 Background and Problem Statement

PPPs as solution for sustainable development

Since 1 January 2016, the implementation of the 2030 Agenda for Sustainable Development was formally introduced to the world, with as main objective to reach the composed 17 Sustainable Development Goals (SDGs), that undertake the most urgent global challenges (United Nations, 2016). These global challenges are from extreme complexity, because of their enormous scale, extensive actor involvement, and their, at times, conflicting nature (Fu et al., 2019). Considering such great ambitions of the SDGs, only a joint effort of various sectors and governmental levels will have a chance at accomplishing them (Berrone et al., 2016). In accordance with the importance of collaboration, the United Nations explicitly promote the establishment of effective Public-Private Partnerships (PPPs) (UNECE, 2018).

The main reason for including PPPs in the SDGs strategy is to partly tackle the massive financial deficit of US\$800 billion to US\$1 trillion per year for infrastructure projects (World Economic Forum, 2014; Woetzel et al., 2016). Between 1990 and 2019, 6600 PPPs were registered for infrastructure projects in low and middle-income countries, which were equal to US\$ 1.5 trillion, illustrating its enormous capital value (Fabre & Straub, 2021). The accomplishment of these infrastructural-based PPPs are deemed to be essential for society, as the achievement of a considerable proportion of the SDGs, is dependent on the availability of virtuous infrastructure (Thacker et al., 2021).

As a consequence of this large inclusion of PPPs for infrastructural development, and its pronounced importance for sustainability, there is a recognized need to also involve sustainability more within infrastructure projects themselves (Hueskes et al., 2017). To illustrate, the construction industry in Economic Cooperation and Development (OECD) countries for instance are responsible for about 30% of the total energy consumption (Matar et al., 2017). Moreover, when looking at the whole world, infrastructure accounts for 79 percent of the total greenhouse emissions, and 88 percent of the total adaptation costs needed to accomplish the SDGs (Thacker et al., 2021). If public and private sectors fail to effectively incorporate sustainability considerations within PPPs for infrastructure projects, these numbers could become even more significant (Pinz et al., 2018).

The arrangement of effective PPPs, on the other hand, provides an inherent potential to improve environmental, social, and economic sustainability (Koppenjan & Enserink, 2009). Their wide application in various infrastructural sectors create promising opportunities to expansively incorporate and develop sustainability principles (Ma et al., 2022). Furthermore, the inclusion of the private sector's techno-managerial capacity, in public services, is expected to deliver more innovative solutions for sustainable development (Dolla & Laishram, 2020). As a result, governments are increasingly interested in PPPs for infrastructural projects and sustainable developments (Shen et al., 2016; Pinz et al., 2018).

Ambiguous PPP definition

When considering this optimistic view on PPPs in relation to sustainability, it is important to note that there is no wide-ranging agreement about an explicit definition for PPPs (KS et al., 2016). This absence of a clear PPP definition, at least already starts in the late 1990s, called the post-New Public Management era (Reiter & Klenk, 2019). During this period and onwards, public sectors have increasingly moved away from traditional procurement methods for public services, and deregulated, decentralized, or contracted out more responsibilities towards the private sector (Casady & Peci, 2020; Salamon & Elliot., 2002). According to Grimsey & Lewis (2005), PPPs can

therefore been seen as an overarching concept that represent the space between traditional infrastructure procurement and complete privatization. As a consequence, while some studies view organisational arrangements for infrastructure projects already as PPPs, when the private sector collaborates within or provides support for public infrastructure-based services (e.g. Hueskes et al., 2017; Berrone et al., 2019; Spraul & Thaler, 2020). Other studies consider PPPs more as a public procurement system, wherein public and private sectors engage in a long-term contractual agreement to share design, construction, operational, maintenance or financial responsibilities (e.g. Liang & Wang, 2019; Verweij & Meerkerk, 2021; Koppenjan et al., 2022). Hence, also in recent scientific literature, forms of PPPs range from relatively short-term service or management contracts, to actual long-term joint ventures between governments and private agencies (KS et al., 2016).

Inconclusive contribution of PPPs to sustainability

Likewise, in the research field of sustainability and PPPs, studies also do not maintain an unambiguous definition of PPPs. Findings on the most appropriate forms and key characteristics of PPPs, for integrating sustainability within infrastructure projects, therefore involve divergent interpretations that are difficult to generalize (Wang & Ma, 2021). Accordingly, Wang & Ma (2021) argue that, although PPPs are broadly described as a promising tool for sustainability, the best sustainable PPP formations and appropriate ways for incorporating sustainability are still undetermined. How governments can accurately utilize the potentials of PPPs, for pursuing their sustainability objectives, is thereby also rather uncertain (Berrone et al., 2019). With such lack of understanding about suitable forms of PPPs, for sustainable development, it is challenging to prescribe them as the appropriate solution (KS et al., 2016).

Another reason for scepticism on the role of PPPs, within sustainable development, can be explained by the definition of sustainability, which is also, particularly, a fuzzy concept (De Roo & Porter, 2015). The Brundtland Commission of the United Nations, defines sustainability as “*development that meets the needs of the present generation without compromising the ability of the future generations to meet their own needs*” (Brundtland & Khalid, 1987, p.43). Over the years, this concept of sustainability has evolved into scientific models, such as the triple bottom line. This model suggests that the concept of holistic sustainability exists out of three different perspectives, namely from the society, the environment, and the economy (Sadler, 1988). As a consequence, this model explains the ambiguity of sustainability, due to the various interpretations people can have of it. Within PPPs, the decision-making on incorporating sustainability considerations involves mixed networks of public and private actors, all with different interests and perspectives (Hueskes et al., 2017). Because of this complex multiplicity of actors, it can be difficult to translate sustainability policies into practice (De Roo & Porter, 2015). The result is that, the genuine incorporation of sustainability considerations, at the PPP project level, often fails to occur (Dolla & Thaler, 2020). Empirically assessing whether or not PPPs are the appropriate solution for sustainable development becomes, therefore, rather difficult. Since, their full potential is frequently not achieved. Consequently, their actual contribution to sustainability remains “*inconclusive*” (Pinz et al., 2018, p.16).

Complex governance

Within the sustainability literature, there is a broad consensus that adequate governance approaches might be beneficial in making progress towards sustainable development within projects (Hueskes et al., 2017). To illustrate, Lombardi et al. (2010, p.3) state that “*sustainability is made ‘real’ in policy- and decision-making settings*” and Kemp et al.. (2005, p.18) proclaim “*better governance is a prerequisite for [. . .] steps towards sustainability*”. Similar as in other contexts, governance of PPPs and sustainability consists of internal and external conditions. Internal conditions refer to the way sustainability is managed by the involved public and private actors, within the projects themselves (Liu et al., 2022). Whereas, the external conditions relate to

sustainability considerations that are enforced onto projects, from higher governmental levels, through regulation and legislation (Spraul & Thaler, 2020).

According to Ugwu et al. (2006), there are numerous examples of external policy frameworks for sustainability, while there is less attention for integrating sustainability at the internal project level. Additionally, Dolla & Laishram (2020) argue that external governmental initiatives for sustainability often have a weak impact on the internal decision-making of sustainability considerations within PPPs. According to Feng et al. (2022), this is mainly because public sectors, currently, do not correctly utilize and understand their role within the internal governance of PPPs, resulting in project failures. An international report by Eurodad (2018) empirically supports this, as it emphasised that PPPs are currently failing in being the promoted solution for sustainable development, due to fragile public sector performances. To illustrate, the studied PPPs encountered internal problems, such as incorrect risk management, lacking transparency, and weak accountability, as a result of which external (overarching) sustainability objectives were not achieved. Furthermore, Liu et al. (2022) emphasised several regularly occurring problems within PPPs, such as high cost overruns, financial risks, and low innovation, which question the operational sustainability of PPPs. According to Wojewnik-Filipkowska & Węgrzyn (2019), such problems can only be prevented through a form of PPP governance, that balances public and private engagements and interests. However, in practice, this causes tensions between the long-term sustainability objectives of the government and the short-term profit objectives of the private sector (Pot, 2021). Unsurprisingly, many studies therefore consider the governance of PPPs towards sustainability, as inherently complex (e.g. Hueskes et al., 2017; Koppenjan & Enserink, 2009). Considering all of this, there is a recent concern about the long-term sustainability performance of PPPs (Akomea-Frimpong et al., 2022).

1.2 Research Problem and Research Aim

Knowledge gap

Consequently, studies have emerged about how sustainability considerations within PPP contracts of infrastructure projects can be stimulated, through governance (Hueskes et al., 2017; Spraul & Thaler, 2020; Dolla & Laishram, 2020; Akomea-Frimpong et al., 2022, Ma et al., 2022; Liu et al., 2022). These studies have found prominent beneficial insights into ways for encouraging sustainable principles, and they have identified factors that may limit sustainability considerations within PPP agreements. Hueskes et al. (2017), for example identified that PPPs mostly consider sustainability principles that are focused on the environment, whereas social considerations are often excluded because they are less measurable and enforceable. The studies done by Dolla & Laishram (2020) and Akomea-Frimpong et al. (2022) recognized this, and therefore they both have developed a sustainability indicator framework that can aid PPPs in embracing environmental, social, economic, and governance performance criteria. Further, Spraul & Thaler (2020) identified internal and external governance elements that can contribute to sustainability-related outcomes. Additionally, Ma et al. (2022), investigated the instrumentality of PPPs in relation to sustainable development from a global perspective. They have indicated several instrumental attributes that can be regarded as critical, within PPPs, for contributing to the SDGs. Lastly, Liu et al. (2022) has developed a conceptual framework for governing sustainable PPPs, which identified how several PPP governance barriers, for sustainability, can be mitigated.

Still based on their findings, these studies agree that the PPP approach towards infrastructure projects for sustainability demands further research into the governance of sustainable PPPs. Mainly because, governance within projects continues to be a bottleneck for sustainability. According to Hueskes et al. (2017), this is primarily because of the incompatibility between the contractual structure of PPPs and a holistic consideration of sustainability. Although Hueskes et al.

(2017), have found that stronger sustainability considerations might benefit from appropriate governance elements within the contractual structure of PPPs, involved actors are still inclined to pursue accustomed contractual structures and routines, wherein sustainability is often neglected. Akomea-Frimpong et al. (2022) state that information on appropriate decision-making and project management policies can be the bedrock for PPPs in making the transition from traditional performance measures to sustainable performance measures. However, according to Spraul & Thaler (2020), most of the current studies, that have added to this research field, lack empirical findings that indicate the precise effects of governance elements on PPP sustainability performance. This fragmented knowledge about the relationship between governance elements, sustainability, and PPPs make it increasingly difficult for policy-makers and practitioners of PPPs to include sustainability considerations (Liu et al., 2022). With as a result, regularly occurring unsustainable PPP problems (Eurodad, 2018). In sum, thus while governance is advocated to be essential for integrating sustainability within PPPs, there is still a fragmented understanding about the explicit influence of governance elements on PPP sustainability performances.

Research Aim

Therefore, this study aims to contribute to the research field of governance, PPPs, and sustainability, by attempting to empirically investigate how governance elements within PPPs influence their sustainability performance. Before the intended contribution can be clearly formulated, it is important to accurately outline the form and definition of PPPs, that is aimed to be examined throughout this study. Since, the understanding of PPPs is vastly ambiguous. The definition of PPPs, in this research, can therefore be understood according to the definition of Grimsey and Lewis (2004, p.2), which was also used by Hueskes et al. (2017):

“Public-private partnerships are arrangements whereby private parties participate in, or provide support for, the provision of infrastructure [...], to deliver public infrastructure-based services”.

In line with this definition, this study aims to examine two Dutch projects in the water channel maintenance sector. In the Netherlands, Rijkswaterstaat (RWS), the executive organisation of the Dutch Ministry of Infrastructure and Water Management (IenW), is the administrator of most water channels, and responsible for their maintenance. However, maintenance services are often contracted to private parties, which is also the case in the selected projects (Rijkswaterstaat, 2021). Accordingly, each separate maintenance project includes two private parties, that participate, and provide support for, the provision of infrastructure, to deliver an infrastructure-based service, namely; maintenance. Hence, following the outlined definition, these projects can be understood as PPPs. These PPPs are expected to be suitable cases, in relation to the research aim, as they both are required to integrate sustainability considerations, and strive to collectively improve their sustainability performances, through public and private cooperation (Rijkswaterstaat, 2021).

Hence, the findings on the utilized governance elements and on their influence on the sustainability performances, of the selected PPPs, might be able to contribute to a better understanding about the influence of governance elements on PPP sustainability performances. This contribution will consist of theoretical and practical implications. Firstly, the theoretical implications are aimed to enlarge the theoretical knowledge of PPP governance towards sustainability, by utilizing the conceptual Collaborative Governance Framework (CGF) of Liu et al. (2022). This framework is selected because, according to Liu et al. (2022), it is proven to be an appropriate tool to acquire a detailed understanding on the governance of PPPs. Correspondingly, this makes this study academically relevant, because currently there is a lack of insights on the explicit influence of governance elements on PPP sustainability performances (Spraul & Thaler, 2020). The attempted detailed understanding of the relationship between governance elements and PPP sustainability could aid future literature in the process of discovering governance approaches, that are

appropriate for sustainability considerations within PPPs. Secondly, this study aims to expand the practical understanding of PPP governance, by contributing practical implications in the form of recommendations to PPP policymakers and practitioners, based on the empirical findings and theoretical implications. Consequently, this study involves societal relevance, as the recommendations are aimed to partly minimize the difficulty experienced by PPP policymakers and practitioners to integrate sustainability considerations within projects, which could prevent or mitigate some frequently returning unsustainable problems in the future.

1.3 Main Research Question and Sub-questions

Against the described background information and with the research aim in mind, this study tries to answer and adhere to the following main research question:

“How can governance elements within public-private partnerships influence their sustainability performance?”

Before this question can be answered, the following sub-questions need to be discussed:

- *Which governance elements can be found within the case-studies?*
- *What are the sustainability performances of the case-studies?*
- *What is the influence of the involved governance elements on the current sustainability performance of the two case-studies?*

1.4 Reading Guide

Now that the research aim is clear, this study will first investigate previous literature to be able to compose a theoretical framework (chapter 2). This chapter starts by introducing potential opportunities and challenges for PPPs in relation to sustainability. Subsequently, an ongoing debate about the suitability of PPPs for weak or strong sustainability is discussed, in order to conceptualize the dependent variable (sustainability performance). After that, the independent variable is explained, and operationalized, by using the CGF of Liu et al. (2022), which provided governance perspectives, elements and instruments. Ultimately, chapter 2 ends with combining the operationalization of governance elements and sustainability performances to compose a PPP Sustainability Governance Framework. Chapter 3, then will discuss the methodology of this study. It explains the case selection, case description, and introduces the research design. This includes the utilized research methods, and explains the analytical process per step. Thereafter, the findings of this methodology are presented and analysed in chapter 4. It first provides an overview of the identified governance elements of the two PPPs and discusses the differences per governance dimension. Secondly, the estimated sustainability performances of the studied PPPs are presented in relation to the sustainability ambitions. In the last part, the influence of the governance elements on the sustainability performances within the studied PPPs is analysed. First, the project governance processes, towards sustainability progress, of the compared PPPs are mapped out. Second, based on this, enabling and constraining influences could be identified. In chapter 5, these findings are discussed in relation to previous literature, out of which theoretical and practical implications are derived. In the end, there is briefly concluded by providing an answer to the main research question, discussing the contributions and limitations of this research, and recommendations are provided for future research.

Chapter 2: Theoretical Framework

2.1 Theory on Sustainability and PPPs: Weak versus Strong Sustainability

2.1.1 PPPs Potential Opportunities and Challenges for Sustainability

Potential opportunities

Considering the implementation of the 2030 Agenda for Sustainable Development by the United Nations, public sectors carry the responsibility to have sustainability as a central guideline within their decision-making and operational activities (Pinz et al., 2018). The use of PPPs is, therefore, seen as a promising mechanism in accomplishing sustainability-related outcomes, due to close collaboration with the private sector (Wang & Ma, 2021). As a result, the governance of sustainability issues is more and more succeeded by a combination of public and private sectors, instead of the traditional decision-making by only central governments (Block et al., 2013). Within literature, this strategic reorientation can mainly be converted into three assumed opportunities of PPPs, namely (Steijn et al., 2011):

- *More efficiency*; securing outcomes with lower costs or resources.
- *Added value*; securing greater outcomes by enhancing the value of products or services.
- *More innovative results*; securing outcomes that have not been achieved before.

These are great opportunities because, partnering with the private sector can deliver additional resources, expertise, and capital, giving more financial capacity and cognitive capability to the public sector for incorporating sustainability aspects in their projects (Casady et al., 2020; Zhang & Xu, 2022). Accordingly, the public sector attempts to utilize the expected higher techno-managerial competence of the private sector to deliver more innovative solutions, that are more efficient and sustainable (Dolla & Laishram, 2020). Which provides more opportunities for implementing sustainability considerations within projects.

Potential Challenges

However, as already was indicated within the introduction (section 1.1), literature also advocates various potential challenges on the performance of PPPs for sustainable development, due to the complex relationship between governance, sustainability and PPPs (Dolla & Laishram, 2020). The International Institute for Sustainable Development (IISD) (2012), listed many potential challenges of PPPs regarding sustainability. In this section, this complex relationship is further discussed, by taking into account three challenges that are discovered by the IISD (2012) in practice:

- *Complicated to calculate the value of sustainability*; short term (private) versus long term (public) investment dilemma.
- *Focus on value for money*; value of PPP focused on financial considerations.
- *Lack of government managerial capacity*; complicated for governments to manage sustainability-focused PPPs.

Calculating the value of sustainability, can be regarded as a potential challenge because, within the context of PPPs, the conceptualization of sustainability follows an ambiguous pattern. This is because principles and actions towards sustainability within PPPs are influenced by the involved stakeholders (Robinson, 2004). Meaning that in essence the definition of sustainability, within various projects, is dependent on the institutional context of how the stakeholders view sustainability and on their interests in relation to the project, which could vary extensively (De Roo & Porter, 2015).

Within PPPs the governance of sustainability issues are more and more succeeded by a combination of public and private sectors instead of the traditional decision-making by only central governments (Block et al., 2013). The inclusion of a wider range of stakeholders and hybrid forms of governance make that different interests need to be intertwined, creating a complex interplay of perspectives and capabilities (Hueskes et al., 2017). Moreover, Koppenjan & Enserink (2009) describe this relationship between sustainability and PPPs also as complex, because although private sectors can promisingly tackle the financial and innovation boundaries of the public sector, for sustainable development, they still remain short-term focused and profit driven. Whereas, a government that pursues sustainable development, according to environmental, social, and economic aspects, must aspire a long-term vision (Akomea-Frimpong et al., 2022). The short-term perspective of private sectors includes the remaining large focus on the traditional triangle model where time, costs and quality have the priority (Saeed et al., 2018). Private parties, therefore, could be unwilling to participate within the long-term sustainability objectives of the public sector (Liu et al., 2022). Considering such contrasting interests, positive outcomes of sustainability, within PPPs, can only be reached if the willingness of the private sector to invest, and the sustainability objectives of the public sector are accurately balanced (Koppenjan & Enserink, 2009).

This directly introduces the second potential challenge of *value for money*, because the inclusion of the private sector make that financial considerations are often a larger motivator for assessing a PPP success, than their ability in providing environmental or social benefits (IISD, 2012). Patil & Laishram (2016) for example explain that the short term profit-generation motive of the private sector can result in larger emphasis on economic aspects, wherein social consideration are often neglected. According to El-Gohary et al., (2006), neglectation of social considerations, such as stakeholder participation, has caused many PPP failures. In order to not solely focus on financial models, governments should establish more governance criteria for the use of PPPs, that also incorporate social and environmental aspects (IISD, 2012).

However, governments seem to have a *lack of managerial capacity* for this. To illustrate, within PPPs, the government has the social duty to create a specific and detailed contract that ensures that the private sector can accurately perform their operational activities, that are in line with the project objectives and criteria (IISD, 2012). With incorporating sustainability, the public sector also must clarify an incentive structure for the private sector that supports sustainability objectives (Koppenjan & Enserink, 2009). However, at the same time the public sector also needs to consider this incentive structure in the context of other contingencies (Ma et al., 2020). As a consequence, governments have to invest more time and resources into sustainable benefits, than the private sector, which can influence the effort the public sector is willing to take towards sustainability (Ma et al., 2020). Hueskes et al. (2017), also have indicated that if the public sector want to include social sustainability criteria in contracts, they find it complicated to incorporate these, because social aspects are complicated to define and measure, and therefore difficult to enforce. For managing and creating the suitable scope in PPPs, with the inclusion of the private sector and holistic sustainability principles, the public sector thus often has an unfitting set of expertise and capacity (Koppenjan & Enserink, 2009). In accordance, findings by Liu et al., (2022), indicated that weak government leadership and institutional environment are the two of the main reasons, for less sustainable PPPs.

Based on what is described above, implementing sustainability through cross-sectoral governance within PPPs can be contemplated as a complex process, due to its involvement of various stakeholders, need for innovations, and contrasting interests. Currently, this complex relationship is still not overcome, as sustainability principles are still not accurately integrated within PPPs (Hueskes et al., 2017; Dolla & Laishram, 2020, Akomea-Frimpong et al., 2022). An exact definition for sustainable-oriented PPPs is therefore remaining ambiguous (Wang & Ma, 2021).

2.1.2 Two Extremes for Sustainable PPPs and Associated Performances

Consequently, there is an ongoing debate about if PPPs are more suitable for ‘weak’ sustainability or ‘strong’ sustainability approaches. These concepts were first introduced by Neumayer (2003) as two economic approaches to sustainable development. Moreover, Hopwood et al., (2005) have connected three forms of sustainability performances to these approaches. In this section (2.3.2), these sustainability approaches and performances are discussed. Based on this, figure 1 presents the main characteristics of these sustainability approaches and performances. In this research, weak or strong sustainability can be seen as two extremes for PPPs in implementing sustainability considerations:

- *Weak sustainability*; allowing trade-offs between environmental, social, and economic aspects, and accept environmental degradation if it involves technological progression.
- *Strong sustainability*; view environmental, social, and economic aspects as complementary, and transform current arrangements to accomplish the most sustainable benefits.

Weak sustainability: a Status quo performance

Weak sustainability suggests that technological innovations will be the solution for all environmental problems such as degradation of land, greenhouse gas emissions, and extraction of primal resources (Devolder & Block, 2015; Hueskes et al., 2017). Its supporters believe that, according to ways of this ecological modernization, dominant states and businesses will trigger economies of scale that will improve the economy and society as a whole (Dryzek, 1997). An important mechanism connected to weak sustainability is the decoupling of economic growth from environmental issues (Pearce, 1992). This alludes for an intertemporal trade-off, whereby the current extensive exploitation of resources, and whereby the economy prioritization above the environment and society is justified, as they will be used for the development of new technologies, that will limit material and energy inputs in the future (Biely et al., 2018).

A weak sustainability approach is, in literature, often related to a *status quo* sustainability performance (Lombardi et al., 2010; Pelenc et al., 2015; Hopwood et al., 2005). Everything within this performance is based on the thought that change is needed, however that this change can be managed within existing arrangements. Top-down management and ecological modernization are central in this performance, as the need for wider participation is assumed to be redundant and technological innovations is seen as the main driver for achieving sustainability-related objectives (Hopwood et al., 2005).

However, although this approach and performance has brought the world more efficient use of materials and energy, Jänicke (2008) has identified crucial limits of ecological modernization and a status quo performance. Firstly, enhanced efficient use of materials and energy could result in a rebound effect, meaning that the improved efficiency is negligible due to an extensive increase in usage. Secondly, technological innovations are not an answer to all sustainability problems, such as social and economic issues. In the context of PPPs, Hueskes et al (2017) found that PPPs can be helpful for the development of weak sustainability approaches, however it remains far less instrumental for stronger sustainability approaches that also involves social and economic principles.

Strong sustainability: a Transformation performance

Strong sustainability is based on a totally different ideology. Instead of trusting in the conventional political and economic power structures, strong sustainability advocates radical changes to these dominant manifestations of sustainability problems (Devolder & Block, 2015). In order to make this possible, supporters of strong sustainability are sceptical about technological progress, as not

every sustainability issue can be solved by technological innovations (Lombardi et al., 2010). Environmental, social and economic aspects are herein not separate from each other, but they are complementary (Bourban, 2021). It seeks to find how the economy and society can exist within the carrying capacity of the environment (Hueskes et al., 2017). Such strong conceptualization of sustainability, is according to strong sustainability advocates, the only legitimate option towards sustainable development (Ekins et al., 2003; Biely et al., 2018). Within the context of PPPs, such conceptualization remains absent, which makes that the focus of sustainability-oriented PPPs are varying between environmental, social and economic sustainability (Wang & Ma, 2021).

Approaches towards environmental sustainability are mostly focused on improving the efficiency of raw materials and resources or limiting degradation of natural environments (Chen et al., 2019). The social dimension of sustainability is more concerned with fair partnerships and transparent involvement of stakeholders (Cheng et al., 2020). Finally, economic sustainability takes into account aspects such as employment rates, innovation and the actual project delivery (Yuan et al., 2018).

Taking a strong sustainability approach is within literature mostly connected to a *transformation* sustainability performance (Lombardi et al., 2010; Pelenc et al., 2015; Hopwood et al., 2005). A transformative sustainability performance can be seen as a fundamental change to established structures that completely tackles the root of unsustainable problems (Hopwood et al., 2005). The central element within this transformation category is a holistic approach, wherein environmental, social and economic dimensions cannot be seen separate from each other. However, transformative changes can also occur in the dimensions individually, since it is not always possible to include environmental, social, and economic aspects within projects (Hopwood et al., 2005).

Intermediate: a Reform performance

Since, the weak and strong sustainability approaches are considered as two extremes for achieving status quo or transformative sustainability performances, Hopwood et al., (2005) also advocated an *intermediate* sustainability performance called; a *reform* sustainability performance. This sustainability performance suggests that changes of policies and lifestyles are necessary for sustainable development, however these changes can be achieved within the current economic and social structures (Devolder & Block, 2015). Such a performance is reached with establishment of significant, concrete goals and a critical outlook on current policies or operational activities (Hopwood et al., 2005). The involvement of the private sector, through market interaction is a key concept, to reach a reformative performance (Hopwood et al., 2005). Accordingly, it is an intermediate performance category between the two extremes, because a complete reversal of unsustainable practices is not entirely advocated and technological modifications remain a significant part.

Sustainability approach	Weak sustainability ← ——— Intermediate ——— → Strong Sustainability		
Sustainability performance	<i>Status quo</i> <i>(manage within existing structure)</i>	<i>Reform</i> <i>(being critical on current policies)</i>	<i>Transformation</i> <i>(complete restructuring of policies)</i>
Key concept	<i>Decoupling of economic growth</i>	<i>Market interaction</i>	<i>Holistic approach</i>
Main solution	<i>Technological innovations</i>	<i>Significant and concrete goals</i>	<i>Fundamental reassessment of current arrangements</i>

Figure 1: Main characteristics weak and strong sustainability (Adapted from Lombardi et al., 2010 and Pelenc et al., 2015)

2.2 Theory on PPP Sustainability Governance: Governance Perspectives, Elements, and Instruments

This ongoing debate about sustainability within PPPs already shed some light on the literature behind PPP governance. As stated in the introduction (1.2), many studies agree that adequate governance might be essential for appropriate integration of sustainability considerations within PPPs. However, that it remains challenging to object external overarching sustainability conditions of governments onto the internal, project-level conditions of PPPs. Therefore, this section takes a closer look at the literature behind PPP governance. The literature consists of two governance perspectives, and their related governance elements and instruments. In this section (2.3), these will be explained respectively.

2.2.1 Two PPP Governance Perspectives

According to Koppenjan et al (2022), there are two theoretical perspectives that are important for the governance of PPPs, namely:

- *The contractual perspective*; achieve required performance through specific contract conditions and obligations.
- *The collaborative perspective*; achieve required performance through jointly address problems and unexpected circumstances.

Contractual Perspective: Structural Elements and Hierarchical Instruments

The *contractual perspective* is categorized as the dominant perspective within PPP processes (Koppenjan et al., 2022). This perspective is based on a principal-agent relationship, where within PPPs the public sector is seen as the principal and the private sector as the agent (Verweij & Van Meerkerk, 2021). Through this perspective, the public sector attempts to incorporate established external governance conditions, within the internal governance conditions of PPPs (Spraul & Thaler, 2020). In practice this is challenging, due to central issues related to akin relationships such as adverse selection and moral hazard (Picard, 1987). The bedrock of these issues is based on information asymmetries between the principal and the agent (Koppenjan et al., 2022).

To illustrate, adverse selection covers the possibility that the principal mis selected the agent for the appropriate task, as the ability of the agent is not fully known by the principal at the start and throughout the partnership (Shrestha et al., 2019). Moreover, moral hazard occurs when the agent decides to take action according to their own interests and goals (Laffont & Martimort, 2002). Also here, the principal cannot directly identify when a moral hazard arises. Although the principal can thus obligate certain external conditions in the internal PPP contract, the agent can internally at any time decide to deviate from these conditions and pursue their own interest, without the principal knowing. This is called opportunistic behaviour (Warsen et al., 2019). Such events of misinformation can be attempted to prevent, by the principal, by for example making additional transaction costs through monitoring and sanctioning of the agent (Koppenjan et al., 2022). Even though, there is no guarantee that this actually fully intercepts opportunistic behaviour (Verweij, 2018).

Still, governments predominately utilize *structural elements* to obligate established external conditions onto PPPs. These are formal, command and control mechanisms, that attempt to govern the PPP towards the desired output with a top-down approach (Hueskes et al., 2017). The assumption behind these elements is that appropriate contractual agreements, such as accurate rules and provocative sanctions must be able to incentivize private parties to take rational decisions that are in line with the public expectations (Koppenjan et al., 2018). PPP governance, that is based on such elements, mostly employs *hierarchical* instruments. These governance instruments involve detailed procedures and restrictive rules (Gestel et al., 2012). They are mostly suitable

within PPP circumstances with low complexity, wherein the government is able to accurately design and predict the required procedure for the desired project output. Within sustainable-oriented PPPs, the appropriate detailed rules and procedures could stimulate the private sector in becoming more sustainable (Koppenjan & Enserink, 2009). Thereby a combination of contract performance criteria and evaluation methods from the principal may induce a more adequate sustainability performance of the agent (Shrestha et al., 2019).

Collaborative perspective: Process Elements and Network instruments

The second theory emphasizes a more *collaborative perspective*. This perspective is focused on creating high quality relationships, that strengthens trust and commitment throughout the PPP (Koppenjan et al., 2022). This perspective is used to collectively work towards established external overarching objectives within the internal project-level conditions of PPPs (Spraul & Thaler, 2020). It mainly involves *process elements*, which are informal, collaborative, and relational mechanisms, that strive to govern the PPP according to a horizontal approach (Hueskes et al., 2017). It explains that concepts such as shared goals, mutual interests and constant communication are essential within a successful partnership (Suchman et al., 2018). The logic here is that actors not only act according to incentives and self-interests, but also by norms and values (Koppenjan et al., 2018). In their study Koppenjan et al (2018) therefore argue, that collaborative steering can enhance the interaction between public and private sectors. This collaborative steering mainly utilizes *network instruments*, which are attempts at facilitating cooperation, communication and participation of actors in the PPP process (Kort et al., 2016). Examples are mutual decision-making, user panels or collaborative working sessions (Gestel et al., 2012). These instruments are more suitable for complex PPP environments, wherein the government is unable to accurately know what is required for the desired project outcome. Correspondingly, not everything is decided and anchored upfront. On that account a collaborative advantage can be created whereby the expertise, capacities and resources of involved public and private actors are closely connected and synergized (Stadtler, 2016). Furthermore, according to this collaborative PPP-model, risks are shared between the public and private sector, which can prevent significant conflicts along the project's lifecycle (Hueskes et al., 2019).

A recent study by Hayter & Clapp (2020) on a PPP for improving the Canadian forest sector for example, showed that collaborative endeavours resulted in improved sustainability performance and enhanced commitment for the long-term. Furthermore, Bjärstig (2017) indicated that public-private collaborative management definitely positively affected the sustainability performance of projects. Koppenjan et al (2022) also argue that the collaborative approach can be used to jointly solve problems, which creates trust and commitment throughout the contract period. This trust and commitment can stimulate private actors to invest more in innovative solutions (Warsen et al., 2018). Leendertse (2015) adds to this by finding that private actors actually prefer a high-trust, long-term and committed relationship with the public sector.

Not mutually exclusive: Market Instruments

Still both the contractual and collaborative perspective are required to integrate established external sustainability conditions onto PPPs, and to facilitate valuable performances (Spraul & Thaler, 2020; Warsen et al., 2019). On the one hand, the contractual perspective is needed to guarantee specific terms and conditions, to which the public and private sector have contractually agreed to persist to (Hueskes et al., 2019). Otherwise, it gives the opportunities for the private sector to behave opportunistically. To some degree, this structures and constrains the things that are possible within a PPP project (Koppenjan et al., 2022). Hence, the legitimacy of the project and the accountability for the project can simply be more secured (Hueskes et al., 2019).

On the other hand, research has identified that more collaborative approaches are also determined essential within PPP performances. Warsen et al (2018) even argued that, due to the complexity of PPP projects, relational characteristics might be more important than contract characteristics. This is because of the incomplete contract theory (Tian et al., 2022). Contracts are unable to fully predict or describe what is required to achieve the desired output of the project. Christensen et al. (2016), suggests that contracts are hard to make complete, because it is costly, complex, and unpredictable. Collaborative aspects can fill in the shortcomings of contracts and determine interactions through trust and commitment (Hueskes et al., 2019; Koppenjan et al., 2022). Throughout the contract period uncertain events may happen that can affect the project outcome. These contingencies cannot all be identified upfront and included in the contract agreements (Brown et al., 2016). Collaborative aspects allow involved actors to absorb and respond to these events (Bertelli & Smith, 2010; Verweij, 2015). Accordingly, Koppenjan et al. (2022) concluded that the contract does not fully control PPP performance, but exactly the practices that are developed along the project lifecycle by the involved parties.

So in PPP practise, there is often an exchange between the contractual and collaborative perspective. Accordingly, this facilitates an interplay between both structural and process elements. *Markets instruments* are commonly used here (Gestel et al., 2012). These instruments focus on collaboration with market parties, however the government is still in control by monitoring and supervising the private actor's performance. Examples of these instruments are performance monitoring, and dispatching rewards or sanctions (Gestel et al., 2012). These instruments are suitable for PPP environments that are moderately complex, wherein the government knows what performance is required for the desired project output, however it still requires market interaction to be able to achieve this performance.

In sum, this interaction between the contractual and collaborative perspective highlights the challenge of integrating external sustainability conditions (overarching regulatory goals) onto the internal conditions (project-level) of PPPs. It is impossible to integrate external sustainability policies onto PPPs, solely through the contractual perspective, because the complex dynamics of PPPs bring along various unpredictable contingencies throughout the project lifecycle (Pagoni & Georgiadis, 2020). As a result, the actual achievement of external objectives, within PPPs, is largely determined by the way the public and private sector collectively respond to these contingencies (Pagoni, & Georgiadis, 2019). Koppenjan et al (2018) has shown, that an adequate interplay between both perspectives, could facilitate excellent performances in terms of time and budget. Consequently, this could be an interesting starting point to see how the PPP sustainability performance is influenced from this interplay of governance perspectives.

2.2.2 Operationalization with Four Key Dimensions of PPP Sustainability Governance

Hence, this amplifies the need to investigate the cross-organisational nature of PPP governance for sustainability. A recent study by Liu et al. (2022), developed a CGF that focused on sustainability governance, which is based on the collaborative governance framework of Ansell & Gash (2008). As stated in section 1.2, this research utilizes this CGF of Liu et al. (2022) to operationalize the discussed contractual and collaborative perspective into governance elements by creating typologies. The coherency of this operationalization is visualized in figure 2.

The typologies are based on four key PPP governance dimensions:

- *Government leadership*; represents the leadership of the government in terms of a policy maker or a business partner for sustainability .
- *Institutional environment*; it articulates the formal and informal institutions for sustainability.
- *Collaborative process*; refers to the organisational management of the PPP for sustainability, in terms of project and process management.
- *Starting conditions*; concerns the allocated capacity and the business environment for sustainability.

The empirical findings of Liu et al., (2022), indicated that government leadership and the institutional environment had to largest influence on the sustainability performance of PPPs. Mainly because the collaborative process and starting conditions are also, for the most part determined by governmental decision-making.

Government Leadership: Policy maker and Business Partner

The *Government leadership* dimension is instrumental within PPP cooperation, because governments have the responsibility for facilitating sustainability-related outcomes (Pinz et al., 2018). They must make the first step in allocating appropriate regulatory and social resources for the project (Ma et al., 2020). If governments fail to do so, this can have harmful effects on the partnership and its sustainability performance (Delhi & Mahalingam, 2020; Liu et al., 2022). Accordingly, within PPP sustainability governance, the government can choose to adopt more of a structural, *policy maker role (S1)* or a more process, *business partner (P1)* role (figure 2).

When PPP governance utilizes a contractual perspective, the *Government leadership*, is more tended to adopt the role of a policy maker (S1). The government then uses its power predominately for establishing and supervising hierarchical instruments such as formal regulations and criteria that can be integrated in the contract (Liu et al., 2022). Accordingly, the government is mostly focused on creating the appropriate regulatory structure beforehand, that incentivises the private sector on to a sustainable pathway (Spraul & Thaler, 2020).

Following a more of a collaborative perspective, the *Government leadership* is more tended to adopt the role of a business partner (P1). The government is expected to use more network instruments, such as facilitating cooperation activities, which sends positive behaviour, motivation, and capacity towards the private sector (Liu et al., 2022). Hence, the government attempts to stimulate innovative and sustainable development during the project's lifecycle, together with the private sector, through collaborative dynamics. This can stimulate the private sector's willingness to participate in sustainability considerations (Ma et al., 2020; Delhi & Mahalingam, 2020).

Institutional environment: Formal and Informal Institutions

The *Institutional environment* is important within PPP sustainability governance, as a fragile institutional environment, that limits or does not stimulate PPP project innovation, can have a negative affect on the PPP sustainability performance (Wang et al., 2020). This dimension concerns all laws, regulations, and criteria, but also norms, values, and perceptions of a PPP (Liu et al., 2022). It therefore consists of structural, *formal institutions (S2)* and procedural *informal institutions (P2)* (figure 2).

The adoption of a more contractual perspective in the *Institutional environment* is expected to consist more of formal institutions (*S2*). Such institutions have the opportunity to function as a stimulating legal framework for sustainability, but it can also be limiting sustainable progress of PPPs (Liu et al., 2022). To illustrate, hierarchical instruments, such as protocols or detailed procedures within contracts could stimulate the private actor to behave more sustainable (Hueskes et al., 2017). However, these can also be unsound with the goals or ambitions that are established (Song et al., 2018). Liu et al., (2022), therefore advocate an unified and integrated legal basis for PPP sustainability.

When considering more the logic of the collaborative perspective the *Institutional environment* is expected to utilize more *informal institutions (P2)*. This happens through network instruments, such as consideration of habitual procedures, traditions, norms and values (Zhang et al., 2015). Consideration of these instruments make it possible to also involve more qualitative and less measurable sustainability aspects, through communicating and taking into account other perceptions (IISD, 2012). A misperception between the public and private sector about such aspects can negatively influence the PPPs sustainability performance (Liu et al., 2022). For example, different understandings of particular criteria between the public and private sector can cause conflicts in the future of the project timeline (IISD, 2012). Song et al. (2018) describe that such misunderstandings are unattractive for private sectors, which discourages them to participate in the sustainability considerations of the projects. Consequently, the projects are often implemented with a lower sustainability performance.

Collaborative process: Project and Process management

The *collaborative process* is important within PPP governance, because it considers the way in which the PPP is formally constructed and managed, but also the cooperation between the involved partners (Liu et al., 2022). Therefore, the collaborative process can be more structurally-focused on *project management (S3)* or more procedurally-focused on *process management (P3)* (figure 2). Inadequately managed PPPs in the collaborative process can negatively influence the sustainability performance (Hueskes et al., 2017; Song et al., 2018).

The structural focus of the contractual perspective, will set the focal point more on project management (*S3*) in the collaborative process. This mostly consist of procedural and transaction rules, that are set beforehand to effectively determine the input, workflow, and output of the PPP (Liu et al., 2022). Adequate, enforceable, and specific input and output specifications can stimulate sustainable benefits within PPPs (Hueskes et al., 2017). Hierarchical instruments can therefore be expected here.

In turn, with more a collaborative perspective, the collaborative dimension will be more focused on process management (*P3*). This happens by providing practical feedback, through stakeholders engagement and transparent communication, on the established sustainability rules and processes, during the project lifecycle (Liu et al., 2022). It also goes beyond the legal framework, and attempts to set goals, and find solutions with collaborative dynamics (Spraul & Thaler, 2020). This environment is therefore more suitable for network instruments.

Starting conditions: Allocated Capacity and Business environment

Lastly, the starting conditions are considered important within PPP sustainability governance. These involve the circumstances that make particular sustainability benefits possible within a PPP (Liu et al., 2022). Such circumstances can be more structurally-focused on the *allocated capacity (S4)* or more procedurally-focused on the *business environment (P4)* (figure 2).

Following the contractual perspective, the starting conditions, are more focused on the allocated capacity (S4). This includes the resource availability for making sustainable development possible within PPPs, which can consist of qualified personnel and specific financial capacity of the public sector (Panayides et al., 2015). Hierarchical instruments also involve specific required processes and standards for available inputs (Gestel et al., 2012).

On the collaborative perspective side, the starting conditions, target more process elements, by creating a business environment (P4), that can support and facilitate cooperation activities between the public and private sector (Liu et al., 2022). It includes resources and incentives that stimulate business-oriented thinking, which is crucial for making progress in projects and operating PPPs (Panayides et al., 2015). This involves close collaboration, similar as network instruments (Gestel et al., 2012).

Again not mutually exclusive

Again the structural and procedural typologies of each dimension are not mutually exclusive. Meaning that in practice both sides can be used (Hueskes et al., 2017). Considering the literature on the governance perspectives in section 2.3.1, it is not always one or the other. Therefore, also market instruments can be expected, when a governance dimension is not necessarily on the structural or the process side. This means that market instruments are expected to be used within the contractual perspective and in the collaborative perspective. Still, for each dimension applies that it can be more structurally or more procedurally focused, which is expected to facilitate more hierarchical or more network instruments.

Governance Element	Contractual Perspective		Collaborative Perspective	
	Structural	Intermediate	Process	
Government leadership	<i>Policy maker (S1):</i> Focus on power essential for maintaining clear ground rules and contract criteria.	Both	<i>Business partner (P1):</i> Focus on the behaviour and capacity of the government that acts as a project's partner by facilitating and intervening cooperation activities.	
Institutional Environment	<i>Formal institutions (S2):</i> Focus on legal ground to ensure legitimacy and accountability.	Both	<i>Informal institutions (P2):</i> Focus on the considerations of norms, values and perceptions.	
Collaborative Process	<i>Project management (S3):</i> Focus on management rules that are already set before hand, which determines the workflow towards the desired output.	Both	<i>Process management (P3):</i> Focus on participation and communication through cooperation activities that are proceeding during the project's lifecycle.	
Starting Conditions	<i>Allocated capacity (S4):</i> Focus on the resource conditions for the employment of sustainability.	Both	<i>Business environment (P4):</i> Focus on business incentives that enable innovative and sustainable development within the project.	
Governance Instruments	<i>Hierarchical</i>	<i>Market</i>	<i>Network</i>	

Figure 2: Overview of the operationalized governance elements (Adapted from Liu et al. (2022)).

2.3 Similarities between Theory PPP Sustainability and PPP Governance: Developing a PPP Sustainability Governance Framework (SGF)

When considering the theory on PPP sustainability and PPP governance, there can be argued that they have overlapping characteristics. Therefore, in this section, there is explained that the governance perspectives, elements, and instruments have a different suitability within the discussed sustainability approaches and performances. Based on this, the goal here is to compose a framework for PPP sustainability governance (SGF). This framework is presented in figure 3.

Governance for weak sustainability

If the public sector aspires external overarching sustainability goals, that are weak sustainability-oriented, which include status quo performances, the contractual governance perspective, including the structural typologies (*S1, S2, S3, S4*), and hierarchical instruments seem to be the more appropriate. This is because of three similarities:

- Top-down management
- Value for money
- Low complexity and high governmental capacity

Firstly, similar as with the contractual perspective, within a weak sustainability approach and status quo performance, the power of decision-making lies predominately with higher levels of authority (Hopwood et al., 2005). Structural elements (*S1, S2, S3, S4*) such as *top-down management* are central in this (Hueskes et al., 2017). According to Hueskes et al., (2017), this is because weak conceptualizations of sustainability are better measurable and enforceable, which can quite easily be structurally integrated in the contract, according to a top-down approach. The required inclusion of other actors, than the public sector, within decision-making of status quo performances is hardly mentioned (Hopwood et al., 2005). As a result, solely relying on the contractual structure for sustainability can only be beneficial for weak sustainability, as it would become problematic if more far-reaching and less measurable sustainability considerations are aspired to be contractually established (Hueskes et al., 2017).

Secondly, when taking more a contractual perspective, with top-down management towards sustainability, far-reaching and less measurable, environmental, and social aspects are often neglected, due to a lack of enforceability in the contract (Liu et al., 2022; Hueskes et al., 2017). As a consequence, the contractual perspective is at most able to assess and stimulate a quantitative sustainability performance (IISD, 2012). As far-reaching social and environmental aspects are hard to measure, financial criteria, such as the *value for money*, will be getting a higher priority (Van den Hurk & Hueskes, 2017). Likewise, the decoupling of economic growth within a status quo sustainability performance is reached.

Thirdly, Hopwood et al (2005) state that within a status quo sustainability performance conventional governmental and commercial structures can be gently pushed towards improvements with relatively simple management methods, such as environmental impacts assessments. Moreover, with exclusively a contractual perspective, there can be expected that only relatively simple and quantitative sustainability considerations can be integrated in the contract (Hueskes et al., 2017). Integrating far-reaching and less measurable sustainability aspects in the contract would become to complicated for the government (IISD, 2012). Therefore, also the hierarchical instruments can be connected to a status quo sustainability performance, as there is expected that PPP processes have *low complexity*, due to remote actor involvement in decision-making and rather simple solutions. Additionally, with such relatively simple circumstances, the

government is expected to be knowledgeable and to have *high organisational, and financial capacity* (Gestel et al., 2012).

Governance for strong sustainability

If public sectors have external conditions that pursue strong sustainability-oriented sustainability with transformative performances, the most appropriate perspective seems to be the collaborative perspective, including the process typologies (*P1, P2, P3, P4*), and network instruments. This is also because of three similarities:

- Network management
- Added value
- Complex circumstances and low government capacity

Firstly, when taking a strong sustainability approach, that pursues a transformative performance, by incorporating environmental, social and economic aspects, leadership of both the public and private sector within decision-making is required. Public sector leadership is essential for the public resources and motivation, whereas private sector leadership is important for the expertise (Spraul & Thaler, 2020). Sustainability aspects within a transformative performance are not easily measurable, but more qualitative and uncertain. Therefore, they cannot be decided and established upfront in the contract (Hueskes et al., 2017). *Network management*, according to the collaborative perspective has to fill in this shortcomings (Hueskes et al., 2019) (*P1, P2, P3, P4*). Accordingly, existing literature advocated that contract flexibility has a positive relationship with stimulating PPP far-reaching sustainability considerations (Tian et al., 2022). This is because flexible contracts have the ability to distribute risks between the public and private sector and is able to anticipate on unforeseen events and less measurable sustainability considerations, giving an improved sense of fairness and security (Song et al., 2018). In the context of PPP sustainability, this flexibility refers to giving regulatory space for innovations and sustainable progress (Tian et al., 2022). Such flexibility is only possible with the inclusion of network management, through high stakeholder involvement and close negotiation, for developing and incorporating more transformative sustainability principles (Pinz et al., 2018). Findings by Spraul & Thaler (2020) support this, by showing the importance of process elements within increasing the sustainability of policies and activities. However, Wijayasundara et al. (2022) found that, the public sector generally obstructs contract flexibility, because of a hesitancy of change. Providing openness for new innovations might thus be a bottleneck.

Secondly, due to the collaboration between public-private capacities and the contract flexibility within decision-making, more qualitative sustainability considerations can be implemented in PPPs (IISD, 2012). A strong sustainability approach and transformative performance pursues such *added values*, on environmental, social, and economic aspects (Hopwood et al., 2005). Incorporating these aspects through collaboration make that PPPs are not only valued by their financial performance, but also on their environmental and social progress (IISD, 2012).

Thirdly, the inclusion of more stakeholders and additional sustainability aspects, creates a complex interplay of interests within PPP decision-making (Hueskes et al., 2017). In such highly complex circumstances, there can be expected that the government is unable to manage these due to insufficient capacity (Gestel et al., 2012). Network instruments are thus suitable for reaching transformative performances, as this involves highly complex circumstances, wherein the situated government capacity is low.

Governance for reform performance

Lastly, there can also be an intermediate approach towards sustainability identified that has characteristics of weak sustainability and strong sustainability, which involves a reform sustainability performance. It can include major sustainable benefits due to the establishment of concrete goals and a critical outlook on current policies or operational activities (Hopwood et al., 2005). However, a complete reversal of unsustainable practices is not advocated and technological modifications remains a significant part. Still, supporters of the reform approach want to stimulate participation, in terms of quantity and quality. Moreover, there is a large focus on finding best practices through research and considerable stakeholder involvement. Inclusion of the market is commonly used for this. Therefore, an exchange between both structural (S1, S2, S3, S4) and process (P1, P2, P3, P4) elements are expected to be appropriate.

Although, the complexity within a reform sustainability performance definitely increases, compared to a status quo performance, there can be expected that the desired output of such a performance can still be defined beforehand by the government (Gestel et al., 2012). In addition, the established practices and policies are nevertheless remaining at the basis of the PPP, as they are solely significantly improved in contemplation with the market (Hopwood et al., 2005). Consequently, market instruments would be suitable for pursuing reform approaches, because of their usage moderate complexity, and a moderate required government capacity.

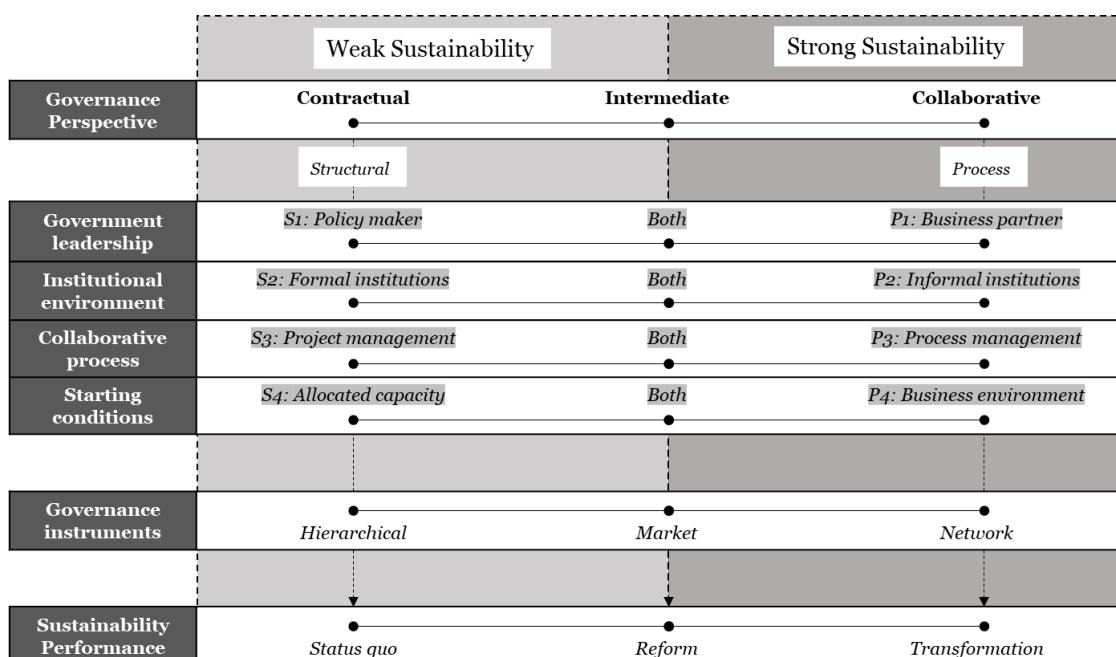


Figure 3: PPP sustainability governance framework, indicating the similarities between sustainability approaches and governance perspectives.

Chapter 3: Methodology

3.1 Research method and case study description

Comparative case study

This study has aimed to empirically investigate how governance elements can influence the sustainability performance of PPPs. Based on the theoretically composed sustainability governance framework, there could be expected that the adoption of more contractual governance approach (S_1, S_2, S_3, S_4) or a more collaborative governance approach (P_1, P_2, P_3, P_4) can result in different PPP sustainability performances (*status quo, reform, transformation*). In order to empirically analyze this influence, this study has adopted a comparative case-study analysis as a research method. This method was selected because comparative case study research is acknowledged to be a suitable method to get a detailed understanding of interlinkages between processes and outcomes (Krehl & Weck, 2020). As previously stated in section 1.2, this study has selected two Dutch PPPs from the water channel maintenance sector, which were used to carry out the comparative case study. The PPPs include:

- A maintenance project between RWS, Heijmans, and Martens en van Oord (plot 1)
- A maintenance project between RWS, Strukton, and van der Herik (plot 2)

The selected PPPs were expected to be an appropriate selection for a comparative case-study. Firstly, because the PPPs are embedded in similar contextual characteristics. To illustrate, they share the same public sector (RWS), operational sector (water channel maintenance), contract form (performance contract), and starting date. Moreover, both PPPs aspire to integrate sustainability considerations within their projects (Rijkswaterstaat, 2021). Accordingly, the causal mechanisms between governance elements and sustainability performance, within both projects, were expected to be more meaningful, because they were less dependent on contextual variables (Goerres et al., 2019). The influence of the governance elements used in both projects on their sustainability performance could therefore be better identified, as the contextual factors, wherein the PPPs are situated, are comparable.

Secondly, empirical dynamics of PPPs and the way in which they are managed are advocated as factors to consider, when attempting research into the relationship between sustainability and PPPs (Pinz et al., 2018). In accordance, an adequate understanding about the dynamics within PPPs is important (Cheng et al., 2020). Against the research aim and theoretical framework of this study, it is therefore important that both the contractual and collaborative side can be investigated for governance elements, and their influence on sustainability performance. Due to an internship at 'RWS Oost-Nederland A-Vaarwegen', the selected PPPs became accessible for in-depth research at both the contractual and collaborative side.

Lastly, according to The World Bank (2022), maintenance projects may only be regarded as PPPs, under the condition that they are performance-based. When such performance-based maintenance projects have a contract duration of 3-5 years, the project's contract gets the nomenclature of a management contract. Both of the selected projects are established according to a performance-based contract of 5 years. Following the terminology of The World Bank (2022), these projects can thus be characterized as performance-management-contract PPPs. Previous studies also used performance-based contracts to investigate contractual and collaborative governance within PPPs (Zheng et al., 2008; Gajurel, 2014). According to Castelblanco et al. (2020), performance-based contracts provide suitable environments to cooperatively implement contractual and collaborative governance elements. Based on this, this study regards performance-based PPPs as suitable case-studies in relation to the research aim and theoretical framework.

Case study descriptions

Within RWS, the cluster ‘ON A Vaarwegen’ is responsible for the selected PPPs. The PPPs are established on 12 February 2021, according to two performance contracts that are effective until 12 February 2026 (Rijkswaterstaat, 2021). Both PPPs have an opportunity to extend their contract period with 3 years. The final assessment of the contract awarding procedure was based on 80 percent quality, and 20 percent on the price. Sustainability and asset management had a prominent role within the quality assessment. The working area is located in the east of the Netherlands, and is divided into two plots (figure 4). Plot 1 is awarded to Heijmans. This area consists of 3 waterchannels (Boven-Rijn, Waal, Maas-Waalkanaal). Heijmans had the highest score on the sustainability awarding criteria (Rijkswaterstaat, 2021).

Plot 2 is granted to Strukton, and consists of 6 waterchannels (Pannerdensch Kanaal, Nederrijn, Lek, IJssel, Twentekanaal, IJsseldelta). Strukton scored the highest on the asset management awarding criteria (Rijkswaterstaat, 2021). In compliance with the performance contracts, Heijmans and Strukton are responsible for the maintenance of the waterways, that are situated within their plot. Both Heijmans and Strukton have allocated the operational activities for this to a subcontractor. Heijmans to ‘Martens en van Oord’ and Strukton to ‘Van den Herik’. The working activities mainly involve the dredging of rivers and channels, and maintenance of river banks and the greenery (Rijkswaterstaat, 2021). Further details of the case-studies are presented in table 1.

Table 1: Case-study characteristics.

Plot	Public sector	Private sector	Type of contract	Value of contract	Contract period
1	Rijkswaterstaat (ON A Vaarwegen)	<ul style="list-style-type: none"> • Heijmans • Martens en van Oord 	Performance (management) contract for maintenance	€32 million	5 (+3) years
2	Rijkswaterstaat (ON A Vaarwegen)	<ul style="list-style-type: none"> • Strukton (Civiel) • Van den Herik 	Performance (management) contract for maintenance	€50 million	5 (+3) years



Figure 4: Geographical locations of the two case-studies (Adapted from: *Rijkswaterstaatdata.nl, 2021*).

3.2 Research Design: A three-step data collection approach and data analysis

Three-step data collection approach

Against the background, theoretical framework, and the case-studies, this research has utilized a three-step research design, including qualitative mix-methods, to be able to answer the research questions (figure 5). There was anticipated to use a mixed method approach, because data on multiple variables (governance elements, sustainability performance, influence) had to be collected. Step 1 focused on identifying governance elements within the two case-studies, that regard sustainability. Step 2 assessed the sustainability performances of the two case-studies through the ambitieweb. Step 3 identified the influence of the involved governance instruments on the assessed sustainability performances. For each step, the unit of analysis and unit of observation is explained. Ultimately, the findings of this data is analysed to provide an answer to the main research question.

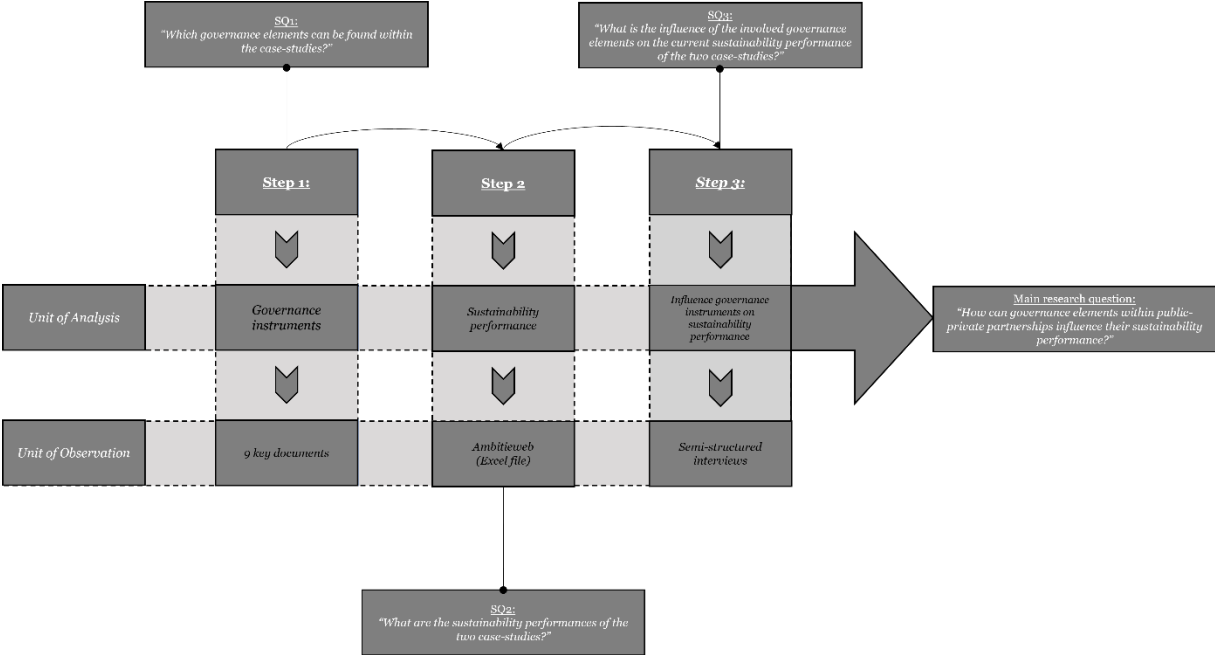


Figure 5: Research design: a three-step approach

Step 1: Which governance elements can be found within the case-studies?

Step 1 has focused on answering SQ1. The unit of analysis in this step were the established governance elements within the studied PPPs, that regard sustainability. The unit of observation, that was selected for this are 9 key documents within the PPPs. These documents are presented in table 5. These documents can be seen as the foundation for the sustainability approach of the two PPPs. They were used to investigate which governance elements IenW, RWS, and the contractors have prescribed for their sustainability approach in the two PPPs. It was beneficial to do this as a first step, as it gained more in depth and tailor-made knowledge about the two PPPs.

Subsequently, the collected data were analysed according to a deductive-inductive coding process (Miles et al., 2014). This means that at first the identified governance instruments in the documents were analysed according to a composed coding scheme (figure 6), that is based on the sustainability governance framework of section 2.4. For each identified governance element, there was analysed if they are more contractual-oriented or collaborative-oriented. Dependent on this, they were linked to one of the structural typologies (S1, S2, S3, S4) or process typologies (P1, P2, P3, P4), sorting them to hierarchical or network instruments. However, there were also governance elements identified, by which it was difficult to indicate if they are inherently contractual-oriented or collaborative-oriented. These elements have followed the intermediate coding-path, whereby there was still indicated if they had a more structural or process typology. Based on the sustainability governance framework, were characterized as market instruments. After this first deductive coding process, the identified governance elements were also made more tangible, by inductively coding them, according to the description that was given in the document, wherein the element was identified. Ultimately, 27 structural elements and 20 process elements were found, however only the elements that were anticipated to have the largest influence on sustainability performance were presented in Chapter 4.

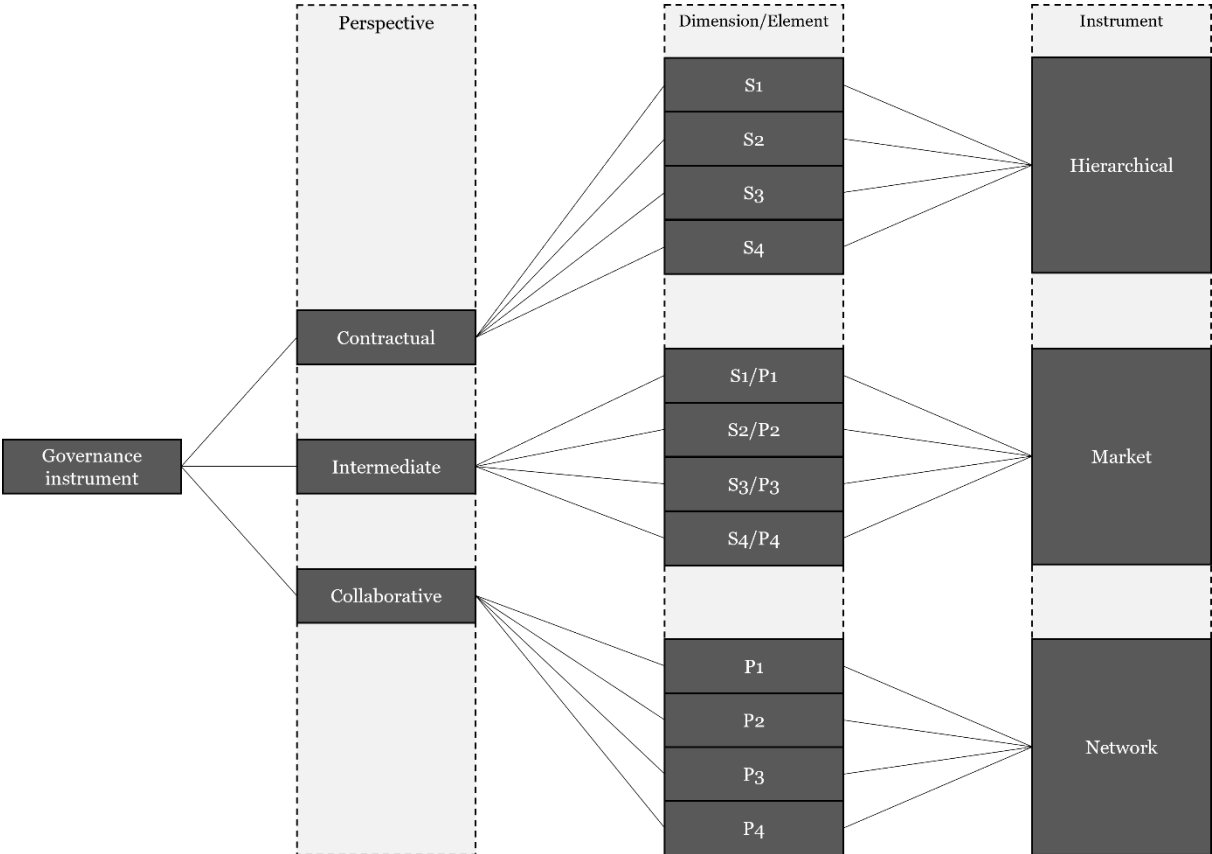


Figure 6: Coding scheme governance elements for document analysis

Step 2: What are the sustainability performances of the case-studies?

Step 2 has focused on answering SQ2. The unit of analysis in this step, was the sustainability performance of the studied PPPs. The selected unit of observation in this step was twofold. First, the ‘ambitieweb’ (AW) of PianOo, the expertise centrum in tendering of the Dutch Ministry of Economic Affairs and Climate (EZK), was used. PianOo has created a free to use Excel file for the AW, which can be found on their website (PianOo, 2022). This format was selected, because the included sustainability aspects can be adjusted to project circumstances. Based on information out of the 9 documents of step 1, 3 environmental, 3 social, and 2 economic sustainability aspects were included within the AW (figure 7). These included sustainability aspects are based on the composed AW document for sustainability integration in projects within the water channel maintenance sector (GWW, 2022), and the learning space documents of the studied PPPs (D6, D7).

Environment	Social	Economic
<ul style="list-style-type: none"> • <i>Climate</i>; Reducing greenhouse gas emissions and usage of sustainable energy sources. • <i>Circularity</i>; Circularity of used materials and commodities. • <i>Milieu</i>: Preserving biodiversity, soil and water quality 	<ul style="list-style-type: none"> • <i>Social relevance</i>; Participation and usage of local knowledge. • <i>Well-being/living environment</i>; Consideration of health, nuisance and safety. • <i>Supply chain responsibility</i>; Preventing of poor working conditions, discrimination, and poor salaries. 	<ul style="list-style-type: none"> • <i>Investments</i>; Balance between sustainability performance and budget. • <i>Business climate</i>; Foster (local) employment and innovative solutions.

Figure 7: Definitions sustainability aspects.

Subsequently, respondents that are involved within the studied PPP were asked to fill in this AW with the Excel file. This includes 4 respondents. Their characteristics are indicated within table 3. The respondents were asked to score, each sustainability aspect for their particular project, according to 4 sustainability levels;

- *Level 0*; No sustainability performance/not relevant
- *Level 1 (Status quo)*; insight in and implementation of minimal sustainable benefits, that are slightly better than the ‘grey situation’, by for instance including technological innovations.
- *Level 2 (Reform)*; concrete (reduction) goals are set for the existing arrangements, to encourage significant improvements.
- *Level 3 (Transformation)*; the current arrangements are completely restructured to have no negative effect and/or by contributing positive effects.

Table 3: Characteristics Respondents

Respondent	Organisation	Public/private	Case
R1	Rijkswaterstaat	Public	Plot 1
R2	Heijmans	Private	Plot 1
R3	Strukton	Private	Plot 2
R4	Van den Herik	Private	Plot 2

For their score, they were asked to give a short explanation. Out of these scores, the Excel file automatically had created, per each individual Excel file, a radar-graph which visualizes the perceived sustainability performance per respondent. These were labelled, according to the codes

of the respondents (AWR1, AWR2, AWR3, AWR4). After these Excel files were collected, they could be compared with an AW that has been developed for both PPPs by RWS, at the start of the projects. The ambitions within this AW are for both project the same. This AW has been found within document 5 and 6, which are learning space documents developed in collaboration between RWS, Deltares, and the contractors. This AW was coded as; ‘AWRWS’.

In the end, this comparison provided an indication on how experienced employees within the two PPPs estimated the current sustainability performance, which measures there were taken for this, and if it was in line with the ambitions established beforehand.

Step 3: What is the influence of the involved governance elements on the current sustainability performance of the two case-studies?

Lastly, step 3 took into account the results of step 1 and 2, and attempted to answer SQ3. The unit of analysis was the influence of the identified governance instruments on the estimated current sustainability performance of the two PPPs. The used unit of observation in this step were semi-structured interviews with the same respondents of step 2. The interviews were semi-structured, because the questions were not entirely prepared beforehand, however the theoretical governance typologies have been used as guidelines for asking questions.

All interviews were individually executed by means of a Teams-meeting. These were recorded and manually transcribed. The focus was on experiences and observations of the respondents with the established governance elements, in regard to the current estimated sustainability performance. Due to the consideration of the information found within step 1 and 2, specific questions on the governance typologies and the sustainability performance could be asked. In order to safeguard that the answers were also specifically focused on the case the respondents are involved in, there was made clear at the beginning of every interview that all the questions are regarding the project of the particular respondent. As a result, the respondents were expected to be able to give more accurate answers to the questions.

Consequently, there could be analysed how the respondents have experienced the governance elements and what their influence was on the current sustainability performances. Accordingly, the data gathered from the interviews was linked to the governance elements of the sustainability governance framework from section 2.4. This was done by comparing the identified governance elements with the experiences of the respondents to see whether or not, they had enabled or constrained the sustainability progress. Based on these findings, there could be indicated which governance elements were important for the current sustainability performance, and which were not within the studied PPPs. Ultimately, recommendations were composed in relation to these findings, that might be able to aid the investigated PPPs and future PPPs in improving their sustainability performances.

Ethical considerations

The documents of step 1 are business confidential, therefore only their title name, owner, year of publication, and number of pages could be presented. This was discussed in consultation with the project manager and technical manager of the two studied PPPs. Moreover, before research step 2 and 3 were executed, all respondents were asked to fill in a formal consent form. All the respondents have signed the consent form, which was carefully stored on the Groningen University drive. Respondents were hereby provided with a formal opportunity to give consent to voluntary participation in this research. Furthermore, in this form there was made clear that this research takes into account the most strict international norms for doing research (Nederlandse gedragscode wetenschappelijke integriteit, 2018). Furthermore, it provided information on the privacy norms for participation in this research. To make sure, the respondents could at any time decide to not participate in this research, the respondents were provided with contact information of the researcher. The form is attached in appendix A.

Chapter 4: Findings

4.1 Overview of governance elements

The findings section starts with presenting the identified governance elements within the two studied PPPs. It follows the sustainable governance framework of section 2.4, and is based in the document analysis of step 1. Accordingly, each dimension is presented in a table separately. The identified governance elements are coded, with a structural or process typology, and type of instrument. This is according to the coding scheme (figure 6). Next, they are inductively coded per plot, by giving the description of the governance element from the related documents. The differences per dimension are also indicated. Ultimately, for each dimension a table is composed, including the coded governance elements, and the identified differences per plot. The differences are indicated in **bold**.

Government leadership

Table 4: Situated governance elements for sustainability within government leadership of plot 1 & 2.

S1 – H	S1 – M / P1 – M	P1 – N
<ul style="list-style-type: none"> Sharpen sustainability criteria of contracts Structural action against nitrogen (clean and emission-free construction 2030) Clean air agreement (clean and emission-free construction 2030) Climate-agreement (clean and emission-free construction/climate neutral and circular infrastructure 2030) Raw materials agreement (climate neutral and circular infrastructure 2030) Action program KCI 	<ul style="list-style-type: none"> Climate neutral and circular within 2030 and pass this on to the market Monitor sustainability performance in the sector Additional budget for sustainability (development & innovation) More flexibility in contracts RWS must perform as launching customer Research program 'Innovations in de kustlijnzorg (IKZ) Collaboration on policy level with frontrunners sustainability Financially rewarding frontrunners on sustainability. 	<ul style="list-style-type: none"> In the GWW (grond/weg/waterbouw) sector collaboration has become a rigorous requirement Creating partnerships to expand knowledge and enhance innovation
Differences plots		
No differences	<ul style="list-style-type: none"> Plot 1: RWS has adopted the role of a launching customer, by providing flexibility for developments. Plot 2: RWS has not adopted the role of a launching customer. 	No differences

Policy maker – Hierarchical

The hierarchical policy maker role of RWS within the two plots, mainly originates from the EU and IenW level. Composed strategies and agreements have forced project teams of RWS to be more in line with the included objectives (D1). Two overarching goals are relevant for the two plots, namely clean and emission-free construction, and climate-neutrality and circular infrastructure in 2030. In order to contribute to these goals, RWS included contractual demands for asset management, MKI (quantitative/qualitative), and CO2-ambition levels. The goals are thus predominately focused on environmental aspects.

Policy maker – Market

The strategy of IenW considers interaction with the market as a key process within the achievement of their goals (D1). Structurally, it is intended to pass on their goals to companies across the whole market. For that reason, RWS aspires instruments such as performance-monitoring, additional budgets, and flexibility in contracts.

Business partner – Market

As a result of the prescribed importance of market interaction (D1), RWS also strives to be a business partner for the market. According to D1, RWS is expected to act as a launching customer within collaboration processes of projects. This means that the project teams of RWS must be willing to be open for promising innovative solutions and to try and stimulate these. A research program, initiated by RWS, is established for this. Furthermore, collaboration on the policy level and financial rewards are promised to frontrunner contractors.

Business partner – Network

Within the IenW and RWS strategy (D1, D2), collaboration is determined as a rigorous requirement, along project lifecycles. This is because achieving the established goals is determined to be complex and costly. Network instruments such as creating partnerships with contractors and knowledge institutions to develop innovative solutions is strongly advocated (D4). Consequently, for both plots, RWS composed a learning space team, that focuses on developing new sustainable solutions, through collaboration with important stakeholders. Also there is a MKI-meeting between the MKI-team of RWS and the MKI-team of the contractors every three months. Both of these meetings have the intention to have a horizontal partnership.

Differences plot:

One main difference was noticed between the two plots in terms of government leadership. In plot 1, RWS thoughtfully attempts to provide flexibility for improvements proposals of the contractors. Thereby, RWS tries to launch innovative improvements to operational activities, together with the contractors, throughout the current project lifecycle. In plot 2, this was also noticed at the start of the project, however such approach of governance was not continued, as RWS adhered to the standard contract conditions and regulations.

Institutional environment

Table 5: Situated governance elements within institutional environment of plot 1 & 2.

<i>S2 – H</i>	<i>S2 – M / P2 – M</i>	<i>P2 – N</i>
<ul style="list-style-type: none"> • Standards demands for asset management, MKI (quantitative/qualitative), and CO2-ambitionlevel. • MKI-reduction of 50%, based on estimated values. • Monitoring MKI-value of all contractual activities. • Obligated database for calculation MKI. • Specific procedures for progress reporting MKI. • Specific procedures final reporting MKI. • Every two months MKI justification towards RWS and meeting. • Acknowledged LCA-expert has to execute an independent test on MKI calculation. • Expectations for improvements proposals in the field of energy, climate, circular economy. 	<ul style="list-style-type: none"> • 80 percent quality, 20 percent price within tender. • Contractor must make a plan for sustainability, that corresponds to the sustainability criteria and explains the measures required for this, however the contractor is free in initiating this sustainability plan. • Contractors must have a CO2-prestatieladder certificate that corresponds with the tendered level. • Contractors must manage their operational activities with minimal nuisance for the (living) environment, however the contractor is free in initiating this. • Opportunity for a 3-year contract extension. • Fictional discount for registered performance asset management, MKI, (quantitative/qualitative), and CO2 ambition level provided by contracting parties <hr/> <ul style="list-style-type: none"> • Consideration market vision for sustainable developments • Focus on learning and unambiguous policies • Effort compensation 	<ul style="list-style-type: none"> • Horizontal learning space and MKI meetings. • Opportunities for delivering improvement or investment suggestions. • RWS takes into account knowledge and experience of contractors.
Differences plots		
<ul style="list-style-type: none"> • Plot 1: Estimated values for MKI-reduction were not indicated to be incorrect. • Plot 2: Estimated values for MKI reduction were indicated to be incorrect. <hr/> <ul style="list-style-type: none"> • Plot 1: Improvement proposals are making steps in development. • Plot 2: Improvements proposals get rejected by established regulations or contract conditions. 	<ul style="list-style-type: none"> • Plot 1: talks about effort compensation sustainability performance. • Plot 2: No talks about effort compensation. 	<ul style="list-style-type: none"> • Plot 1: Similar opinions about improvement proposals. • Plot 2: Different opinions about improvement proposals.

Formal institutions – Hierarchical

The formal institutions of the two plots are also largely the same. D2 describes that water channel maintenance projects are related to EU regulations, due to the great proposition of dredging in the operational activities. The strategy for coastline and water channel maintenance, therefore takes these laws into account (D2). When zooming in on the formal institutions for sustainability of the two plots, it involves mainly specific protocols and criteria for the MKI, and CO2 emissions. These are intended to provide structure to the established sustainability approach. The contractors are expected to follow these procedures, during the whole project lifecycle.

Formal institutions - Market

Furthermore, there are particular formal institutions identified, that are demanded by RWS, however the contractors are not obliged to certain protocols or procedures. The contractors are required to deliver a sustainability plan, a CO2 performance certificate, and a plan for reducing nuisance during operational activities. These are substantiated and explained by the contractors. Subsequently, RWS has to approve them, and keeps monitoring the performance along the whole project lifecycle. Here, a difference between the two plots was identified, as plot 1 is able to get a effort compensation for their performance, however this was not known by the respondents of plot 2. If RWS is satisfied with the performance at the end of the project, the contractors of each plot could earn a 3-year contract extension (D6, D7).

Informal institutions – Market

The focus of RWS for making the coastline and water channel maintenance sector more sustainable strongly depends on the market. Informal institutions are definitely prescribed to be taken into account, as consideration of the market vision, and learning for each other is mentioned in both the strategy documents (D1, D2). Accordingly, RWS strives to create unambiguous policies with the market parties to make them understandable and feasible.

Informal institutions - Network

At the actual project level of the two plots, RWS strives to take into account the knowledge and experience of the contractors, to create potential, innovative improvements or investments. These are discussed during horizontal learning space meetings and MKI-working sessions (D2).

Differences plots

More differences were noticed within the institutional environment. In plot 2, the estimated values based on previous years for the MKI-prognose were indicated to be incorrect. In plot 1, this was not observed. Moreover, many of the improvement proposals within plot 2 got rejected, whereas in plot 1 some improvement proposals are getting developed. RWS and the contractors of plot 2, do not share the same opinions about the improvement proposals. Contrastingly, due to these improvements in plot 1, there are talks about an effort compensation for the contractors.

Collaborative process

Table 6: Situated governance elements for sustainability within collaborative process of plot 1 & 2.

S3 – H	S3 – M / P3 – M	P3 – N
<ul style="list-style-type: none"> • Every two months communication towards RWS about progress MKI and CO2 reduction. • MKI-working session every three months with sustainability advisor (RWS). • Minimal requirements project management plan and sustainability plan. • Costs developing improvement proposals within contract sum. • Realisation improvements proposals within contract period. 	<ul style="list-style-type: none"> • MKI-baseline in consultation with contractors • Contractors fill in the project management plan and sustainability plan, RWS decides if it is sufficient (enough trust). • RWS is approachable for contract modifications. 	<ul style="list-style-type: none"> • Supply chain collaboration • Horizontal control and involvement about sustainability progress • MKI-working sessions • Every two weeks learning space meeting
Differences plots		
<ul style="list-style-type: none"> • Plot 1: Fixed sustainability advisor throughout current project lifecycle. • Plot 2: Fluctuations within sustainability advisors throughout current project lifecycle. 		<ul style="list-style-type: none"> • Plot 1: Extensive development of learning space meeting document. • Plot 2: Minimal development of learning space meeting document.

Project management - Hierarchical

In order to manage the sustainability approach of the two plots, RWS has established two moments for communication and reporting. Every three months a MKI-working sessions and every two months a report about the progress of the contractual sustainability demands. A sustainability advisor of RWS is available for a supporting role. Also, RWS demands a project management plan, that includes how the contractors expect to match the quality demands from RWS (D4). RWS demands minimal requirements for this, which are mainly focused on project goals, collaboration agreements, and project process descriptions.

Project management – Market

The MKI-baseline, that the contractors are required to pursue during the project lifecycle, is determined in consultation, between RWS and the contractors (D8, D9). The contractors are expected to describe their sustainability plan, with substantiated measures, and trustworthy arguments, to convince RWS. These plans need to be in line with the minimal requirements of RWS procurement demands (D4). The demanded moments for reporting and monitoring, gives RWS the opportunity to control the performance of the contractors.

Process management - Network

The basis of the process management is for both plots the same. In D2, RWS strongly advocates the importance of stakeholders along the whole supply chain. RWS wants to utilize the strengths of contractors, suppliers, and knowledge institutions. Within the two plots, this has resulting in every three months a MKI-working session, and every two weeks communication about the learning space. During these meetings, there is horizontal control and involvement about the sustainability approach and performance.

Differences plots:

Within the project management there was noticed that plot 1 has a fixed sustainability advisor of RWS, whereas in plot 2, there were many fluctuations in sustainability advisors throughout the

current project lifecycle. Another difference was that the learning space document of plot 1 has an extensively been developed. In plot 2, this development is still minimal.

Starting conditions

Table 7: Situated governance elements within the starting conditions dimension of plot 1 & 2.

S4 – H	S4 – M / P4 – M	P4 – N
<ul style="list-style-type: none"> Overarching strategies for sustainable development Action program KCI Sustainability fulcrum Detailed procedure formats and rules for MKI and CO2 reporting and monitoring Expected MKI-values based on previous years 	<ul style="list-style-type: none"> Additional budget for sustainability, but has to be justified by RWS. Opportunity for 3-year contract extension. 	<ul style="list-style-type: none"> MKI-Working sessions. Openness of RWS for innovative suggestions (innovating, uniformity, producing). Learning space meetings every two weeks.
Differences plots		
<ul style="list-style-type: none"> Plot 1: Expected MKI-values based on previous years not indicated to be incorrect. Plot 2: Expected MKI-values based on previous years was indicated to be incorrect. 		<ul style="list-style-type: none"> Plot 1: Openness of RWS for innovative suggestions, which created space for business-oriented thinking. Plot 2: No openness of RWS for innovative suggestions, which limited the space for business-oriented thinking.

Allocated capacity - Hierarchical

The overarching strategies developed by IenW and RWS are the starting point for the sustainability considerations in both plots. The action program KCI in D2, provides procedures on how to realize the prescribed goals of the strategies. At the actual project level, this has resulting in allocated detailed procedures for MKI and CO2 reporting, and prescribed MKI-values for the projects. The contractors have to execute their operational activities according to these procedures.

Allocated capacity – Market

RWS has access to additional, impulse budgets, that are meant to aid project teams of RWS in incorporating and developing sustainability considerations, that are in line with the overarching goals. Both the project teams have chosen to utilize such an impulse budget. The project teams are required to justify the budget, by monitoring and reporting the sustainability performance of the contractors to the sustainability fulcrum of RWS. Each plot can get access to a sustainability advisor from this fulcrum. If RWS is satisfied with the partnership of the contractors, a contract extension of 3 years can be awarded.

Business environment – Market

In order to keep the sustainability performance of the projects on a developing pathway, the contractors have the opportunity to deliver improvement proposals for sustainability. RWS, therefore entered several partnerships with market parties to enhance innovations. Still, RWS decides if such improvement proposals can be introduced into the projects.

Business environment – Network

Such improvement proposals can be discussed during the MKI-working sessions, and within the learning space meetings. In D2 there is described that knowledge and innovative suggestions, must move along three phases; innovating, uniformity, and producing. Innovating starts with knowledge development, and pilots. Uniformity concerns making it standard for projects. And lasty producing relates to the actual usage of the improvement proposals.

4.2 Sustainability ambitions and current estimated performances

The second part focuses the sustainability ambitions of the projects beforehand, and the current estimated sustainability performance. It takes into account the comparison between AWRWS and the other AWs. Each AW is visualized with a radar-graph, including a short description of the respondents (figure 8, 9, 10). Subsequently, the findings of each plot are presented separately, explaining the environment, social, and economic aspects.

Sustainability ambitions for both plots

With the identified governance elements, RWS ON A Vaarwegen aspires to reach several sustainability ambitions within the two plots (figure 8). Most of these ambitions are focused on environmental sustainability (climate, circularity, milieu). Especially on the aspects climate and circularity a transformation performance, in 2030, is aspired. Accordingly, RWS wants to ensure that these projects contribute to climate neutrality and a circular economy (weak sustainability). Ambitions on social aspects and economic aspects are less progressive. There was indicated, that RWS is still undeveloped in considering social aspects, because RWS mostly manages executive-focused projects, wherein environmental aspects seem to be more important (R1). Also there is mentioned, that within such executive-focused projects, social aspects are quite unpredictable and not the responsibility of RWS (R1). Therefore, social aspects are mainly focused on maintaining a status quo performance in terms of safety, liveability, and nuisance. Only within the economic investments aspect, RWS strives to do more reformative investments to improve the climate and circular aspects.

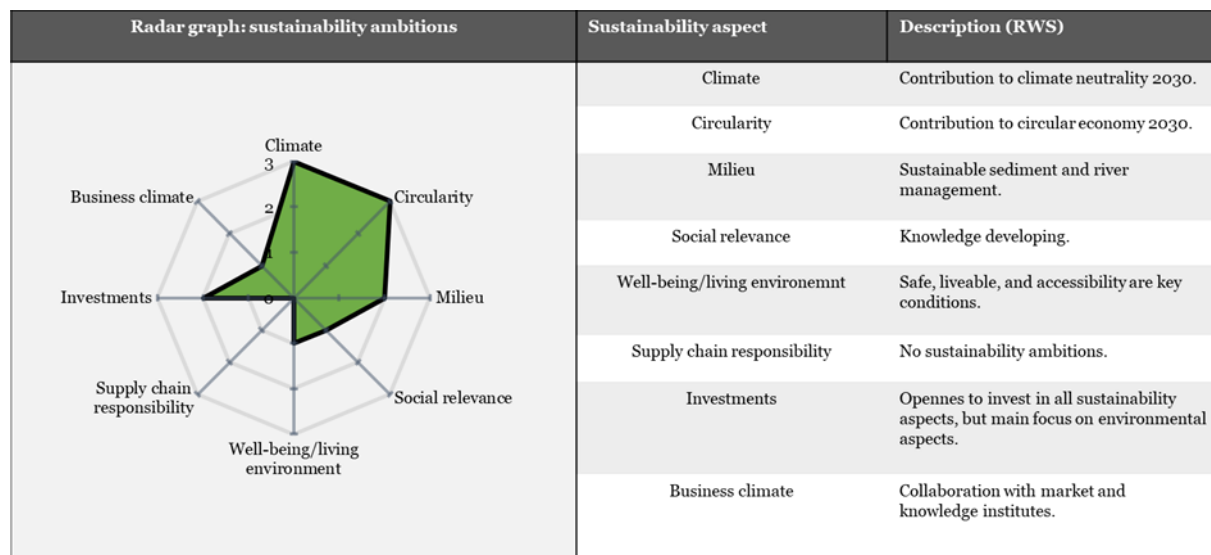


Figure 8: Radar graph and connected descriptions about the sustainability ambitions of both plots.

Plot 1: current estimated sustainability performance

Environmental

Currently, the performance on the environmental sustainability aspects is estimated to be reformative (figure 9). The operational activities comply with the 50 percent emission reduction (R1), due to the usage of less emissive energy sources (R2). Furthermore, they are developing other measures that are different from the grey situation, such as system balance and river management

(R1), an electric dredging ship (R1), water and ground research (R2), and a device for plastic removal (R2). Considering this, plot 1 is reasonable progress towards the ambitions of RWS on environmental sustainability.

Social

Despite the relatively low ambitions of RWS on social aspects, the estimations still represent some reformative performances (figure 9). For example, a new program was established to improve safety and reduce environmental nuisance (R2). Moreover, there is indicated, that due to the use of less emissive materials the working conditions became more healthy, and the environmental burden became less significant.

Economic

In terms of economic aspects, investments are estimated to be reformative (figure 9). Governmental investments are required to develop innovations (R1). However, currently this is still only for small innovations (R2). Larger investments remain difficult. Still, these investments in predominately environmental sustainability have the opportunity to stimulate the business-oriented thinking of other sectors (R1). However, on the project-level is has no sustainability performance (R2). This could be explained by the fact that R1 is involved in the public sector and

AWR ₁ (current estimated sustainability performance)	Sustainability aspect	Description (R1)
	Climate	Emission reduction with 50 percent.
	Circularity	System balance and river management policy.
	Milieu	Attempt at minimizing the environmental burden with electric dredging ship.
	Social relevance	Municipalities are often included. Increase the support for zero-emission policies.
	Well-being/living environment	Significant developments are made for working conditions and the environment, due to less emissive materials.
	Supply chain responsibility	As a consequence of the clean and emission-free construction goals, the working conditions are improved.
	Investments	Without investments (subsidies) government innovations are not possible.
	Business climate	Developments in plot 1, aid local and regional sectors and stimulate more investments.
AWR ₂ (current estimated sustainability performance)	Sustainability aspect	Description (R2)
	Climate	Usage of alternative, less emissive energy sources.
	Circularity	Following the (broader) procurement demands of RWS.
	Milieu	Water and ground research, and development for plastic removal.
	Social relevance	No concrete goals, however local citizens get informed and involved when needed.
	Well-being/living environment	Establishment 'No accidents' program, and safety and (local) reducing environmental nuisance have priority.
	Supply chain responsibility	Contractors take on a large responsibility within the supply chain, to ensure fair and sustainable progress.
	Investments	Investments for relatively smaller innovations possible. Larger investments are difficult.
	Business climate	No sustainability performance.

Figure 9: Radar graphs and descriptions (R1/R2) about estimated sustainability performance plot 1.

R2 in the private sector. Respondents from the public sector could potentially experience a business climate differently from someone that is involved in the private sector.

Plot 2: Sustainability ambitions and current performance

Environmental

The performance of plot 2 on environmental sustainability is harder to identify. On the one hand, the performance is estimated to be quite reformative, due to concrete proposals and measures on climate and circular aspects (R3). However, on the other hand, most of these proposals are rejected, due to regulation barriers or contract conditions, resulting in a status quo performance (R4). Currently, plot 2 can thus not progress towards the environmental sustainability ambitions due to contract and regulations conditions. After the analysis of these AW's, there could be concluded that R3 mainly filled in the aspired performance for environmental sustainability, whereas R4 filled in the current estimated performance.

Social

Performances on the social aspects also have varying scores. Still factors such as the consideration of safety and limiting nuisance are both estimated to be improved in this project (R3,R4). Also, similar as in plot 1, there is indicated that the environmental sustainability improvements have created benefits for the well-being of the living environment (R4). The local knowledge of other parties is also utilized to create more efficient ways of operational activities (R4).

Economic

Again, the economic aspects also have differentiating scores. This is also due to the fact, that large investments are proposed to improve the sustainability performances (R3), however this are not implemented and decided on the project-level. In terms of investments and business environment, plot 2, also cannot progress towards the established ambitions.

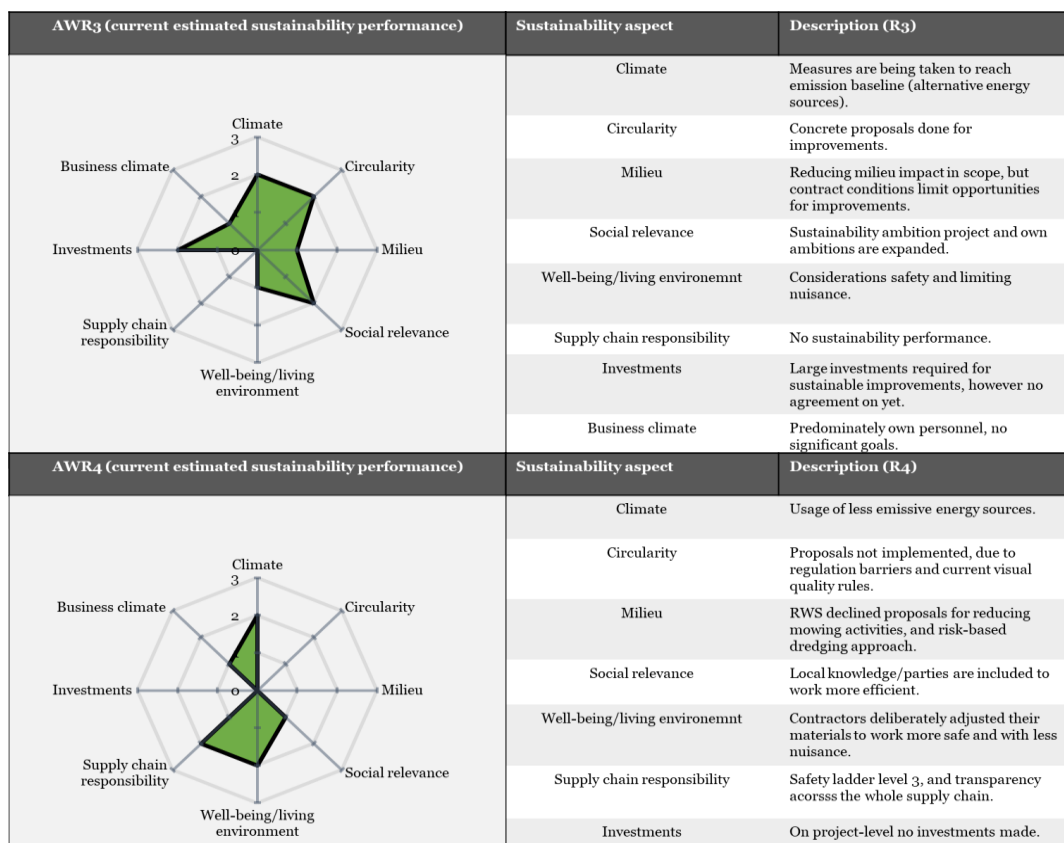


Figure 10: Radar graphs and descriptions (R3/R4) about estimated sustainability performance plot 2.

4.3 Influence governance elements on sustainability performance

The last part of the findings shows how the governance elements have influenced the sustainability performances of the two plots. These influences were identified by taking into account the experiences and observations of the interviewed respondents in relation to the identified governance elements and sustainability performances. The respondents have mentioned governance elements in the interviews, that had influences on the sustainability progress. Based on these influences two storylines of the governance towards sustainability progress could be composed for both plots. The coherency of these storylines are mapped out within figure 11. A more broader visualization of the influences within both plots can be found within appendix B & C. Ultimately based on these mapped out storylines, enabling and constraining influences of governance elements could be identified. These are presented in table 8

Governance storyline plot 1

The influence of the governance elements within plot 1 starts at the government leadership dimension. RWS takes on the role of a *policy maker* to ensure, that the project follows ambitious goals by sharpening their sustainability criteria. In addition, RWS stimulated collaboration activities with a *business partner* role, as there was acknowledged close cooperation is a rigorous requirement for sustainable development. As a consequence, standard environmentally-focused sustainability criteria were established in the *formal institutions* in the form of contract demands. These were indicated as not sufficiently ambitious in comparison to the established goals. Therefore, a joint sustainability vision was established by RWS and the contractors to extent the sustainability demands (*informal institutions*). Accordingly, within the *project management*, significant improvement proposals were done by the contractors, that are working towards the ambitious goals. *Process management* in the form of tailor-made collaboration, between the RWS project team, the RWS sustainability advisor, and the contractors, managed to develop these significant improvement proposals (electric dredging ship). This close collaboration and horizontal decision-making between RWS and the contractors did cause the project to become a complex and vulnerable environment, according to the experiences of involved actors. Aligning the interests of RWS and the contractors, therefore seized more time and collaborative attention. Still, there was indicated, that this created considerable space for business-oriented thinking (*business environment*), which was the most important basis for a frontrunner sustainability performance within the water channel maintenance sector. Also, to stimulate this kind of thinking, there are talks about an effort compensation (section 4.2). However, eventually RWS has to limit such business-oriented thinking (*informal institutions*), because they also have to consider other contingencies (justification tax resources, other regulations). There was indicated, that the actual involved RWS project team still had the intrinsic motivation to continue the development of the electric dredging ship. In spite of that, higher governmental levels within RWS have to decide about the actual implementation of the developed improvements, which was indicated to be politically complex (*policy maker*). To illustrate, many RWS supervisors have to first discuss such improvement proposals, and then all give permission for implementation, which is a slow process. As identified in section 4.1, the improvement proposals have to be implemented within the contract period, which is initially 5 years (*project management*). Contractors are, due to the slow decision-making process, sceptical about the actual implementation of the electric dredging ship within these 5 years. There is also questioned, if there is sufficient capacity for such large improvements (see section 4.2, radar graph R2). Still, RWS expects the higher ambitions to be pursued within the project. Ultimately, considering the significant environmentally-focused performances of plot 1, the performance is indicated to be a *reformative form of weak sustainability*.

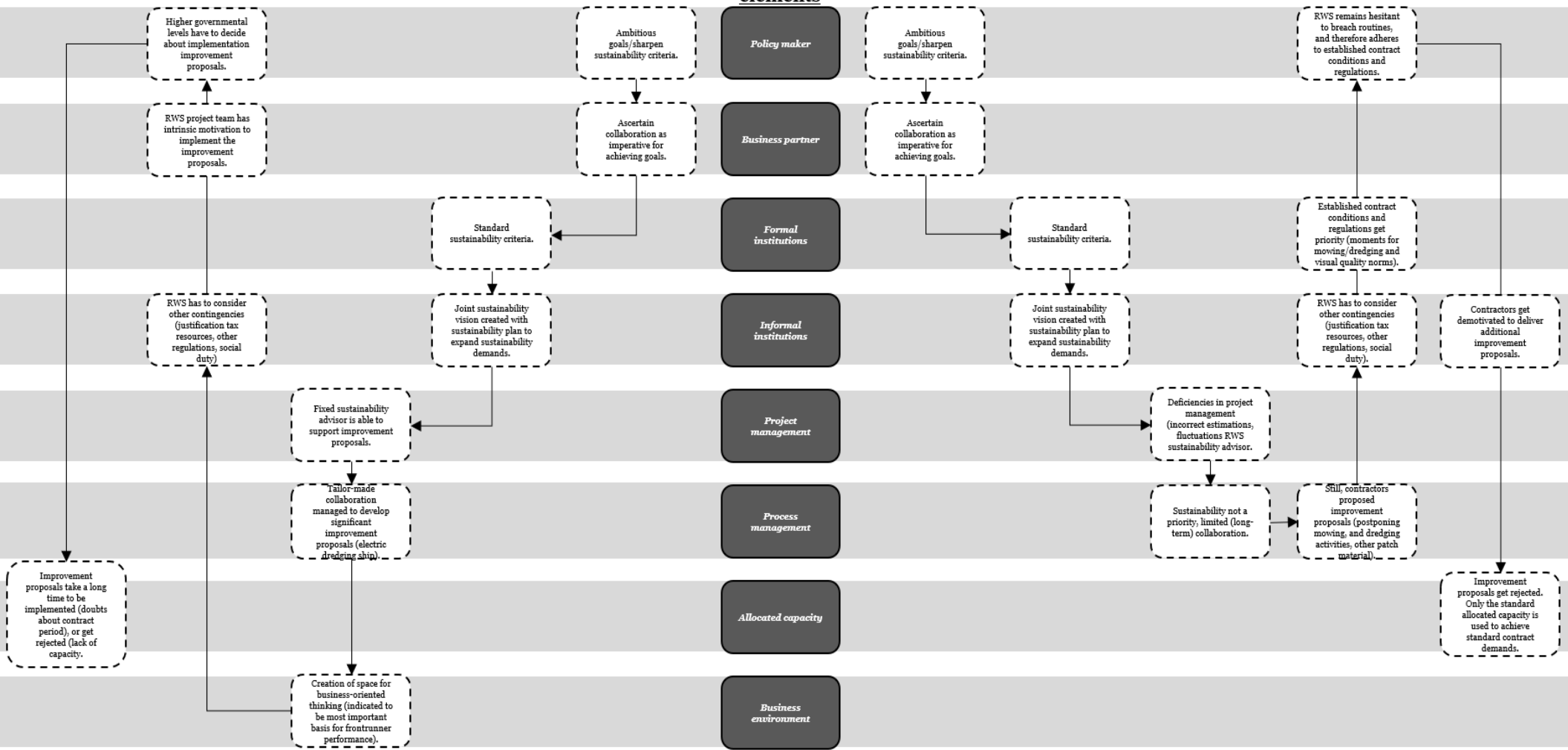
Governance storyline plot 2

Similarly, as in plot 1, the governance elements within plot 2 start at the government leadership dimension. Also, here RWS utilizes the same *policy maker* and *business partner role*, that try to implement sustainability considerations within the project. Accordingly, plot 2 got the same standard sustainability demands as in plot 1 (*formal institutions*). The project team of RWS and the contractors likewise agreed, that these standards demands could be extended, as they were indicated as not sufficiently ambitious. A joint dot on the project lifecycle horizon was set, as reference to work towards more ambitious sustainability objectives (*informal institutions*). However, the path towards this dot got obstructed, due to *project management* deficiencies. The estimated values and prescribed required activities for the operational maintenance activities, provided by RWS, based on previous years, were incorrect. As a consequence, the contractors mainly had to focus on making modifications to their activities and on mapping out the current maintenance state of the operational area. Further, there were many fluctuations within the sustainability advisor of RWS. Because of these deficiencies, sustainability became less of a priority and the aspired long-term relationship for improvement developments became obstructed (*process management*). Still, the contractors, allocated own company resources to propose several improvements proposals on postponing dredging and mowing activities, and they suggested using a more circular form of patch material. The project team of RWS received these proposals. However, after deliberating other contingencies (contract conditions, visual quality rules, etc.) against these proposals, RWS decided to reject the proposals. From the perspective of the contractors this is incomprehensible (*informal institutions*), because on the one side, RWS composes ambitious sustainability objectives, but on the other side the public organisation remains hesitant in changing established conditions to set steps towards these objectives (*policy maker*). The contractors indicated this has demotivating effects for developing additional improvement proposals, because from their perspective their used company resources were unnecessarily used. A *business environment*, that provides space for business-oriented thinking, is therefore not situated within plot 2. The plot has to work with the *allocated capacity*, that is solely sufficient for the standard sustainability performance. Still, RWS still aspires to pursue the composed ambitious goals, within this project. Ultimately, due to these reasons, plot 2 could not expand the established standard sustainability demands. Hence, the sustainability performance of plot 2 can be indicated as a *weak sustainability status quo performance*.

Plot 1

Governance elements

Plot 2



Project progress

Weak sustainability (reform)

Sustainability performance

Weak sustainability (status quo)

Figure 11: Mapped out influences governance elements on sustainability progress both plots.

Enabling and constraining influences

Now that the sustainability progress of both projects are outlined, the comparison between them reveals enabling and constraining governance elements for sustainability within the PPP governance dimensions. These are summarized within table 8.

In regard to the *government leadership* dimension, the first enabling influence is imposed by the *policy maker* role of RWS, by forcing environmental sustainability onto both the projects. Whereas, in later stages of the projects, it also has constraining influences caused by political complexity in plot 1 and hesitance to breach routines in plot 2. The role of RWS as *business partner*, on the other hand, only has enabling influences in both projects. RWS managed to incentivize cooperation activities at the start of the projects, which lead to two joint sustainability visions, that extended their standard sustainability contract demands.

In accordance, with respect to the *institutional environment*, the *formal institutions* functioned as a starting point for further sustainability considerations. Alignment of *informal institutions*, through the joint sustainability vision, was able to give meaning to the expansion of the standard sustainability demands, which was established in a sustainability plan. However, because RWS has to consider other contingencies, such as other regulations, there was identified in plot 2, that established contract conditions and regulations prevented improvement proposals. Mainly, because RWS was hesitant to breach these established routines, which relates back to the constraining *policy maker* role. In plot 1, on the other hand, there can be noticed, that RWS first adopted a *business partner* role to persevere improvement proposals, through intrinsic motivation. However, this role was eventually overruled by the *policy maker* role, as the political complexity of RWS slowed down this process, which could eventually even prevent the continuation of sustainability progress.

This is related to the *project management*, within the *collaborative process* dimension, because improvement proposals have to be implemented within the contract period of 5 years. Henceforth, this questions the worthwhile of significant or transformative improvements, because there can be expected that such measures take longer to implement. Furthermore, this would disregard the enabling influences of a fixed sustainability advisor (*project management*) and tailor-made collaboration (*process management*), that were able to develop steps towards significant sustainability progress in plot 1. In plot 2, the *collaborative process* dimension can either way be indicated as a constraining dimension, since deficiencies in *project management*, limited long-term and close collaboration (*process management*). In addition, the improvements that were proposed by the contractors got rejected (*policy maker*).

Consequently, in contrast with plot 1, plot 2 was unable to create a *business environment* in the *starting conditions* dimension. Improvement proposals did not get the space they required to develop further. Plot 2 remained to the standard *allocated capacity*. While, in plot 1, the *business environment* was exactly the main basis for their frontrunner sustainability performance in the water channel maintenance sector. Thus, the continuation of process elements (*business partner, informal institutions, process management, business environment*) in plot 1 has enabled developments of significant improvements, with support of structural elements (*policy maker, formal institutions, project management*). Whereas, in plot 2, the continuation of process elements (*business partner, informal institutions, process management, business environment*), to be able to develop further improvements, was constrained by structural elements (*policy maker, formal institutions, project management*).

Table 8: Enabling and constraining influences governance elements.

Governance element	Plot 1 (influence)	Plot 2 (influence)
Policy maker	Forced environmental sustainability onto the projects.	
	Political complexity slows/prevents sustainability progress.	Hesitant to breach routines, which prevents sustainability progress.
Business partner	Managed to stimulate collaboration towards sustainability progress, and intrinsic motivation of RWS project team aids in the development of improvement proposals.	Managed to stimulate collaboration towards sustainability progress.
Formal institutions	Starting point for sustainability considerations	
	-	Established contract conditions and regulations prevent sustainability progress.
Informal institutions	Creation of joint sustainability vision to expand standard demands.	
	RWS has to consider other contingencies (justification of tax resources, other regulations, social duty).	RWS has to consider other contingencies, which prevents further sustainability progress. Contractors get demotivated to deliver additional improvement proposals.
Project management	Fixed sustainability advisor.	Incorrect estimations and fluctuations RWS sustainability advisor.
Process management	Tailor-made collaboration.	Sustainability not priority, limited (long-term) collaboration.
Allocated capacity	Current capacity sufficient for standard sustainability performance.	
	Current capacity insufficient for further sustainability progress.	
Business environment	Business-oriented thinking most important basis for frontrunner sustainability performance.	-

Chapter 5: Discussion and Conclusions

Based on the empirical findings of the two case-studies on governance elements and their sustainability performance, there can be described how these governance elements have influenced their current sustainability performance. The findings are interpreted and discussed in the portrayed theoretical context. Subsequently, the theoretical and practical implications of this study are discussed. The theoretical implications are mainly focused on the governance typologies of the conceptual framework of Liu et al. (20220). In the end, the main conclusions of this study are discussed, including an answer to the main research question, research limitations, and recommendations for future research.

5.1 Discussion

In the introduction of this study (section 1.1), the governance of PPPs towards sustainability was described as inherently complex (Hueskes et al., 2017; Koppenjan & Enserink, 2009). The detailed comparative case study analysis of the selected PPPs show similar results. To illustrate, although many structural and process elements were established at the start of the PPPs, to integrate sustainability considerations, unpredictable contingencies along the studied project lifecycles limited their actual functionality. The discussed potential challenges for PPP sustainability integration of IISD (2012) have played a considerable role in this. Namely, in both plots there was an agreement about a high value for sustainability within their projects. However, maintaining this high value for sustainability along the project lifecycle was shown to be complicated within both plots. The allocated financial capacity, within both plots, for example was only suitable for the standard sustainability performance and not for the agreed upon higher ambitions for sustainability. Expansion of this capacity proceeds slow or is not deemed to be required, expressing the focus on financial considerations. Surprisingly, in this study, there was not identified that these challenges were caused by the short-term and profit-oriented view of the private sectors. In contrast, the findings provided more indications that higher governmental levels at RWS limit the sustainability progress of the studied PPPs, due to the a complex political process for agreements, and their hesitancy to breach established regulations and contract conditions. The latter is in line with the findings of Hueskes et al. (2017), which found that involved actors of PPPs often remain inclined to established contractual structures and routines.

Henceforth, when considering the empirical findings in relation to the developed PPP sustainability governance framework of section 2.3, the contractual governance perspective seems indeed to be more suitable for weak sustainability. Since, the standard contractual demands and agreements were only focused on achieving environmental sustainable benefits, through hierarchical instruments, such as detailed procedures for emission-reductions. With respect to the suitability of the collaborative governance perspective for strong sustainability, the empirical findings could not confirm this, as there were no transformative or holistic sustainability performances found. However, the comparative analysis of the two PPPs showed that plot 1 utilized more process elements, than plot 2. Through these process elements plot 1 was able to develop significant improvements proposals to accomplish a frontrunner sustainability performance in the sector, whereas plot 2 was unable to develop such approaches. While this study, thus could not confirm the suitability of the collaborative perspective for strong sustainability, it does suggest that process elements are important within increasing the sustainability performance of PPPs (Spraul & Thaler, 2020). When linking these findings back to the CGF of Liu et al. (2022), some theoretical implications can be made.

Theoretical implications

Policy maker and business partner

According to the findings, the governmental parties (IenW & RWS) have actively composed strategies and agreements, that are in line with overarching policy frameworks, to force sustainable considerations onto the contractual structure of the studied projects. Empirical experiences on the policy maker role indicate, that the resulting sustainable considerations are an improvement, compared to previous projects, and a fine starting point to incorporate sustainability within the projects. Plot 1 even managed to become a frontrunner on sustainability, with these sustainability considerations as foundation. This suggests that it is important for the public sector to have an active role, within implementing sustainability at the project level (Ma et al., 2020; Pinz et al., 2018).

The focus, however, of the stimulated sustainability considerations, through the policy maker role of RWS, remain environmentally-focused. According to empirical experiences from this study, the projects within RWS are executively-focused, in which environmental aspects are considered more important. This makes RWS undeveloped in considering social aspects within project contracts, which could be a reason for why the social sustainability ambitions for the projects are also relatively low. Furthermore, although the policy maker role has stimulated sustainability within the projects, it also limited the space for more far reaching sustainability considerations. Therefore, this study suggests, that creating an appropriate regulatory structure for stimulating sustainability, is more appropriate for weak sustainability approaches (Hueskes et al., 2017).

Inciting to sharpen the sustainability criteria for projects is not the only measure, the governmental parties (IenW, RWS) have taken. They also recognise market interaction and collaboration, as rigorous requirements for sustainability within the projects. The empirical findings on the business partner role show, that openness for innovative suggestions, intrinsic motivation, and good stimulation for collaboration, by the RWS project teams are indicated as beneficial factors for, providing space and incentives for further environmental sustainable developments. Thereby, the contractors were inspired and extended the sustainability ambition and performance. Hayter & Clapp (2020) and Bjärstig (2017), found that stimulation of collaborative project steering within PPPs can improve the sustainability performance. This study has thus found similar results, but only for the improvement of environmental sustainability, because most of the process elements were focused on environmental sustainability. Additionally, this study agrees that the private sector's willingness to participate in sustainability considerations is stimulated by sufficient governmental motivation (Liu et al., 2022; Ma et al., 2020; Delhi & Mahalingam, 2020). Notwithstanding this finding, this study also suggests that this governmental motivation for sustainability and innovation is particularly limited.

Formal institutions and informal institutions

Namely, the empirical findings on formal institutions, also showed the other side. The contractors were willing to expand the contractual sustainability conditions, with extensive improvement proposals, that would significantly contribute to the overarching sustainability goals of RWS. Subsequently, the RWS project teams warmly received such proposals. However, agreements about them often take a long time, due to the political complexity of RWS, or they get rejected by established regulations of the same or other sectors. This substantiates the finding made by Ma et al. (2020), which implied that efforts of the public sector towards sustainability, are influenced by their social duty to also consider other contingencies. All in all, it seems that the established formal institutions do not match with the current sustainability ambitions of RWS, and that it has limited the sustainability performance. This is in line with the results of the Liu et al., (2022), and Song et al., (2018), since they also indicated that an unsound legal framework undermines sustainable development within PPPs.

According to the findings, informal institutions could also have an important role in this. Both projects indicate to have a joint sustainability vision, between RWS and the contractors, with ambitious goals. Correspondingly, the contractors employ many company resources, for improvement proposals, to considerably operate towards these goals. RWS, however, cannot always accompany the same efforts, due to the consideration of other contingencies. As a consequence, RWS remained hesitant in providing flexibility within the contract conditions, while the contractors required such versatility to apply their considerable improvements to sustainability. The public sector kept pursuing the accustomed regulations and contract conditions, which is in line with the findings of Hueskes et al. (2017). From the contractor's perspective in the projects, this can be incomprehensible, as they do not have to consider such contingencies. Empirical experiences of the contractors indicate that this contrives demotivation for additional improvement proposals. Liu et al. (2022), found that such misperception could negatively influence the PPP sustainability performance. This study did not confirm this, but the demotivation of contractors, could discourage the private sector for akin projects in the future. Low willingness of the private sector in sustainability considerations does decrease the sustainability performance of projects (Song et al., 2018). Public sector hesitancy towards changes and innovations can thus be regarded as a bottleneck within PPP sustainability (Wijayasundra et al., 2022). Moreover, although this does not directly confirm that flexibility improves PPP sustainability performance, it does suggest it is an essential factor in achieving sustainability within projects (Tian et al., 2022; Cheng et al., 2021).

Project management and process management

Opportunities for discussion about the improvement proposals were predetermined in a project management plan. These opportunities are in a form of meetings and progress reports. On the one hand, the empirical experiences indicate a positive influence on the sustainability approach. Mostly in terms of creating a specific sustainability focus, and establishing a sufficient workflow, towards the predetermined sustainability demands. Hence, adequate and enforceable input and output specifications for a sustainability approach, seem to be appreciated by contractors, which was also indicated by Hueskes et al. (2017).

However, on the other hand, it is of interest, that such specifications are also actually fulfilled. Fluctuations in sustainability coordinators, and incorrect prescribed data about the required activities and their emissions impeded the sustainability performance. These had to be altered during the project lifecycle, which confirms the incomplete contract theory of Chirstensen et al. (2016), and the unpredictability of contingencies within projects (Brown et al., 2016). Furthermore, empirical experiences from the respondents described that, the standard, straightforward contract demands for sustainability could still be achieved, despite such impeding contingencies. Whereas, the development towards the more ambitious sustainability goals, was indicated to be obstructed, due to the impossibility to build a long-term and close partnership. Other empirical experiences of plot 1, exactly describe the magnitude of sharp, transparent, and tailored collaboration within the achievement of a frontrunner sustainability performance. These empirical findings support the importance of process elements within increasing the sustainability performance (Spraul & Thaler, 2020). However, this is again only for the improvement of environmental sustainability, as it could not be identified for the other dimensions.

Allocated capacity and business environment

The empirical experiences on the allocated capacity overall expressed contentment with the available capacity and expertise for the current standardized sustainability demands, as it formed the starting point for seriously considering sustainability within the projects. However additional expertise and capacity is predicted by the respondents to be required for further developments. Exploration of which technical, financial, and operational measures are required to obtain improved sustainability performance, is indicated to be a complex and vulnerable process, which is in line with findings of Hueskes et al. (2017) and Pinz et al. (2018). Moreover, the empirical experiences notify that for further sustainable developments more governmental capacity and expertise is required. The availability for is, however, rather limited. These are similar findings as advocated by Koppenjan & Enserink (2009).

In this study, an adequate business environment or climate, is characterized as one of the main reasons for a frontrunner sustainability performance. More ambitious standard sustainability demands in contracts, flexibility, and courage for taking innovative risks are prescribed to be essential for projects to contribute maximum progress towards sustainability. These empirical findings suggest that the holdings made by Panayides et al. (2015) about the importance of business-oriented thinking for making progress in projects, also apply to advancement of sustainability performance in projects.

Considering the empirical findings on the structural and process typologies, this study can similarly as Liu et al. (2022) conclude that the government leadership and institutional environment are the most influential dimensions on PPP sustainability. The practical experiences proclaim, that the governmental policies and collaborative motivation, represented in the government leadership and institutional environment dimensions, constrain or enable opportunities, within the collaborative process and starting conditions dimensions. As a result, almost in every dimension there can be observed, that the structural elements incentivize contractors to develop further sustainable developments with the aid of process elements. However, the extent of derived innovative measures out of these process elements are limited by established structural agreements. Consequently, table 8 outlines the main theoretical implications of the dimensions.

Table 9: Main theoretical implication on the governance dimensions of Liu et al. (2022).

Dimension	Theoretical implications
1. Government leadership	<p><u>The public sector has a large responsibility in creating sustainable PPPs:</u></p> <ul style="list-style-type: none"> • On the one hand, they have to act as a <i>policy maker</i>, by creating adequate overarching policies, to force the first sustainability considerations into projects (Spraul & Thaler, Ma et al., 2020; Pinz et al. 2018). • On the other hand, they have to take on a <i>business partner</i> role, through collaborative steering, by showing openness, intrinsic motivation, and stimulation for collaboration towards sustainability to accomplish further sustainable developments (Hayter & Clapp, 2020; Bjärstig, 2017).
2. Institutional environment	<p><u>The institutional environment can constrain or enable opportunities for sustainability within PPPs:</u></p> <ul style="list-style-type: none"> • <i>Formal institutions</i> are unable to include social aspects, because these aspects are unpredictable and difficult to materializes (Hueskes et al., 2017). Moreover, if the established formal institutions are not coinciding with the sustainability ambitions, space for innovations and improvements is limited, undermining the sustainability performance of projects (Liu et al., 2022; Song et al., 2018). • Further, similar <i>informal institutions</i>, such as a joint sustainability goals, benefits sustainable progress (Spraul & Thaler, 2020), however the public sector's efforts towards these goals is dependent on other contingencies (Ma et al., 2020). As a result, the private sector can be discouraged to participate in further sustainability considerations, which decreases sustainability performance (Song et al., 2018).
3. Collaborative process	<p><u>The collaborative process is required to structure and develop the sustainability approach of PPPs:</u></p> <ul style="list-style-type: none"> • <i>Project management</i> is important to outline an adequate and enforceable workflow in the contract towards the standard sustainability goals (Hueskes et al., 2017). However, the unpredictability of contingencies within contractual structures (Christensen et al., 2016; Brown et al., 2016), may obstruct further sustainable developments. • <i>Process management</i>, such as sharp, transparent, and tailored collaboration is essential to increase the sustainability performance (Spraul & Thaler, 2020).
4. Starting conditions	<p><u>The starting conditions include the resources and incentives available for sustainability within PPPs:</u></p> <ul style="list-style-type: none"> • Determining the appropriate <i>allocated capacity</i>, such as technical, financial, and operational measures for improving sustainability is a complex and vulnerable process (Hueskes et al., 2017), in which the government often lacks managerial capacity (Koppenjan & Enserink, 2009). • In order to uphold sufficient sustainable progress within PPPs, projects require an adequate business environment, which includes ambitious contractual demands, flexibility, and courage for taking innovative risks (Panayides et al, 2015).

Practical implications

Based on these empirical findings and theoretical implications, it would be relevant to indicate how this could affect the practical level of PPPs. To illustrate, the empirical findings of this study provide evidence that the three opportunities (more efficiency, added value, more innovative results) of PPPs for sustainability of (Steijn et al., 2011) can be obtained within projects. Plot 1 has achieved more innovative results, that, can be seen as a frontrunner performance on sustainability within the water channel sector. Plot 2 pursues solely the standard sustainability demands. Although, these demands stimulate more efficiency, they do not achieve much added value or innovative results. The absence of tailor-made collaboration and an appropriate business environment, which were present within plot 1, could be the reason for why plot 1 has a higher performance than plot 2. Still, both PPPs are predominantly focused on environmental sustainability. The empirical experiences did indicate that the benefits of the less emissive innovations trickled down to social and economic dimensions. This must, however, be regarded as a weak sustainability approach, due to the large focus on ecological modernization (Dryzek, 1997).

Besides the observations on the opportunities of PPPs for sustainability, this study also distinguished indications of the potential challenges (calculating the value of sustainability, value for money, lack of governmental managerial capacity) of PPPs for sustainability (IISD, 2012). Both PPPs had established a joint sustainability vision at the start of the project. However, the empirical experiences showed it is difficult to actually give value to this vision, due to incompatible interests on contingencies during the project lifecycle. As a consequence, many innovative proposals for sustainable progress are not being implemented, because they are not manageable within the governmental capacity.

Therefore, when combining the empirical findings and the theoretical implications, particular practical implications, in the form of recommendations can be made. These might aid PPPs in overcoming the challenges for sustainability, to provide more value to the opportunities. The recommendations are presented in table 9.

Table 10: Four practical implications, in the form of recommendations.

Practical implications	Recommendation descriptions
<p>1. Align the established regulatory framework with the overarching sustainability ambitions.</p>	<p>Opportunities for innovative initiatives, towards the overarching governmental sustainability goals, within projects are often obstructed by established regulations. If the public sector aspires to inflict the overarching goals onto the project-level, it is essential that the regulatory framework also allows space for the required technical, financial, and operational measures to be realized. In the first instance, it is therefore an important task of the public sector to identify obstructing regulations or contract conditions, and evaluate if there are possibilities for modifications, which can make them more in line with the overarching sustainability goals.</p>
<p>2. Create project-specific sustainability ambitions and considerations.</p>	<p>If modifications to obstructing regulations or contract conditions are not possible, it is important that both the client and the contractor prematurely understand what the impact is on the sustainability prospect of their project. This could be done, for example, by developing an ambitieweb in collaboration at the start of the project, which is able to create project-specific sustainability conditions. The outcome of the ambitieweb can be used as a guideline for sustainability, along the project-lifecycle. Subsequently, this can mitigate the risk of the contractor using company resources for improvement proposals, that ultimately get rejected by the public sector. Further, such close collaboration at the start of a project might be able to reduce the difference between prescribed conditions and the actual practical level, which could create more realistic sustainability considerations.</p>
<p>3. Keep evaluating established regulatory and contractual structures, and breach them when applicable.</p>	<p>In the end, it is inevitable that PPPs will encounter limiting contingencies or exactly opportunities for sustainability along the project lifecycle, which were not structurally included in the partnership agreement. Proposed changes for the sustainability approach are therefore realistic occurrences. Hesitance of the public sector in modifying limiting contingencies, or in seizing every arising opportunity is understandable. However, this hesitance cannot restrain the space PPPs need to investigate the sustainable potential of proposed changes. Otherwise, the private sector could get demotivated to engage in further proposals for changes. Established regulatory and contractual routines, that limit this space for sustainability progress, should therefore be evaluated and breached when applicable.</p>
<p>4. Construct a resilient PPP sustainability approach.</p>	<p>Consequently, it might be useful to construct a resilient PPP sustainability approach, that uses structural governance elements as sustainability guidelines and process governance elements as supplements to respond to limiting contingencies and opportunities for sustainability. The structural elements could portray a fitting, ambitious sustainable pathway for projects, whereas the process elements could seize bottlenecks and progress for sustainability along the way. Accordingly, PPPs could be more resilient against conflicting contingencies occurring along the project lifecycle.</p>

5.2 Conclusions

In sum, this study attempted to investigate how governance elements within PPPs influence the sustainability performance. Accordingly, the conceptual framework for PPP sustainability governance of Liu et al. (2022) was used to identify relevant governance elements in important documents of two Dutch PPPs. Experiences with the governance elements and their influence on the sustainability performance were investigated with semi-structured interviews, and an Excel-file, including the ambitieweb. The findings show that structural elements only are able to inflict weak sustainability considerations onto PPPs. Whereas, process elements are able to deliver more significant developments. However, the findings remain inconclusive about their suitability for strong sustainability. Nevertheless, this study has contributed an in-depth practical understanding about how governance elements can directly influence the sustainability performance within PPPs, which is still a lacking research field. Moreover, the mapped out governance processes for sustainability, and the enabling and constraining influences could give future research a better understanding about the dynamics within PPPs that aspire sustainability considerations.

Furthermore, the discussion between the empirical findings and previous literature has resulted in theoretical implications, that contribute to the academic research field of PPPs and sustainability. These implications can be used to extend the theoretical knowledge on the CGF of Liu et al. (2022). To illustrate, this study has shown that the structural and process typologies, derived for this CFG, can have enabling and constraining influences on the sustainability performances. Further, most of these implications, on these typologies, are similar to findings of other studies. From which this study can conclude that, the structural and process elements for sustainability within the government leadership and institutional environment of PPP governance, largely determine the structural and process elements for sustainability within the collaborative process and the starting conditions. Additionally, per each individual dimension, the structural elements, which are mainly weak sustainability-focused also have a great influence the process elements. Therefore the following answer to the main research question can be formulated:

‘Structural governance elements are required to compose the starting point for PPP sustainability performance and to incentivize further developments. Whereas, the process governance elements have the ability to generate these further developments. However, the extent to which this ability can be utilized is dependent on the structural boundaries established by the public sector. Consequently, a harmonization or mismatch between what is structurally-expected, and what is procedurally-possible make or break an adequate PPP sustainability performance.’

Ultimately, this suggests that governments indeed have a large responsibility in bringing sustainability and PPPs closer together, because of their considerable role in establishing structural elements. However, similar as in other studies there can currently only be concluded that this seems possible for weak sustainability considerations. Which makes the recent concern about the long-term sustainability performance of PPP justifiable. Therefore this study has provided four recommendations for policymakers that participate in future PPPs in becoming more sustainable.

Research limitations and recommendations for future research

In hindsight, this study has had some limitations. As a consequence, the empirical findings cannot simply be generalized. Firstly, this regards the apprehended PPP definition and the selected cases. Because although, the selected cases are PPPs, according to the outlined understanding, in this study, they are not representative for the whole ambiguous concept of PPPs. This study has investigated two projects, that predominately focused on maintenance-oriented activities. These are executively-focused and on-site activities, which could be a reason for why the projects are mainly focused on environmental sustainability. Accordingly, the findings could have been vastly different when another definition of PPPs was maintained, and other forms of PPPs were researched. Hence, in regards to the knowledge gap of empirical findings on the direct effects of governance on PPP sustainability performance, and the fragmented knowledge of policymakers and practitioners, this study could only address this gap for PPPs, that correspond to the outlined understanding.

Another limitation of this research, concerns the fact that the studied PPPs have not yet finished their projects. This research was only able to investigate the influence of the utilized governance elements on the PPP sustainability performances, after one operational year. On this account, the empirical findings that are currently indicated could change over time. Which implies, that the influence of the identified governance elements could have different influences on the sustainability performance at the end of the projects.

Further, in regards to the research methods, the number of respondents is rather limited. The inclusion of more respondents could have indicated different or more similar experiences. Also, the respondents involve mainly employees from the private sector. The inclusion of more respondents from the public sector could, therefore, had contributed additional insights about the influence of the governance elements on the PPP sustainability performances. Moreover, the sustainability performances are estimations from respondents and are qualitatively measured. As a consequence, the respondents experiences and observations could contain some bias. A quantitative way of measurement could therefore have different and more objective results.

In sum, it would be relevant for subsequent research to investigate other definitions and forms of PPPs. As a result, there could be identified, which forms of PPP contracts are the best option for including sustainability within PPPs, and which are less prosperous options. In addition, a larger comparative study, that includes multiple forms of finished PPPs, could potentially discover governance elements that are consistently enabling or constraining sustainability performances. Quantitatively measuring the sustainability performances is then also recommended, as it would disclose biased observations. Consequently, a more broader view and in-depth understanding of the long-term influence of governance elements on PPP sustainability performances could be accomplished. Policymakers and practitioners of various PPPs might then be able to have a more adequate understanding on how to include sustainability considerations through governance. Ultimately, based on such studies, the United Nations could promote a more specific conceptualization of PPPs to accurately determine if they are suitable indeed suitable for reaching the SDGs.

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Toestemmingsformulier

Naam van de deelnemer

Titel onderzoek

Informatie met betrekking tot privacy

- De persoonsgegevens die worden verkregen in dit onderzoek worden alleen gebruikt voor onderzoeksdoeleinden. Deze gegevens zullen daarom worden gewaarborgd door het onderzoeksteam en ook alleen ter kennisgeving zijn voor het onderzoeksteam (onderzoeker en begeleider).
- De kwaliteit van het onderzoek van de Rijksuniversiteit Groningen wordt getoetst aan de strengste internationale normen. Daarnaast handhaaft de RUG de gedragsregels die zijn vastgelegd in de [Nederlandse Gedragscode Wetenschappelijke Integriteit 2018](#). Belangrijke waarden in deze gedragscode zijn eerlijkheid, zorgvuldigheid, transparantie, onafhankelijkheid en verantwoordelijkheid. De verzamelde gegevens worden dus opgeslagen, verwerkt, gedeeld en beschermd volgens deze waarden.
- In het onderzoek zelf zullen alle bevindingen en ervaringen anoniem blijven. Deze zouden enkel gelinkt kunnen worden aan een bedrijfsfunctie als hier toestemming voor is gegeven.
- Opnames van audio en video worden voor onderzoeksdoeleinden voor 60 dagen bewaard en daarna worden deze verwijderd.
- Als u vragen heeft over uw privacy binnen dit onderzoek kunt u altijd contact opnemen met de onderzoeker.

1. Ik heb de informatie over het onderzoek begrepen en bij onduidelijkheden heb ik ten alle tijden de mogelijkheid om vragen te stellen.

2. Ik stem er vrijwillig mee in om deel te nemen aan dit onderzoek. Ik begrijp dat ik kan weigeren om vragen te beantwoorden en dat ik me zonder opgave van redenen uit het onderzoek kan terugtrekken.
-
3. Ik begrijp dat deelname aan dit onderzoek inhoudt dat ik zal worden gevraagd om ervaringen en bevindingen met betrekking tot de duurzaamheidsaanpak en duurzaamheidsprestatie van mijn project.
-
4. Ik begrijp dat de informatie die ik heb verstrekt, zal worden gebruikt voor wetenschappelijk onderzoek en een afstudeerproject.
-
5. Ik begrijp hoe mijn persoonlijke gegevens worden verkregen, behandeld en beschermd.
-
6. Ik begrijp dat persoonlijke informatie die over mij is verzameld en die mij kan identificeren, niet zal worden gedeeld met personen buiten het onderzoeksteam.
-
7. Ik heb het recht om op elk moment en zonder opgave van redenen af te zien van deelname en mij terug te trekken uit het onderzoek, zonder dat dit negatieve gevolgen voor mij heeft. Ik meld dit dan bij de onderzoeker.
Ik begrijp dat *mijn gegevens die tot op dat moment verzameld zijn*, dan niet altijd meer kunnen worden verwijderd vanwege de integriteit van het onderzoek.
-
8. Ik ga akkoord met het opnemen van audio en video (teams) en dat deze worden bewaard voor 60 dagen voor onderzoeksdoeleinden.
-
9. Ik ga ermee akkoord dat mijn functie gebruikt kan worden in het onderzoek om een indicatie te geven van eigenschappen van respondenten.
- Ja
 Nee

Datum (14-11-2022):	Handtekening onderzoeker:

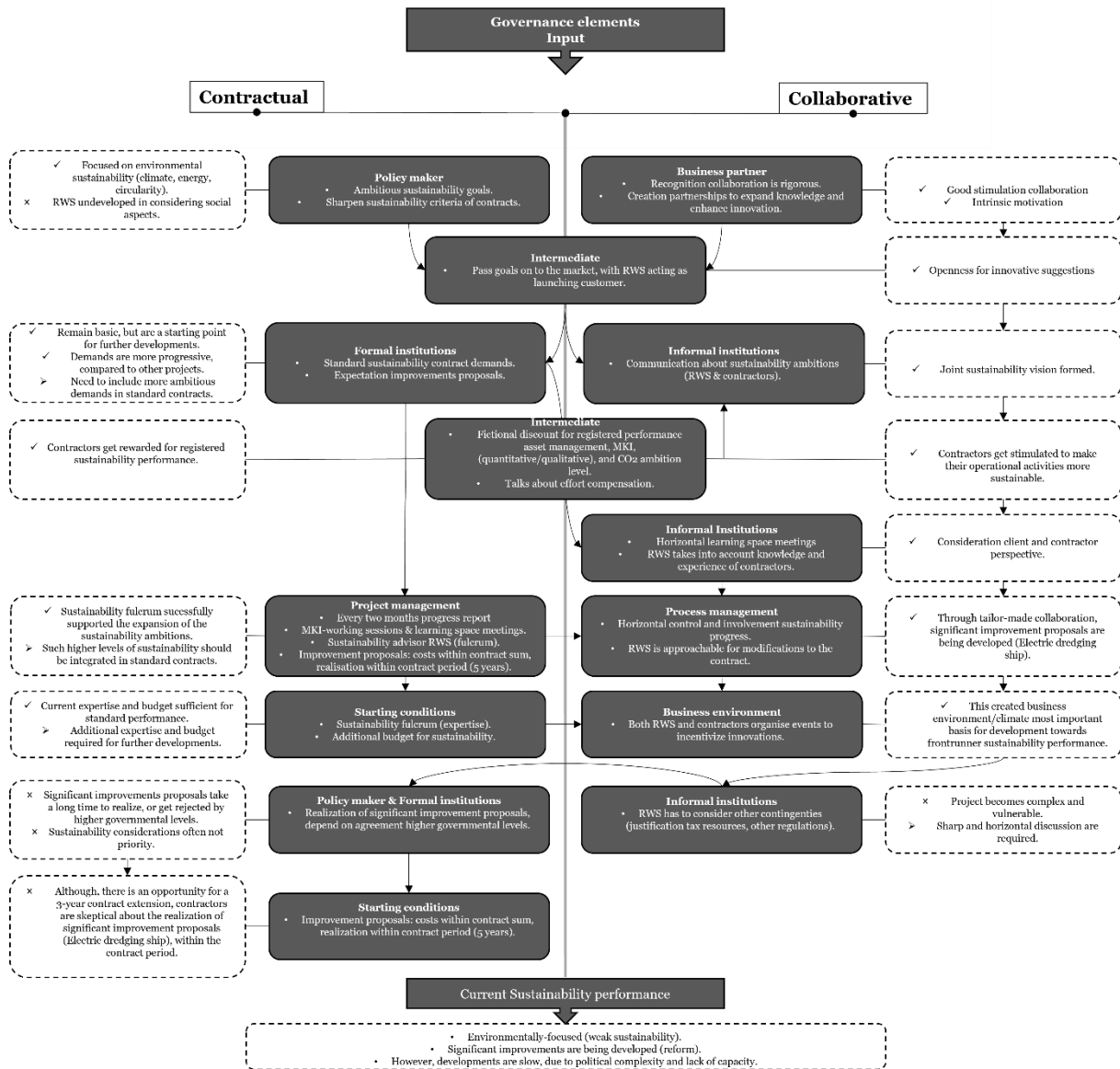
Datum (dd-mm-jjjj):	Handtekening deelnemer:

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Contactgegevens onderzoeker

- *Naam: Maarten Grit*
- *Telefoonnummer: 0683103019*
- *E-mail: M.j.grit@student.rug.nl of maarten.grit@rws.nl*

Appendix B: Extended Analysis Plot 1



Appendix C: Extended Analysis Plot 2

