Master Thesis

Exploring governance mechanisms for inter-organizational collaboration in Dutch infrastructure programmes

MSc Construction Management and Engineering

Tatiana Gómez Chica

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Exploring governance mechanisms for inter-organizational collaboration in Dutch infrastructure programmes

by

Tatiana Gómez Chica

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Chair: Dr.ir. A (Ad) Straub
                     Faculty of Architecture and the Built Environment
First Supervisor: Dr. ir. (Maedeh) Molaei
                     Faculty of Architecture and the Built Environment
Second Supervisor: Dr. E. J. (Erik-Jan) Houwing
                     Faculty of Civil Engineering and Geosciences
Company supervisor: Dhr. Ir. J. Pots (Jesper)

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Preface

It seems unreal that the time has come to reflect on this incredible journey in completing my Master's in Construction Management and Engineering, where this thesis represents a large part of my Master's effort. During the completion of this thesis, there has been a journey full of ups and downs, showing that hard work always pays off. However, the outcome of this research would not have been possible without the support and contributions of many people who deserve to be mentioned. First, I would like to thank my committee: Ad, Erik-Jan, Maedeh and Jesper, who provided me with time, effort and, above all, patience to guide me on the right path. Especially, I want to thank Maedeh, who guided me from day one to choose a topic and helped me when I felt lost on this journey. I would also like to thank Jesper, who allowed me to do this research at Witteveen+Bos and guided me all the way. Additionally, special thanks to all the people I interviewed during my research, who provided me with valuable information for this thesis and for the enriching and valuable conversations that made me reflect on my research.

Moreover, my most sincere thanks to my friends in the Netherlands, who have been like a family to me and accompanied me during these difficult times of pandemic and study. I would also like to thank my family, especially my mother; all this effort is for and because of you. Last but certainly not least, I want to thank Finn, without you, none of this would have been possible; thank you for all the love and infinite support.

I hope this research will not only bring new knowledge but also contribute to practice. I hope you enjoy the reading!

Tatiana Gómez Chica
Delft, December 2022

Executive Summary

Programmes in the Dutch infrastructure sector can contribute to overcoming the industry's lagging performance and the increasing amount of renovation of work it is currently facing. Additionally, they have the potential to integrate the fragmented supply chain while facilitating better coordination of the projects being executed more effectively and efficiently. However, they also introduce chaos to the collaboration that can be detrimental effect on the programme's outcome. Although there is extensive literature on inter-organizational collaboration in projects, little attention has been paid to the programme context. It is still unknown how governance should be organized to facilitate inter-organisational collaboration in programmes Therefore, this study responds to the call for research.

This research is carried out with the help of Witteveen+Bos. The research objective is to explore the governance in ongoing infrastructure programmes and develop a model that provides an overview into how programme governance should be organised in the early phases of Dutch infrastructure programmes. To achieve the research objective, the main research question is formulated:

> *"What governance mechanisms facilitate the inter-organisational collaboration in the early phase of infrastructure programmes?"*

In order to answer the main research question, five sub-research questions were formulated. The research is based on qualitative research with an exploratory character, consisting of three main parts in which each part answers the sub-research questions.

Part I: Literature review & exploratory interviews

Part I of this research compromises a literature review on programmes and governance for inter organizational collaboration. The literature on programmes suggests that infrastructure programmes are a group of interrelated infrastructure projects clustered together to achieve goals that cannot be accomplished in a single project, characterized by their size, complexity, spiral life and sharing common resources with complex organizational structure. The early phases of programmes are crucial to determine strategic objectives to create value and shape the downstream relationships inside the programmes. Moreover, the typology of the programme sets the management approach in which the organizational structures, programme management strategies, and governance arrangements will vary according to it. This research explores the typology of compliance programmes.

Governance in programmes plays an important role in inter-organizational collaboration as it establishes organizational processes, decision-making simulation, and management tools, allowing for the successful delivery of projects within a programme and the programme itself. However, as there is a lack of literature regarding governance and inter-organizational collaboration in programmes. The literature on project networks was studied as they have overlapping characteristics with programmes. From the literature and the exploratory interviews, it was possible to identify that inter-organizational collaboration is sought by parties as it provides economical, knowledge-related and social drivers. However, cultural, organizational and industrial barriers impede these parties from collaborating. Governance mechanisms set in the early stages can provide structure, processes, actions and decisions that enable inter-organizational collaboration. These mechanisms help to overcome the barriers and, thus, contributing to the goals. This research adopts and modifies the governance framework of Kujala et al. (2021) (see figure 4.1). Based on the modified governance framework from the literature, 22 governance mechanisms are considered for this research to analyzed them in the case studies.

Part II: Multiple case studies

The Flood Protection Programme and the Multi-Annual Noise Remediation Programme were selected to be analyzed based on the 22 governance mechanisms. Afterwards, a comparison was made to identify similarities and differences in the governance mechanisms between both prorammes. Document reviews and semi-structured interviews were conducted to identify the governance approach used in

each case study. Data from the cases were analyzed using thematic analysis, in which the 22 governance mechanisms determined by deducting analysis was coded using ATLAS.ti. Then, each code was grouped according to the six dimensions of governance.

From the results, it is identified that programme governance is established by two distinct levels: the programme level and the contracting authorities'. The programme level compromises the team that has administrative responsibility for organizing the programme. The contracting authorities are the team that is responsible for tendering the projects within the programme. These two levels arise due to the fact that the programmes encompass multiple public clients.

Based on the analyses, the 22 governance mechanisms were identified in the programme as a whole. Depending on the boundary conditions (e.g. the market approach) set at the programme level, these 22 governance mechanisms varied from level to level. The governance mechanisms identified at each level can be found in section 6.3, where multiple comparison tables were created. From the analysis it can be concluded that the governance mechanisms identified at the programme level focus on creating synergies. In contrast, the contracting authorities focus on translating the programme goals to the local context of the projects. Nevertheless, both levels go through the six dimensions of governance. The combination of both is the governance followed during the delivery of the projects, which enables the coordination, adaptation and safeguards exchanges between the public clients and the contractors.

Part III: Model & expert evaluation

Based on the empirical findings, the figure below was developed. This figure summarizes the lessons learned obtained from the case studies, that are briefly discussed below:

1. Governance compromises goal-setting, capability building, rewarding, roles & decision-making, coordination and monitoring.
2. The governance approach is a combination of input from the programme level and contracting authorities level when infrastructure programme compromise multiple public clients.
3. The governance mechanisms established at the program level safeguard processes, exchanges, and synergies across the program. Meanwhile, inherent mechanisms for project location are established at the contracting level.
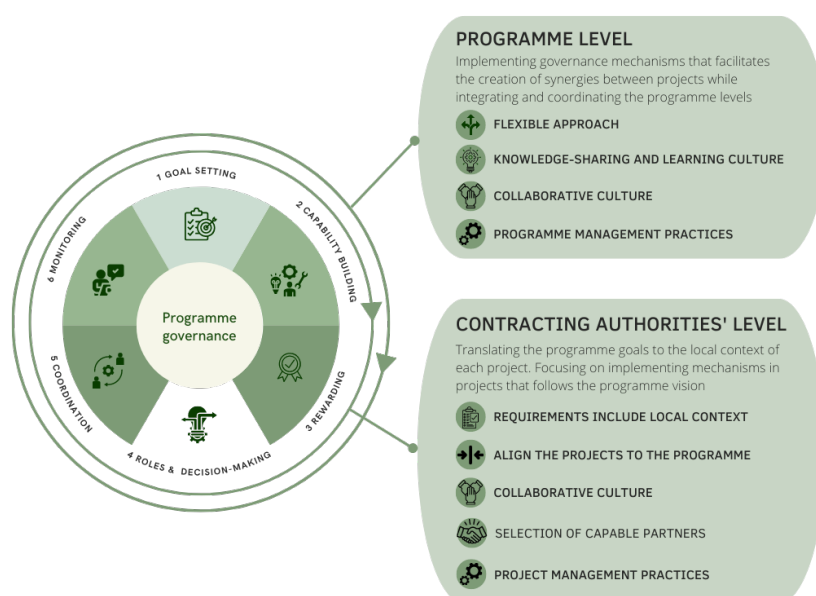
These lessons were used for the creation of the Programme Governance Organizational (PGO) model (see figure below). The model provides a structural way of organizing programme governance while allowing public clients to analyze their choices better. Additionally, figure 7.4 supports the model as it provides governance mechanisms that could facilitate inter-organizational collaboration in the early phases of the programme. As a result, the research objective is fulfilled.

INFRASTRUCTURE PROGRAMMES (with multiple public clients)

Step 1: Typology of the programme
Compliance programmes surge for the need for organizations to comply with new regulations. Therefore, secondary goals in compliance programmes should focus on development themes in order to contribute to future needs.

Step 2: Analyze preliminary conditions
- Characteristics of the programme & projects within the programme
- Preconditions (policy, environment, market)
- Points of attention during construction & operation (opportunities & risks)

Step 3: Set boundary conditions
- The team organizing the programme should set the boundary conditions, establishing the level of flexibility that would be provided to the contracting authorities level.

Step 4: Setting the governance approach during the early phases
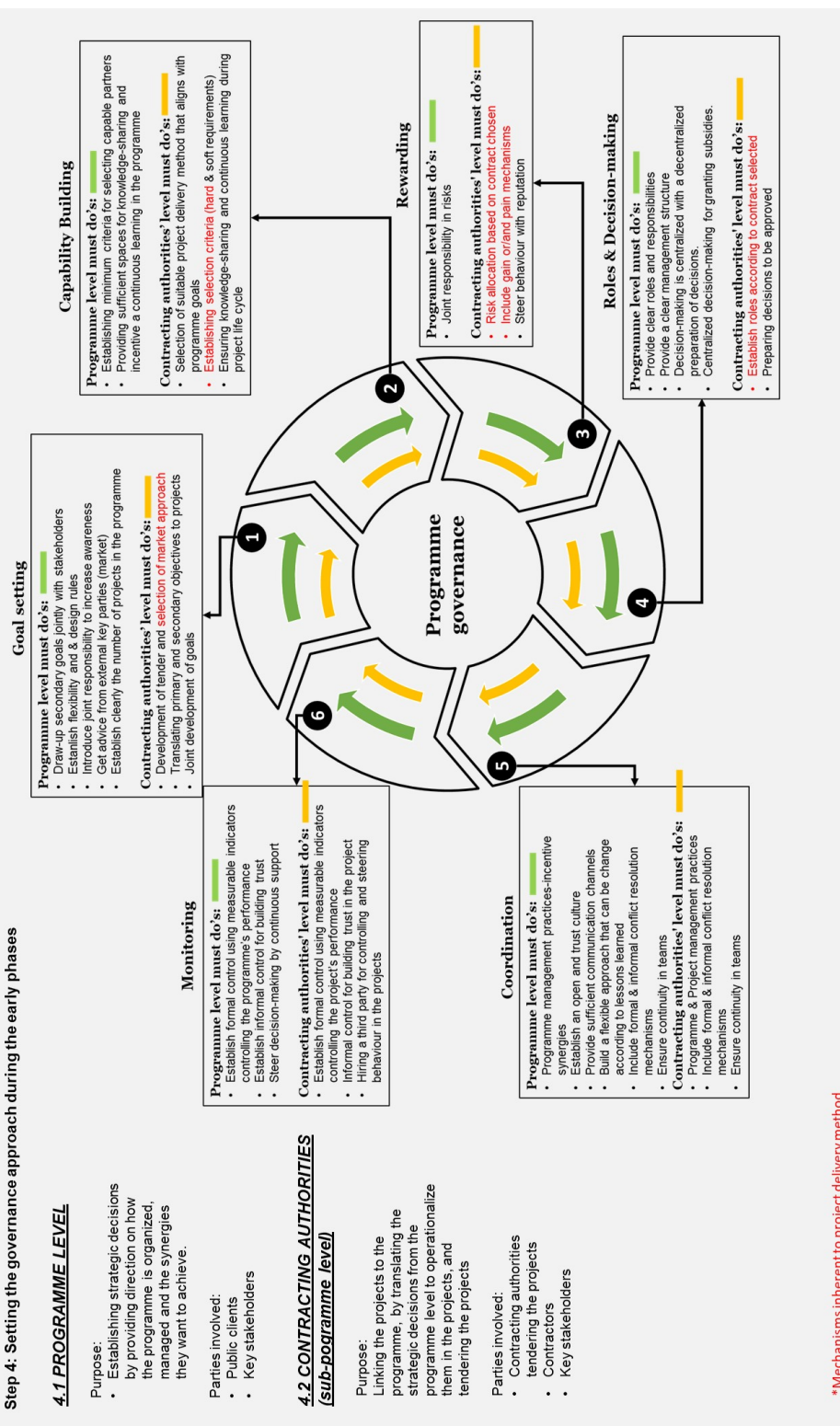
4.1 PROGRAMME LEVEL

Purpose:
- Establishing strategic decisions by providing direction on how the programme is organized, managed and the synergies they want to achieve.

Parties involved:
- Public clients
- Key stakeholders

4.2 CONTRACTING AUTHORITIES (sub-pogramme level)

Purpose:
Linking the projects to the programme, by translating the strategic decisions from the programme level to operationalize them in the projects, and tendering the projects

Parties involved:
- Contracting authorities tendering the projects
- Contractors
- Key stakeholders

Goal setting

Programme level must do's:
- Draw-up secondary goals jointly with stakeholders
- Establish flexibility and & design rules
- Introduce joint responsibility to increase awareness
- Get advice from external key parties (market)
- Establish clearly the number of projects in the programme

Contracting authorities' level must do's:
- Development of tender and selection of market approach
- Translating primary and secondary objectives to projects
- Joint development of goals

Capability Building

Programme level must do's:
- Establishing minimum criteria for selecting capable partners
- Providing sufficient spaces for knowledge-sharing and incentive a continuous learning in the programme

Contracting authorities' level must do's:
- Selection of suitable project delivery method that aligns with programme goals
- Establishing selection criteria (hard & soft requirements)
- Ensuring knowledge-sharing and continuous learning during project life cycle

Rewarding

Programme level must do's:
- Joint responsibility in risks

Contracting authorities' level must do's:
- Risk allocation based on contract chosen
- Include gain or/and pain mechanisms
- Steer behaviour with reputation

Roles & Decision-making

Programme level must do's:
- Provide clear roles and responsibilities
- Provide a clear management structure
- Decision-making is centralized with a decentralized preparation of decisions.
- Centralized decision-making for granting subsidies.

Contracting authorities' level must do's:
- Establish roles according to contract selected
- Preparing decisions to be approved

Programme governance

Monitoring

Programme level must do's:
- Establish formal control using measurable indicators controlling the programme's performance
- Establish informal control for building trust
- Steer decision-making by continuous support

Contracting authorities' level must do's:
- Establish formal control using measurable indicators controlling the project's performance
- Informal control for building trust in the project
- Hiring a third party for controlling and steering behaviour in the projects

Coordination

Programme level must do's:
- Programme management practices-incentive synergies
- Establish an open and trust culture
- Provide sufficient communication channels
- Build a flexible approach that can be change according to lessons learned
- Include formal & informal conflict resolution mechanisms
- Ensure continuity in teams

Contracting authorities' level must do's:
- Programme & Project management practices
- Include formal & informal conflict resolution mechanisms
- Ensure continuity in teams

*Mechanisms inherent to project delivery method

This research contributes to theory and practice as it sheds light on how governance could facilitate inter-organizational collaboration in infrastructure programmes. The analysis of this research discussed four main topics.

First, this study revealed that collaboration is essential for achieving the programme's goals. Public clients seek to create synergies between the interrelated projects to obtain benefits that would not be possible if the projects were managed individually, namely, better communication lines, better knowl-

edge transfer between the projects, creating learning curves and uniformity within the programme.

Second, it was evident that the modified governance framework allowed for obtaining the results from the case studies. However, the combination of both the programme and the contract level builds up the final governance framework established in the execution of the project. Each level can be seen as a compartmentalized space consisting of different purposes. From this, it was concluded that the governance mechanisms implemented in the programmes not only shape the downstream relationships by enabling coordination, adaptation and safeguarding exchanges but also integrate the compartmentalized spaces. Then, each governance dimension was discussed in which the aim was to associate the governance mechanisms identified in the case studies.

Third, the research highlights that the model developed in this research can contribute to a better analysis when organizing the governance for infrastructure programmes compromising on multiple clients. However, there is a need to re-evaluate the final model to understand the level of applicability for practice.

Lastly, the research evidenced four limitations. First, the exploratory character of the research provides a limitation as there is limited research regarding inter-organizational collaboration. Hence, it was needed to conduct exploratory interviews that contributed to enrich the literature review. Second, the Multi-annual Noise Remediation Programme has not yet started the tender procedure, and thus it is possible that new governance mechanisms arise during this stage. Third, another limitation, is the sample size for the case studies, as it does not include all perspectives from every organization participating in the programme. However, it still was sufficient to draw conclusions from each case study. Lastly, due to time constraint it was only possible to evaluate the model with two experts. For the model to be applicable into practice, more evaluations need to be conducted or tested.

Recommendations
For Witteveen+Bos:

- Witteveen+Bos, as an engineering firm, can incentivise public clients to implement the programme-based approach in order to deal with the increasing complexity in projects. Additionally, they can advise clients to seek for collaborative relationships that entail relational and contractual mechanisms corresponding, as they may increase programme success. Furthermore, they should suggest to public clients that when organizing programme governance in the early phases, it is crucial to involve key stakeholders, such as the team that will tender the project. As a result, it would be possible to reduce tensions in the following phases. Finally, the model provided in this research can be tested to understand its applicability in practice.

For public clients:

- Implementing a programme-based approach requires a different mentality that revolves around being collaborative in order to enhance synergies in the programme. Public clients must establish mechanisms that facilitate these synergies. For instance, a sequential configuration of projects enables learning from project to project. Moreover, involving key stakeholders during the early stages can provide essential knowledge to build governance approach. Finally, it is advised to include relational mechanisms that contribute to the building of trust, as it facilitates collaboration between parties.

For further research:

- Future research can enhance the results of this research by conducting more interviews with contractors and increasing the sample size in order to include more perspectives. Moreover, when the programmes are finalized future studies could measure how the governance mechanisms established at the early phases contributed to the programmes goals. Besides, they could focus on how governance mechanisms evolve throughout the programme's life cycle according to the lessons learned. Furthermore, as this research focuses solely on infrastructure programmes compromising multiple public clients, it would be interesting to analyze how the mechanisms established in this research change when the programme involve one public client. Finally, future research can explore how different project delivery methods impact the programme goals, and how the distinct levels identified in this research collaborate.

Contents

Nomenclature

Abbreviation	Definition
GDP	Gross Domestic Product
SRQ	Sub-Research Questions
EI#	Exploratory interviewee #
RWS	Rijkswaterstaat
HWBP	Flood Protection Programme
MJPG	Multi-annual Noise Remediation Programme
PGO	Programme Governance Organizational

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1

Introduction

This chapter is divided into eight sections to introduce the reader to this research study. The sections present the background 1.1, the problem definition 1.2, the research objective 1.3 and scope 1.4, the research questions 1.5, the research design 1.6, the relevance of the study 1.7 and the thesis outline 1.8.

1.1. Background

The construction industry is of great importance to a country's economy as it affects the Gross Domestic Product (GDP), employment rates, and the overall livelihood of the country. It is also one of the largest sectors of the global economy, contributing 13% of the global GDP and providing industrial facilities, real estate, and infrastructure that are essential to our daily lives (McKinsey & Company, 2020). For instance, infrastructure includes public utilities and public works such as roads, railways and waterways that facilitate the movement of people and provide them with products and services they need (Leffers et al., 2022). However, although the infrastructure sector significantly impacts a nation's economy and development, the sector has under performed for a considerable amount of time, with projects frequently running over budget and behind schedule (McKinsey & Company, 2020). Moreover, projects are becoming more complex, making it harder to achieve the project goals and ambitions. As a result, the infrastructure sector faces multiple challenges that have stagnated the industry from becoming a more competitive, cost-effective, sustainable, and innovative.

1.1.1. Challenges of the Dutch infrastructure sector

In this section, two main challenges that the Dutch infrastructure sector is facing are briefly described. The two challenges are the industry's lagging performance and the increased amount of work.

Industry lagging performance

The lagging performance of the sector is related to the fundamental rules and characteristics of the industry. The industry has been characterised by being project-oriented and its fragmented nature (Love et al., 2004; McKinsey & Company, 2020; Riazi et al., 2020). For instance, according to Adriaanse (2014), fragmentation in projects can be expressed in three forms: vertical, horizontal, and longitudinal. Vertical fragmentation relates to the segregation of construction phases, where there is little coordination and minimal exchange of knowledge and information between the phases. Moreover, the division and lack of cooperation between the various parties and disciplines involved in a construction project are known as horizontal fragmentation. Lastly, longitudinal fragmentation refers to the division of projects, where projects are managed individually and not in conjunction. For this reason, fragmentation has caused a low level of collaboration along the supply chain where there tends to be friction between the parties involved, and hence shattering the success of the projects. Therefore, it is necessary to

abandon the conventional methods in favour of more collaborative and integrated delivery approaches in order to overcome fragmentation (Mohamed, 2003; Nawi et al., 2014; Nicolini et al., 2001). Introducing collaborative approaches in the industry might deliver potential outcomes to the project in terms of quality, safety performance, sustainability, human resource management, innovation, cost reduction and dispute resolution (Eriksson et al., 2009; Khouja et al., 2021), facilitating the success of the project (Suprapto, 2016).

An increased amount of works

The Dutch infrastructure sector in the upcoming decade will encounter an increase in new infrastructure works and maintenance. The increasing amount of works is due to the growing population (Leffers et al., 2022), and many Dutch infrastructure assets have also reached their end life cycle (TNO, 2021; van den Boomen et al., 2019). Therefore, most assets, such as bridges, tunnels, locks, quay walls, dikes and viaducts, will need to be renovated or replaced. Pertinent maintenance, renovation, and repair of these public works through design, innovation, and research can be devoted to making the infrastructure sector more sustainable and future-proof (Leffers et al., 2022). Hertogh et al. (2018) mention that replacing and renovating infrastructures is an opportunity to make them more fit for future needs.

1.1.2. From project-based to programme-based

The traditional construction industry's, specifically the infrastructure sector, ad hoc approach and fragmented structure have been criticized as one of the root causes of inefficiencies leading to cost overruns and project delays and limiting the industry's ability to overcome its current challenges (Vrijhoef & Koskela, 2005). Moreover, due to the short-term perspectives of project-based organizations, traditional contracts are used to select the contractor based on the lowest bid, restraining the collaboration between clients and contractors and thus resulting in a fragmented supply chain. In addition, the concept of unique and one-off projects is a mismatch of the long-term perspective needed for innovation and sustainability in the sector (Dubois & Gadde, 2002). Furthermore, according to Blismas, Sher, et al. (2004), the one-time construction project does not reflect the reality of construction clients. They have a large portfolio of ongoing construction projects. In the Netherlands, this amount of work will increase, making it challenging for the public client to manage them. As a result, these projects in the portfolio are usually managed in isolation (Lycett et al., 2004), mainly because they are regarded as unique and temporary (Vrijhoef & Koskela, 2005). Although projects have unique characteristics, construction projects follow similar processes that can be repeated from project to project. However, because of the sector's fragmentation and project-based structure, generating knowledge transfer or standardization across projects in the portfolio is difficult, in which prior experience is frequently lost, causing some limitations and problems (World Economic Forum, 2016). For instance, Dubois and Gadde (2002) argue that there is little effort devoted to transmitting knowledge and experience due to project time constraints. Thus, there is a lack of repetition in projects. Similarly, Riazi et al. (2020) mention that the lack of continuity of project teams forces a new learning curve, affecting the projects' efficiency levels.

For this reason, the Dutch Ministry of Infrastructure and Water Management and the consultancy firm McKinsey & Company have identified four concrete shifts that the infrastructure sector should take to overcome the current challenges that the industry faces (Ministerie van Infrastructuur en Waterstaat, 2019). One of the four shifts that the Dutch infrastructure sector proposes is to shift from a project-based approach to the portfolio approach, also known as a programmatic or programme-based approach, which consists of combining multiple related projects with the goal of achieving benefits that would not be realized if managed separately (Lycett et al., 2004).

The programme-based approach is a possible way to cope with the current challenges of the Dutch infrastructure sector. For instance, infrastructure programmes incentive long-term perspectives needed for implementing innovative and sustainable ambitions (Ministerie van Infrastructuur en Waterstaat, 2021) and fosters the integration of the fragmented supply chain, as collaboration is crucial for achieving the goals. Moreover, the programme-based approach facilitates the creation of new knowledge to generate innovative solutions and stimulate learning through project execution. Lastly, programmes

facilitate better coordination of projects needed for the increased amount of works that public clients have (Ministerie van Infrastructuur en Waterstaat, 2021).

1.2. Problem definition

The increasing pressure to improve project performance on infrastructure clients has led to more integrated approaches that foster collaboration in the supply chain. The programme-based approach is one potential vehicle to address the sector's challenges. On the one hand, applying this approach can integrate the supply chain while allowing for better coordination of projects. On the other hand, it introduces chaos to the collaboration due to the high number of organizations involved (Martinsuo, Teerikangas, et al., 2020). This chaos can have a detrimental effect on the outcome. The literature has emphasised that depending on how governance is organized; it can facilitate inter-organizational collaboration (Chakkol et al., 2018; Kujala et al., 2021; Vangen et al., 2015). Whilst there is extensive literature on inter-organisational collaboration in projects, little attention has been paid to the programme context. It is still unknown how governance should be organized to facilitate inter-organisational collaboration in programmes (Artto et al., 2009; Frederiksen et al., 2021; Martinsuo & Geraldi, 2020; Miterev et al., 2020). Therefore, this research aims to address this gap in the literature by exploring governance mechanisms in infrastructure programmes.

1.3. Research objective

The research objective is to explore governance mechanisms in Dutch infrastructure programmes that facilitate inter-organizational collaboration. Furthermore, the research findings are used to develop a model that provides insights into how governance should be organized in the early phases of Dutch infrastructure programmes.

1.4. Research scope

This research focuses solely on the Dutch infrastructure programmes. Additionally, this research concentrates on the early phases of the programme as it is considered the most important stage for possibilities to add value to programmes (Liu et al., 2019). The importance of this phase is further explained in chapter 2. Moreover, this research focuses on governance mechanisms as it impacts how work is organized and coordinated, and determines the commitment and capability of the programme's actors to work together towards achieving a mutual goal (Kujala et al., 2021).

1.5. Research questions

The following main research question was formulated to achieve the research objective:

"What governance mechanisms facilitate the inter-organisational collaboration in the early phase of infrastructure programmes?"

To answer the main question, Sub Research-Questions (SRQ) were formulated:

- SRQ1: What are infrastructure programmes?
- SRQ2: What is inter-organizational collaboration, and what governance mechanisms enable inter-organizational collaboration in projects?
- SRQ3: What are the drivers and barriers to inter-organizational collaboration in the early phases of the programme?
- SRQ4: What governance mechanisms are present in ongoing Dutch infrastructure programmes and what governance mechanisms do these cases share?
- SRQ5: How can a model capture the lessons from the case studies to be applied to future infrastructure programmes?

1.6. Research design

This section provides an overview of the research design followed in this study to answer the main research questions. The research is based on qualitative research with an exploratory character, consisting of three main parts briefly explained below.

1.6.1. Part I: Literature review & exploratory interviews

The existing theory was reviewed, and exploratory interviews were conducted to build a theoretical framework for this research. As previously mentioned, programmes in the Dutch infrastructure sector are relatively new. Thus, there is a limited number of papers to review the topic of inter-organizational collaboration within programmes. Therefore, exploratory interviews contributed to a better understanding and enriched the findings from theory.

Literature Review

The literature review is an essential step to achieving the primary research objective. In addition, the literature review provided valuable input for answering the first three SRQs. First, to answer the SRQ1, the literature on programmes was reviewed to understand the essential characteristics of programmes and to define the early phases. Moreover, for answering SRQ2, literature on project networks was studied and provided insights into the governance mechanisms that facilitate inter-organizational collaboration. Finally, for SRQ3, the literature on projects and programmes was reviewed to develop a preliminary list of drivers and barriers for inter-organizational collaboration. Then, the governance mechanisms and the preliminary list are enriched with the findings from the exploratory interviews.

To find research papers that study programmes and programme management, a set of keywords was set to find scientific papers that investigate relevant information. Google Scholar and Science Direct are used to find scientific journals, books and reports. The keywords used for the literature review were: program(me) management, program(me)s, programme-based, project networks, and portfolio approach. Since programme management has been researched in different industries, a selection of papers was made based on its applicability to the construction industry.

Moreover, for the review of governance for inter-organizational collaboration in programmes and project networks, a set of keywords was used to find research papers that investigate relevant information: collaboration, inter-organizational collaboration, partnering, program(me) governance, governance mechanisms, collaborative governance, relational governance, and partnership.

Exploratory interviews

After conducting the literature review, exploratory interviews were held with four experts of Witteveen+Bos. The main objective of this session was to enrich theory and to discover new aspects of the subject studied from practice, which aligns with the purpose of an exploratory study (Kvale, 2007). Additionally, the interviews provided valuable input to build the conceptual framework used for the case studies. The experts who were interviewed were selected based on their experience with Dutch infrastructure programmes. During the interviews, they were asked to provide their perceptions regarding inter-organizational collaboration in infrastructure programmes. The following steps were held to perform the exploratory interviews:

- Creation of a preliminary list of barriers and drivers for inter-organizational collaboration from the literature review.
- Selection and invitation of the experts to participate in the interviews. The experts were selected based on their knowledge and expertise in the topic of interest.
- Formulation of questions for the interviews based on the literature review.
- The discussions were recorded in order to have traceability
- During the discussions, it was ensured that the discussion always revolved around the main topic.

Once Part I of the research design is completed, it is possible to answer SRQ1, SRQ2 and SRQ3 of the research, and a framework is developed that is used for the case studies.

1.6.2. Part II: Multiple case study

A multiple case study is selected as the methodology for the empirical research. The multiple case study is a qualitative research methodology that aids in gaining concrete, contextual, in-depth knowledge about the topic of interest (Yin, 2018). As this research focuses on an exploratory approach, using a case study helps to understand the topic.

The data collection of this research was done by reviewing official documents and conducting interviews. After, the data is analysed in order to identify governance mechanism that are present in the programmes and distinguish mechanisms shared by both case studies. The following are steps that were taken in order to answer the SRQ4.

1. Official documents were retrieved from the internet in order to identify relevant information.
2. Semi-structured interviews were conducted with experts working for the public client or the contractor. The questions were formulated based on the framework developed in Part I of the methodology research. Four interviews were held and recorded for each case study to collect, analyse and process sufficient relevant information.
3. The data collected for each case study was analysed thoroughly using applied thematic analysis.
4. The case studies were compared to find similarities and differences in which a model was built based on these findings.

The methodology used for the in-depth case studies is further explained in chapter 5.

1.6.3. Part III: Model and expert evaluation

The reliability of the analysis and the results obtained in Part I and II are enhanced by an evaluation process. After analysing the data, a model is developed based on the research methodology's main findings from Parts I and II. The model is intended to contribute to practice, as it provides a structural way of organizing governance for future infrastructure programmes during the early phases. The preliminary model is evaluated with internal experts from Witteveen+Bos who have experience working with infrastructure programmes. The evaluation of the model is done through discussion meetings that provide feedback and confirmation of the model's applicability in practice. The methodology of Part III is further explained in chapter 7. After finalizing Part III is possible to answer SRQ5, and thus, it would be possible to answer the main research question.

1.7. Relevance of the research study

This research contributes both to the body of knowledge and to practice:

1.7.1. Practical relevance

As the complexity of projects is increasing and there is the urge to fulfil the Dutch ambitions, organizations need to implement new business models to overcome the challenges that project-based organizations face. Programmes are considered one vehicle that could contribute to achieving and fulfilling these goals. However, the programme-based approach is not commonly used in the Dutch infrastructure sector. Therefore, this research contributes to expanding the knowledge of the use of programmes in the infrastructure sector. Specifically, it provides understanding in governing infrastructure programmes. Furthermore, this research provides a model for practitioners that can help them analyse and choose better the governance mechanisms to be used for future infrastructure programmes.

1.7.2. Scientific relevance

The increasing complexity of projects and the combination of challenges have triggered the infrastructure sector to move towards more collaborative approaches. As a result, there has been a growing interest on implementing programme-based approach. However, literature in programmes has mainly focused on clarifying the terminology of 'programmes' (Artto et al., 2009; Pellegrinelli, 1997), the benefits of implementing programme management (Maylor et al., 2006; Shehu & Akintoye, 2009), the importance of programme context (Martinsuo & Geraldi, 2020; Martinsuo & Hoverfält, 2018), programme success criteria (Shao, 2018; Yan et al., 2019), among other topics. However, little attention has been given to explore inter-organizational collaboration in programmes. For instance, Martinsuo, Teerikangas, et al. (2020) states that there is an interest in understanding how multiple organizations collaborate in a programme setting. Therefore, this research contributes to the body of knowledge as it studies how inter-organizational collaboration is governed in infrastructure programmes.

1.8. Thesis outline

Based on the research design previously explained, figure 1.1 provides the framework followed in this research consisting of three main parts. Firstly, a literature review is done on programmes, governance and inter-organizational collaboration. This literature search is conducted via different sources. Additionally, exploratory interviews are held with experts from Witteveen+Bos to enrich the literature findings.

Secondly, to gain factual knowledge, multiple case studies are analysed. The data collection is obtained via semi-structured interviews with public clients and contractors involved in a programme and information retrieved from official documents. The data collection provides insights into governance mechanisms in ongoing Dutch infrastructure programmes.

Finally, by analysing the cases and interpreting them, it was possible to develop an overall model which gives an overview of how to organize the governance in the early phases of programmes in the Dutch infrastructure sector. Experts evaluated the model to understand its feasibility in practice. Following this thesis outline, it is possible to answer the main research question.
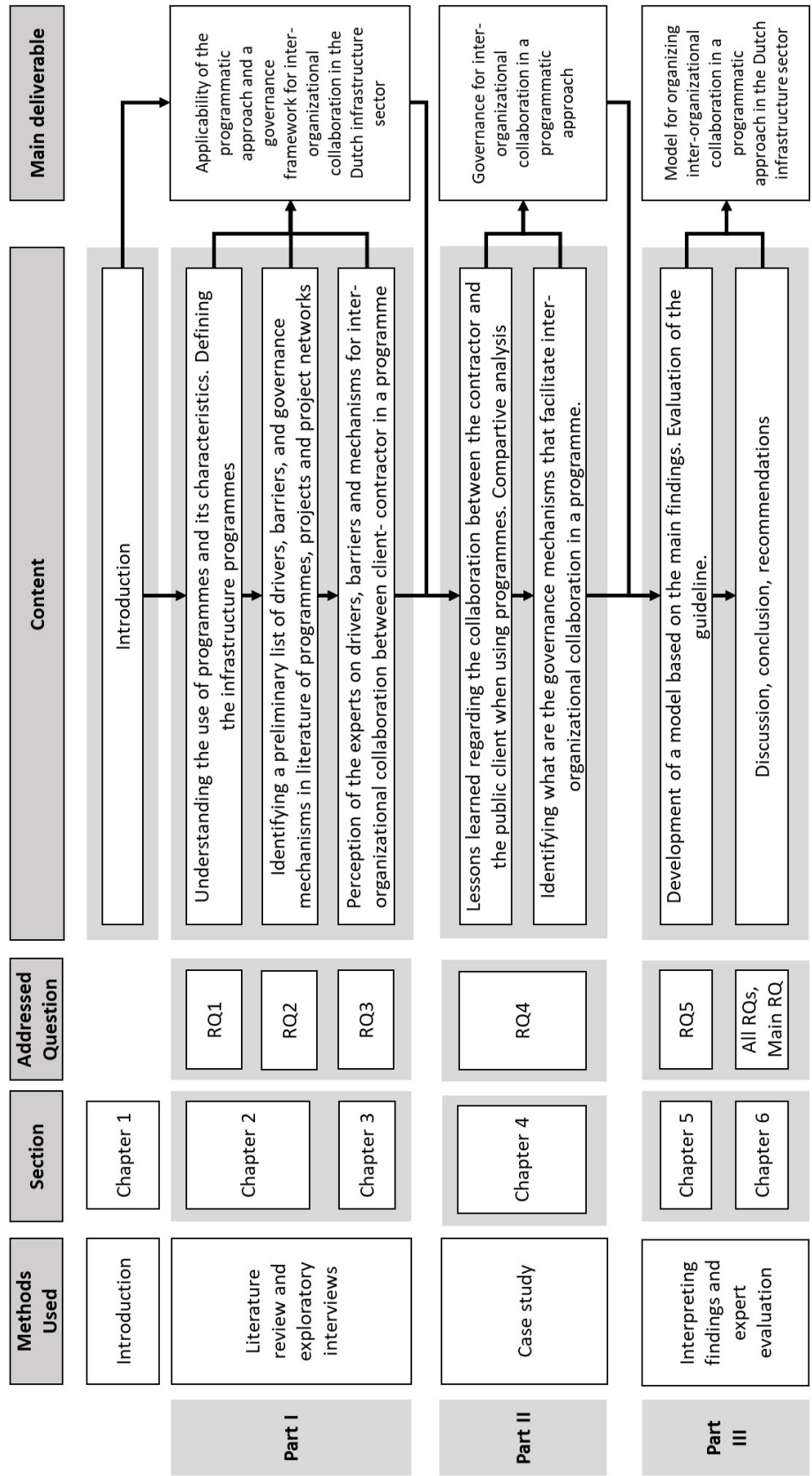
Figure 1.1: Research Framework

2

Infrastructure programmes

This chapter entails six sections that aim to answer *"SRQ1: What are infrastructure programmes?"*. First, a brief overview of the use of programmes in the infrastructure sector is given in section 2.1. Secondly, in section 2.2, the terms "programme" and "programme management" are defined. Thirdly, the early phase of a programme is defined in section 2.3. Then, various typologies of programmes are identified in section 2.4. Subsequently, section 2.5 the characteristics of programmes are described. Finally, in section 2.6, the conclusion of this chapter is provided.

2.1. Programmes in the infrastructure sector

Programmes and programme management are currently being used in different industries. However, there is limited research in the context of infrastructure programmes, in which most of the existing literature focuses on the United Kingdom and the Chinese construction industry. For instance, authors such as Shehu and Akintoye (2009) focus on the significant challenges of implementing programme management in the construction industry, which proposes a framework for effectively adopting programme management in the UK. Similarly, Hu et al. (2015a), Hu et al. (2015b), Jia et al. (2011), and Yan et al. (2019) focus on the success of using programme management in mega construction projects in China. Likewise, in the Netherlands, the programmatic approach is increasingly used in the infrastructure sector. Public clients such as Rijkswaterstaat (RWS), the Municipality of Amsterdam and the Waterboard Drents Overijsselse Delta are implementing it to improve the coordination and performance of their portfolio of projects while integrating the projects (Rijke et al., 2014). However, according to Shehu and Akintoye (2009), public clients lack an understanding of what programme management is and its benefits. As a result, more research on programmes and programme management is required to bring clarity to the industry. Therefore, this study intends to provide new knowledge that contributes to the future implementation of programmes in the infrastructure sector.

2.2. Defining programmes and programme management

Different definitions of 'programmes' can be found in the literature, but the vague definitions of the term has contributed to a lack of awareness of the advantages of its implementation (Ferns, 1991); hence, it is crucial to define its terminology. Therefore, this section describes and defines 'programmes' and 'programme management'.

2.2.1. Programmes

Most literature on programmes has focused on change, strategy, product development and production programmes, in which the specific industry's characteristics impact the programme management approach (Artto et al., 2009). For this reason, it is essential to illustrate what infrastructure programmes

entail. Definitions of 'programmes' in the literature usually refer to a set of interrelated projects that contribute to an overarching goal (Ferns, 1991; Frederiksen et al., 2021; Lycett et al., 2004; Pellegrinelli, 1997; Pellegrinelli et al., 2007; Thiry, 2002). However, this research uses the definition of Project Management Institute (2017) as different authors widely accept it (Frederiksen et al., 2021; Pellegrinelli et al., 2007; Rijke et al., 2014; Shehu & Akintoye, 2009):

"A programme is a group of related projects, subprograms, and programme activities managed in a coordinated way to obtain benefits not available from managing them individually" (Project Management Institute, 2017).

Literature has emphasised that programmes are used to manage projects in a coordinated way to achieve a commnon goal or to extract benefits of managing the projects as a bundle (Pellegrinelli, 1997). Specifically, in the infrastructure sector, programmes are a vehicle for organizing and managing projects to overcome today's complex challenges, as they allow flexibility in dealing with ambiguity, complexity and uncertainty. For instance, programmes can (1) enable horizontal and vertical collaboration (Geraldi et al., 2022; Maylor et al., 2006; Project Management Institute, 2017; Shehu & Akintoye, 2009), (2) allow better transfer of knowledge (Lycett et al., 2004; Maylor et al., 2006), (3) more efficient and appropriate use of resources (Lycett et al., 2004; Pellegrinelli, 1997; Shehu & Akintoye, 2009), (4) better planning and coordination of projects (Lycett et al., 2004; Pellegrinelli, 1997), (5) explicit recognition and understanding of dependencies within the projects (Pellegrinelli, 1997; Project Management Institute, 2017), (6) better prioritisation of projects (Pellegrinelli, 1997), and (7) greater visibility of projects to senior management (Lycett et al., 2004; Pellegrinelli, 1997). However, programme management is essential to achieve the programme goals and the benefits of using programmes since it focuses on managing the interdependencies of the projects within the programme (Project Management Institute, 2017; Yan et al., 2019).

2.2.2. Programme management

According to (OGC, 2011), programme management is a framework of tools, procedures, and strategies that may help firms achieve the programme's objectives. The framework coordinates, communicates, aligns, manages, and controls the projects within the programme (OGC, 2011). In the infrastructure sector, programme management can contribute to better (1) allocation of resources, (2) prioritization of projects and (3) alignment between projects (Pellegrinelli et al., 2007). Although programme management has received increasing attention in recent years, it is recognised that there is still a lack of understanding of the term in practice, which has led to confusion with project management (Lycett et al., 2004; Shehu & Akintoye, 2009). Therefore, it is essential to highlight that programme management is more than a scale-up version of project management (Lycett et al., 2004); instead, it is a supplementary framework for the effective delivery of projects (OGC, 2011; Shehu & Akintoye, 2009). For example, programme management focuses on the strategic level in order to create synergies between projects and deliver benefits through the coordination of interrelated projects (Lycett et al., 2004; Maylor et al., 2006; Rijke et al., 2012). In contrast, project management focuses on outcomes in terms of quality, cost, and time (Rijke et al., 2014). This research uses the definition by Shehu and Akintoye (2009), as his study focuses on the context of the construction industry, which is similar to the context of this research. He defines programme management as *"aligning and coordinating a group of related projects to achieve benefits that are not possible when projects are managed individually"* Shehu and Akintoye (2009). However, the literature underlines that effective programme management is challenging since it is not straightforward and is influenced by multiple factors—for instance, the typology of the programme and changing dynamic context impact the management approach. Therefore, the programme management approach must be sufficiently flexible to adapt and respond along the programme's lifecycle. As a result, dealing with the complexity of its dynamic context while handling multiple organizations that usually have conflicting interests (Lehtonen & Martinsuo, 2008; Lycett et al., 2004; Pellegrinelli et al., 2007; Shao & Müller, 2011; van Buuren et al., 2010).

2.2.3. Differences between projects and programmes

As stated above, the lack of understanding of the difference between programmes and projects has caused the failure of programme implementation in the industry (Shehu & Akintoye, 2009). Many studies have focused on highlighting the differences between these two terms; however, to shed light on 'programmes' in this research, table 2.1 compares projects and programmes on various aspects that were found in the literature (Lycett et al., 2004; Maylor et al., 2006; Pellegrinelli, 1997; Shehu, 2008; Yan et al., 2019).

Table 2.1: Comparison of projects and programmes [own compilation]

Distinctive Aspect	Projects	Programmes
1. Focus	Delivering a specific outcome through a process	An organizing framework for achieving overarching goals
2. Subject of management	Single project	Multiple projects with a shared goal
3. Duration	Fixed duration and ends when the product is delivered	The programme end only when the objectives have been realised
4. Communication	Between project teams	Communication between programme, sub-programme and project level, between sub-programme levels, and between projects and project teams
5. Organization	Temporary organization that is dissolved after project completion	Semi-permanent organization structure
6. Management approach	Project management: Defined requirements for time, cost and quality	Balance between programme management and project management. Programme management: the objective may alter over time as the business, cultural, or political environment evolves.

2.3. Early phase of the programme

Programmes, unlike projects, do not always have a single, well-defined deliverable or a set time frame. A programme's life cycle may differ from that of a project. Instead, once started, programmes are likely to follow a loop, with each loop representing each project delivered. According to Pellegrinelli (1997), a programme has five main phases: initiation, definition and planning, project delivery, renewal, and dissolution. First, programme initiation entails the definition of the programme and team formation. Second, during the programme definition and planning phase, the parent organization establishes how the programme can add value by developing the programme objectives and allocating responsibilities to the programme team. Third, the delivery phase includes completing and delivering a project within a programme. Fourth, programme renewal aims to validate the ongoing business needs to be covered by the programme currently envisaged. Lastly, when the programme objectives are fulfilled, the programme is dissolved.

However, this research focuses solely on the early phase of the programme due to its importance and impact on the subsequent work within the programme. The early phase of a programme is defined as the combination of the initiation, definition, and planning phases (Martinsuo & Lehtonen, 2007). Fig-

ure 2.1 illustrates the programme phases described by (OGC, 2011; Pellegrinelli, 1997), introducing the early phase concept. Previous studies (Liu et al., 2019; Lycett et al., 2004; Martinsuo & Lehtonen, 2007; Matinheikki et al., 2016; Pellegrinelli, 1997) acknowledge the relevance of the early phases in programmes as it shapes the downstream relationships to create value. During the early phase, essential aspects are determined, such as the programme's vision, goals and scope, and how the programme will be organized and managed. Moreover, boundaries are set to understand which stakeholders should be involved to acknowledge their interests in the programme's objectives (Liu et al., 2019; Martinsuo & Lehtonen, 2007).
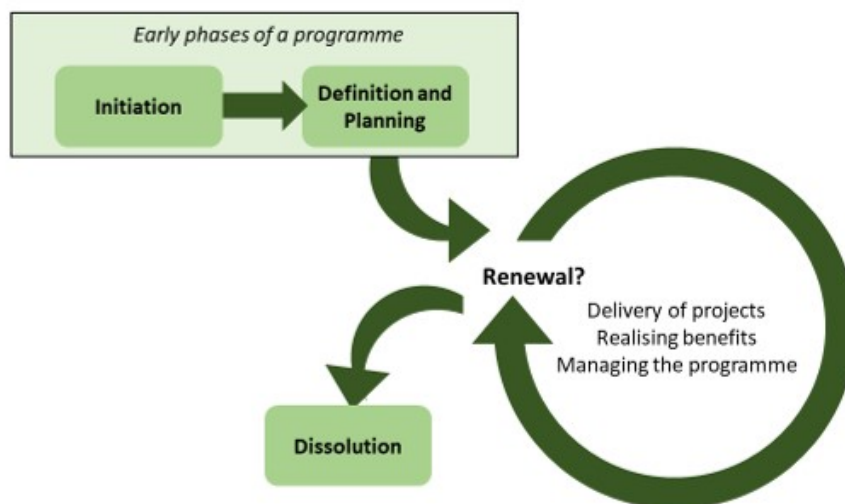
Figure 2.1: Early phases of a programme based on Martinsuo and Lehtonen (2007), OGC (2011), and Pellegrinelli (1997)

Exploring the early phase is crucial for this research since it is where the programme organization establishes the governance arrangements on how different parties will be aligned and coordinated to work towards a shared goal. The concept of governance and its role in programmes is explained in section 3.2.

2.4. Various typologies of programmes

Having established the definition of programmes and describing what programmes are, it is essential to understand that different programme typologies exist in literature. As it is shown in Table A.1 in appendix A, there are different types of programmes. Each typology is classified according to the orientation of the programmes (internal, semi-internal/external, external programmes) (Blismas, 2001; Ferns, 1991), the objectives of the programme (Gray & Bamford, 1999; Pellegrinelli, 1997), the desired level of control (Gray, 1997), the location of the programme (Evaristo & van Fenema, 1999), if the projects existed before the programme started (Vereecke et al., 2003) and the initiative of starting a programme (OGC, 2011). Although most programs have more than one typology, it is important to recognize them because different programme types will require different organizational structures, programme management strategies, and governance arrangements (Frederiksen et al., 2021; Lycett et al., 2004; OGC, 2011; Vereecke et al., 2003). For instance, Lycett et al. (2004) mention that the typology of the programme will set the level of control and management approach necessary to address the cultural, political and organizational challenges at the programme level.

Most of the literature on infrastructure programmes has focused on the typologies suggested by Pellegrinelli (1997), which are classified based on the programme's objectives. However, this research takes a different research approach. The research focuses on the typologies described by OGC (2011), which are classified based on why the programme was initiated. This research aims to understand the influence of the programme typology on the governance approach.

2.5. Characteristics of programmes

To have a detailed understanding of what infrastructure programmes are, the following provides a brief explanation of the characteristics of programmes found in literature:

- **Highly complex and dynamic:** Several studies acknowledge that programmes are highly dependent on their context (Lehtonen & Martinsuo, 2008; Lycett et al., 2004; Pellegrinelli et al., 2007; Shao & Müller, 2011; van Buuren et al., 2010). The management approach is influenced by the industry, programme type, size, mission, configuration, and life cycle. Additionally, the context of the programme refers not only to internal factors within the parent organization but also outside the parent organization and its characteristics (stability, support, harmony and interaction) (Shao & Müller, 2011). Therefore, due to the variety of factors that influence a programme, programmes are complex and dynamic, and the programme organization needs to adapt over the programme's life cycle (Miterev et al., 2020).
- **Interrelated projects:** A programme consists of multiple interrelated projects similar in size and complexity (Blismas, 2001). Integration of the projects enables synergies that contribute to the programme's benefits (Geraldi et al., 2022). For instance, one project operates as a pilot, evaluating several techniques to transfer the knowledge towards future projects (Abdullah & Vickridge, 1999; Geraldi et al., 2022; Thiry, 2002). Therefore, as Shehu and Akintoye (2009) mentioned, one project is likely to influence the other projects and, thus, the entire programme.
- **Configuration:** Programmes are forms of organizing projects within an organization. Projects in a programme can be organized as a chain of projects that occur one after the other (a portfolio) or as a network of related projects (Maylor et al., 2006; Oehmen et al., 2011). The configuration varies according to the strategies selected to achieve the programme goals.
- **Long duration:** Programmes are regarded as having long-term orientation (Miterev et al., 2020) since the benefits will only be achieved once all the projects within the programme are completed (Oehmen et al., 2011). Programmes are considered vehicles for achieving long-term objectives such as sustainability and innovation (Harikkala-Laihinen, 2022).
- **Sharing common resources:** Programmes share resources within the programme's projects, and several authors acknowledge this as a critical aspect of programme management (Shehu & Akintoye, 2010; Trzeciak & Jonek-Kowalska, 2021). Although sharing resources is more cost-effective and efficient, programmes are considered to be cost and capital-intensive, which is a financial challenge for organizations participating in a programme (Shehu & Akintoye, 2010). Nevertheless, sharing resources is fundamental for effective programme management; financial resources and knowledge sharing within the programme are essential (Lycett et al., 2004).
- **Centrally controlled:** Projects in a programme are being centrally controlled by the parent organization (Shehu & Akintoye, 2009).
- **Life cycle:** In literature, it is recognised by several authors that the life cycle of programmes differs from projects as they follow a loop or spiral cycle instead of a linear cycle (Pellegrinelli, 1997; Thiry, 2002). The loops are every project being delivered following its life cycle, where learning and performance play a role as each project serves as a learning for future projects (Thiry, 2002). According to Pellegrinelli (1997), programmes have five discrete phases: initiation, definition and planning, project delivery, renewal, and dissolution. Each phase plays a vital role in achieving the programme's goals; however, this research focuses on the initiation, definition and planning phases, defined as the early phases of a programme. The importance of the initiation, definition, and planning phase is further described in section 2.4.
- **Programme organization:** The programme organization manages the overall programme and project interfaces and coordinates and integrates the efforts of all parties participating in project operations (Frederiksen et al., 2021). A specific programme organization can take different forms influencing the level of synergies and learning within the organization (Thiry, 2010). As shown in figure 2.2, the typical roles that can be found in programmes are programme managers, project managers, programme owner-team, programme office, process owners and programme teams. The organizational structure becomes more complex than projects as new organizational levels are created, making it challenging to integrate and align the different parties. Also, new lines of communication exist, such as vertical and horizontal communications. Vertical communication

refs to project managers reporting to programme managers, and horizontal communications between project managers of different projects (Yan et al., 2019).
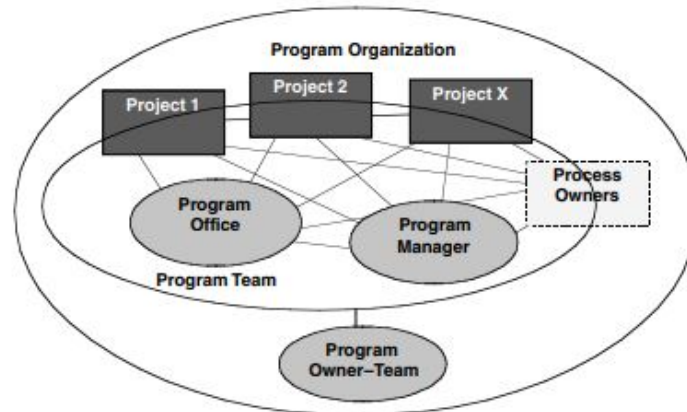
Figure 2.2: Programme organization chart (Thiry, 2010)

After reviewing and integrating the perspectives of various authors (Abdullah & Vickridge, 1999; Frederiksen et al., 2021; Geraldi et al., 2022; Lycett et al., 2004; Oehmen et al., 2011; Pellegrinelli, 1997; Shehu & Akintoye, 2009; Yan et al., 2019) on the characteristics of programmes, this research concludes that programmes are complex and dynamic, with a long lifespan and involving a variety of stakeholders. Each programme is organized according to its intended benefits, and a flexible management approach is needed throughout the programme's life cycle as it is influenced by its context.

2.6. Conclusion

The findings allow to answer SRQ1:*What are infrastructure programmes?*

Public clients have been increasingly interested in implementing programmes in the infrastructure sector in order to be able to tackle the increased amount of works while integrating the supply chain. However, to implement the programme-based approach in the infrastructure sector, public clients must have a sufficient amount of work that can be bundled as a programme, where the projects within the programme should be interrelated. Infrastructure programmes are defined as a group of interrelated infrastructure projects clustered together to achieve benefits that are not possible to achieve when projects are managed individually. They are characterized by their size, complexity and spiral life cycle. As well, they tend to have long duration and are centrally controlled, sharing common resources with complex organizational structures. Programme management is more than a scale up version of project management. It is a framework of tools, procedures, and strategies that focuses on creating synergies between the projects to achieve benefits through the coordination of interrelated project. However, the management approach varies according to the typology, the objectives and the context of the programme. Therefore, identifying the typology, the objectives and the context of the programme is crucial for setting up the management and governance approach during the early phases of the programme.

The following chapter expands on governance and inter-organizational collaboration in projects and illustrates how it can be translated into programmes.

Inter-organizational collaboration and governance in programmes

This chapter addresses *SRQ2: What is inter-organizational collaboration, and what governance mechanisms enable inter- organizational collaboration in projects?* and *SRQ3: What are the drivers and barriers to inter-organizational collaboration in the early phases of the programme?*. It provides an overview of inter-organizational collaboration in programmes and governance mechanisms for inter-organizational collaboration. First, in section 3.1, inter-organizational collaboration is defined and the importance of using partnering to improve projects' or programmes' success. Then, in section 3.2 governance is explained, and the governance mechanisms are identified for enabling inter-organizational collaboration in projects. Then, in section 3.3, the drivers and barriers of inter-organizational collaboration in programmes are identified. After, in 3.4 the conceptual model is defined. Finally, section 3.5 provides the conclusions of this chapter.

3.1. Defining inter-organizational collaboration

Infrastructure programmes can be seen as complex inter-organizational environments that bring together multiple actors with varying values, skills, cultures, traditions, goals, and business models, in which inter-organizational collaboration is essential to align them towards a mutual goal (Kujala et al., 2021). Collaboration and integration in programmes become a challenge as the number of organisations involved increases (Martinsuo, Geraldi, et al., 2020). However, little attention has been given to inter-organizational collaboration in programmes, and hence this research aims to tackle this research gap.

First, this research defines inter-organizational collaboration *as two or more organizations working together towards a mutual goal that a single entity cannot address* (Hardy et al., 2003). To attain the shared goal, these organizations must collaborate by interchanging resources, information, and capabilities and facilitating the creation and exchange of new knowledge that benefits all actors involved (Hardy et al., 2003). This collaborative relationship can be represented by a range of formal arrangements or informal (soft) practices. In the literature, formal arrangements are interchangeable with terms like 'relational contracting,' 'project partnering,' or 'project alliancing' (Xue et al., 2010).

Moreover, this collaborative relationship is motivated by the desire to formalise the relationship and build on collaborative mechanisms, also known as governance mechanisms, that are used for coordination, adaptation, and safeguarding exchanges Kujala et al., 2021. Blayse and Manley (2004), Chakkol et al. (2018), and Suprapto (2016) acknowledge that these governance mechanisms involve an interplay of contractual and relational mechanisms, which alone are insufficient to deal with the complexity of the project. Contractual mechanisms refer to aspects that are explicitly written in contracts, such as the roles and responsibilities of the actors involved in the project (Chakkol et al., 2018; Kujala et al., 2021). In contrast, relational mechanisms relate to more socially derived mechanisms that encourage actors

to build trust, commitment and knowledge sharing (Chakkol et al., 2018). As a result, implementing both contractual and relational mechanisms may facilitate inter-organizational collaboration.

3.2. Governance mechanisms for inter-organizational collaboration

Literature acknowledges that aligning different points of view and interests to develop a clear understanding of a project's objectives and implement the proper techniques to achieve those objectives is immensely difficult (DeFillippi & Sydow, 2016; Kujala et al., 2021; Müller, 2009). However, how governance is organized can enable the different parties to work toward shared goals (Chakkol et al., 2018; Kujala et al., 2021; Vangen et al., 2015), and thus, has an impact on inter-organizational collaboration.

Programme governance, defined as the relationships between various programme participants, are mechanisms that provide structure, processes, actions and decisions that enable inter-organizational collaboration, allowing for the successful delivery of projects within a programme and the programme as a whole (Chen, 2020; Müller, 2009; Rijke et al., 2014). Governance mechanisms are established during the early phases of the programme (Rijke et al., 2014). However, as there is limited research on governance mechanisms for inter-organizational collaboration in programmes, this research adopts the governance framework by Kujala et al. (2021).

The framework categorized governance into six main dimensions for governance: goal-setting, capability building, rewarding, roles and decision-making, coordination and monitoring (see figure 3.1), and identifies governance mechanisms for inter-organizational collaboration. The framework provides a systematic approach to analyze how multiple organizations are organized and managed to create and capture value in project networks. However, even though programmes can be similar to project networks due to overlapping characteristics, some aspects might differ. Thus, this research includes both the literature of project networks and programmes to identify governance mechanisms for inter-organizational collaboration. Below is a brief explanation of each dimension with its corresponding governance mechanisms that facilitate inter-organizational collaboration.
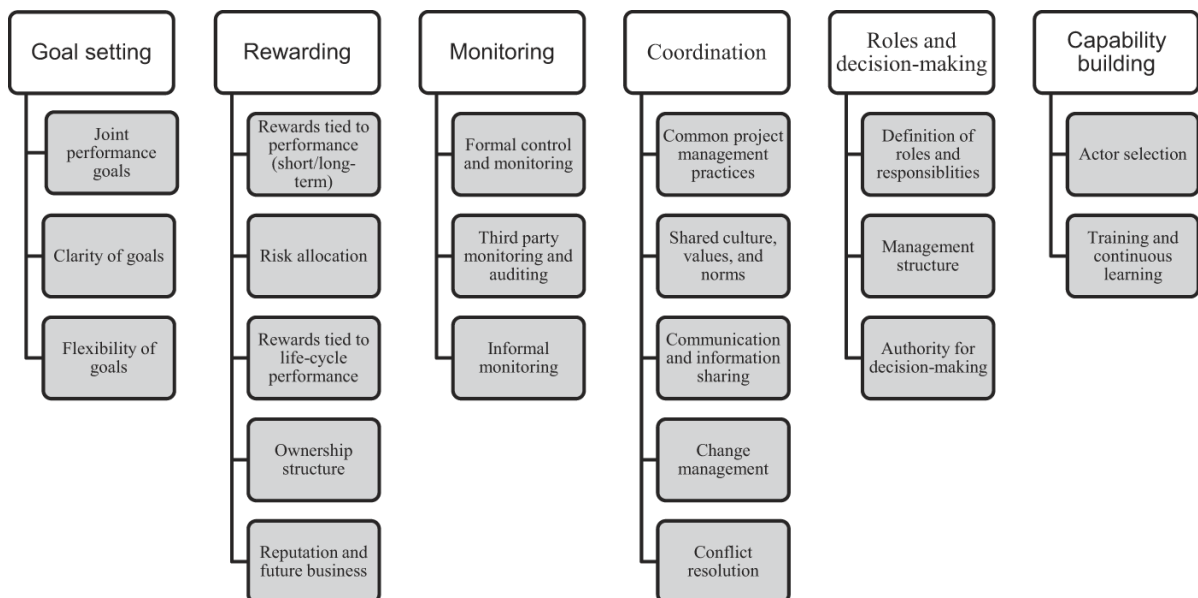

Figure 3.1: Governance framework by (Kujala et al., 2021)

1. Goal-Setting

Goal-setting aims to generate agreed performance goals for the programme that are understood by all actors involved (Kujala et al., 2021). This dimension compromises the need for joint performance, clarity and flexibility of goals. In terms of joint performance, early contractor involvement is acknowl-

edged to be beneficial for this process (Kujala et al., 2021), as it contributes to a better alignment of interests and allows the public client to obtain their knowledge during early phases (Eriksson et al., 2008). Additionally, as programmes compromise a large number of participants, there is a need for the programme organization to provide clarity of objectives to ensure that all parties in the different levels of the programme (steering committee, operational, and project teams) are aware of the programme's goals. As programmes compromise multiple interrelated projects, it is necessary that there is a continuous alignment with programme and project objectives (Rijke et al., 2014) and that there is flexibility during the tender of projects to incentive contractors to propose innovative solutions (Kujala et al., 2021). Furthermore, the procurement method selected should be suitable for each project condition (Eriksson et al., 2008) within the programme. **Sub-dimension: Joint performance, clarity, flexibility**

2. Capability Building

Capability building refers to the fact that the different actors in the project must have the capacity and capability to meet the performance expectations. This capability building is critical because it ensures that the appropriate skills and expertise are identified and linked to the programme early. (Kujala et al., 2021). This dimension compromises the selection of the contractor and training and continuous learning. During the procurement process for a complex project, the client must select the most capable contractor based on specific aspects such as their technical and management capability, financial strength, and perceived organizational reputation (Suprapto, 2016). Traditionally, collaboration was discouraged as the client always selected the contractor with the lowest bid. However, Eriksson et al. (2008) mention that focusing on softer parameters in the selection criteria, such as their collaboration ability and earlier experiences, is necessary for enabling collaboration since it is possible to select contractors with suitable competencies and the right attitudes. Therefore, selecting a suitable contractor is one of the main aspects of facilitating a collaborative project environment (Eriksson et al., 2009). Moreover, one key benefit of using programmes in the infrastructure sector is that it incentives learning and thus, enable continuous improvement. Continuous improvement entails consistently creating and providing more value (Meng, 2011). However,However, the programme organization must provide knowledge-sharing spaces so actors share their experiences working on other projects within the programme (de Groot et al., 2022; Frederiksen et al., 2021). **Sub-dimension: Selection of a capable partner, training and continuous learning**

3. Rewarding

Rewarding aligns actors' interests and motivations with the programme goals using incentives (Kujala et al., 2021). This dimension refers to rewards tied to performance, risk allocation, reputation and future business and ownership structure. However, this research leaves out the term ownership structure. The literature acknowledges that an appropriate contract with suitable incentives and risk sharing can increase mutual trust (Fu et al., 2015), and thus, incentive collaboration. For instance, providing a pain-gain approach in the contract can increase the performance of the projects within the programme (Meng, 2011). Moreover, risk allocation strategies are critical in complex projects for aligning partners to work toward common goals (Kujala et al., 2021). Unfair risk allocation can negatively affect the programme actors' trust, reliability, and commitment, hence hindering collaboration (Deep et al., 2021). Moreover, reputation has also been a relational factor in selecting contractors since a good reputation helps build trust between the partners (Akintoye & Main, 2007). **Sub-dimension: Rewards tied to performance, risks sharing mechanisms, reputation**

4. Roles & decision making

Roles and decision-making refer to providing actors with the knowledge they need to comprehend the impact of actions on overall performance, allowing them to make informed decisions (Kujala et al., 2021). This dimension includes the definition of roles and responsibilities, the management structure and the decision-making authority. Contracts specify the roles and responsibilities of each party; they are determined according to the actors' competencies and risk-bearing capacity. Having clear roles and responsibilities for the actors facilitates the interaction between the project parties and, thus, the collaboration (Dietrich, 2006; Hughes et al., 2012). Additionally, the management structure and the authority for decision-making in programmes depend on the organizational structure. For instance, Müller (2009) mentions that relevant programme hierarchy is included in organizational structure, allowing for decision-making at the right level. However, programmes should be flexible enough to be able to re-

spond quickly to changes, and effective governance also requires an equitable distribution of power among programme actors (Kujala et al., 2021). **Sub-dimension: clear roles and responsibilities, management structure, decision-making authority**

5. Coordination

Coordination is essential to align each actor's behaviour to collaborate successfully. It compromises programme management and project management practices, shared culture, effective communication, conflict resolution, and change management. This research focuses mainly on how coordination is organized in the early phases so when the projects are being delivered in a programme, they are effectively integrated. As a result, formal and informal mechanisms play a role in achieving effective coordination. For instance, informal mechanisms such as relational norms can significantly impact how the public client and the contractor work together (Kujala et al., 2021). Relational norms are shared values and routines representing inter-organizational relationships, in which trust, open communication, no blame culture, and long-term orientation are some examples (Suprapto, 2016).

Moreover, collaborative relationships require effective communication between the contractor and the client to facilitate information sharing (Chan et al., 2004).It can also facilitate the prompt resolution of problems (Cheung et al., 2009; Doloi, 2009). Therefore, regular meetings can facilitate effective communication, as well as joint-working. Joint-working, according to different authors (Black et al., 2000; Chan et al., 2004; Dietrich, 2006; Eriksson et al., 2009), refers to project parties implementing joint activities, such as joint project office, joint problem solving and dispute resolution, joint effort for continuous improvement and team building activities, and shared technological platforms.

Another essential factor influencing collaborative relationships is that parties must desire to collaborate continually to unforeseen difficulties, , which can be defined as a long-term commitment. However, senior management commitment is required for building long-term commitment (Black et al., 2000; Chan et al., 2004). Senior management is responsible for developing project strategies and providing resources, funding and knowledge; hence, they are crucial to leading and organizing construction project operations while also ensuring that the process is effective (Faris et al., 2022). A lack of senior management commitment may cause minor little issues to surface that become severe barriers to the process (Faris et al., 2022). By building long-term perspectives, project actors are keener to create incremental learning (Eriksson et al., 2009). **Sub-dimension: common management practices, shared culture, effective communication, change management, conflict resolution**

6. Monitoring

Monitoring ensures that all actors behave as intended and allows for the use of performance-based incentives. It includes formal and informal control mechanisms and monitoring involving a third party. Formal mechanisms include key performance indicators to measure collaboration in the contracts (Farrell et al., 2019). In contrast, informal mechanisms are meetings to understand each other concerns and needs to be able to achieve the goals (Bygballe et al., 2015). Furthermore, external parties serve as a mediator for conflict resolution and understanding of how client and contractor should work together (Kujala et al., 2021). **Sub-dimension: Formal control and monitoring, third-party monitoring and auditing, informal monitoring**

The governance mechanisms used in this research are summed up in table 3.1. However, none of the mechanisms will enhance collaboration if actors are unwilling to collaborate and if they are only concerned about their personal goals. As a result, to successfully achieve the intended goals of a programme, the client must be aware of what collaboration entails and choose a contractor that is prepared to engage in a long-term agreement and cooperate proactively with the client (Eriksson et al., 2019).

Table 3.1: Governance dimensions and its mechanisms based on (Kujala et al., 2021)

Dimension	Governance mechanisms
1. Goal setting	1.1. Joint performance goals 1.2. Clarity of the goals 1.3. Flexibility in goals
2. Capability building	2.1. Selection of capable partners 2.2. Training & continous learning
3. Rewarding	3.1. Rewards tied to performance 3.2. Risk sharing mechanisms 3.3. Reputation
4. Roles & decision-making	4.1. Clear roles and responsibilities 4.2. Management structure 4.3. Decision-making authority
5. Coordination	5.1. Common management practices 5.2. Shared culture 5.3. Effective communication 5.4. Change management 5.5. Conflict resolution
6. Monitoring	6.1. Formal control and monitoring 6.2. Informal control and monitoring 6.3. Monitoring and auditing via third party

3.3. Drivers and barriers of inter-organizational collaboration in programmes

As previously explained, programmes comprise several projects clustered by a common goal (Thiry, 2010) and are similar in size and complexity. Projects in a programme can be performed sequentially or in parallel; their configuration will vary depending on the programme's aims. Therefore, an effective collaboration might deliver potential outcomes to programmes. However, there are still barriers to why organizations do not collaborate closely in the infrastructure sector. This sub-section briefly reviews the drivers and barriers of inter-organizational collaboration in programmes. Literature in projects and programmes was reviewed to identify the main drivers and barriers. The main reason behind this decision is that value creation in a programme is only achieved when there is an interplay between project management and programme management approaches (Lycett et al., 2004; van Buuren et al., 2010). Therefore, integrating the literature on projects in this research can shed light on how these organisations work in an inter-organizational environment and seek more collaborative ways of working.

3.3.1. Drivers to inter-organizational collaboration

Programmes aim for long-term benefits that are only possible if all parties collaborate. Good collaboration in programmes, similar to projects, is considered a key factor for achieving the programme goals (Prevaas, 2018). For instance, Lycett et al. (2004) mention that effective programme management is relationship-based as there is a need for all projects within the programme to remain aligned with the programme's overarching goals, which is only possible by enabling effective relationships between programme managers and project managers. In the same way, the Ministerie van Infrastructuur en Waterstaat (2021) states that collaboration plays a significant role in programmes. Mainly because multiple-tasking relationship contracts are developed, and the programme objectives usually aim for innovation, learning and improvement, which implies that cooperation and knowledge exchange between parties must be stimulated. Intrinsically, the programme's complexity increases as the number

of actors increases; thus, collaboration plays an essential role in aligning all the parties to work together for a common goal (OGC, 2011; Rijke et al., 2014). Additionally, projects within the programme have a strong interdependence, meaning that parties need each other's knowledge to fulfil their demanding tasks. Some authors in their studies have mentioned that public clients in programmes tend to select collaborative arrangements such as partnering and alliances to integrate the different parties' efforts and coordinate the projects efficiently within the programme (Frederiksen et al., 2021; Prevaas, 2018). In sum, due to the nature of programmes in terms of size, complexity and intensity, collaboration and integration between the programme participants are essential to delivering milestones and achieving the programme's success (Farrell et al., 2019; Prevaas, 2018). Collaboration in programmes will enable (1) better communication lines, both horizontal and vertical communication (Geraldi et al., 2022), (2) better transfer of knowledge (Lycett et al., 2004; Maylor et al., 2006), (3) better performance reducing costs (Lycett et al., 2004; Shehu & Akintoye, 2009), (4) synergies between the projects (Miterev et al., 2016; Rijke et al., 2014), and (4) long-term relationships (Pellegrinelli, 1997). However, achieving the intended collaboration in a programme is a complex task as it requires aligning different interests, and all parties must be willing to collaborate.

This research defines drivers as the expected positive outcomes of the relationship that motivate companies to collaborate(Khouja et al., 2021). In the literature on projects was possible to identify that inter-organizatioanl drivers are divided into three main categories, which are economical, knowledge-related, and social drivers (Khouja et al., 2021). Economic drivers are organizations that seek to acquire critical resources, such as new opportunities to enter new markets, to increase organizational competitiveness. Organizations seeking innovations and technologies, as well as to create new knowledge, are examples of knowledge-related drivers. Finally, social drivers refer to organizations motivated to collaborate to reduce conflicts and opportunistic behaviours.

Findings from the project and programme literature show an overlap in why organisations opt for more collaborative rather than adversarial relationships. This research summarizes the findings of the drivers of inter-organizational collaboration from the project and programme literature in table 3.2.

Table 3.2: Inter-organizational collaboration drivers [own compilation]

Category	Drivers	Description	Author
Economic drivers	**Fair risk allocation**	Risks are allocated to the party that can manage it better	(Akintoye & Main, 2007; Khouja et al., 2021; Ling et al., 2014; Zhang et al., 2022)
	New resources capabilities	Joining resources with other organizations in terms of money and knowledge	(Akintoye & Main, 2007; Golicic & Mentzer, 2005; Khouja et al., 2021; Zhang et al., 2022)
	Increasing competitiveness	Joining capabilities and sharing ways of working improve their position in the market, making it possible to new opportunities	(Akintoye & Main, 2007; Khouja et al., 2021; Ning & Ling, 2013; Zhang et al., 2022)
	Increasing performance	Choosing alternative ways of working can improve the quality, while reducing the costs and time	(Golicic & Mentzer, 2005; Khouja et al., 2021; Ling et al., 2014; Lycett et al., 2004; Shehu & Akintoye, 2009; Zhang et al., 2022)

Category	Drivers	Description	Author
Knowledge-related drivers	**Innovation and technology**	Organizations can have access to new technology and innovation can be incentive	(Akintoye & Main, 2007; Khouja et al., 2021; Xue et al., 2010; Zhang et al., 2022)
	Generating new knowledge	Parties are more willing to take the risk to introduce new approaches that can bring better quality and creating synergies between the parties	(Khouja et al., 2021; Miterev et al., 2020; Rijke et al., 2014; Zhang et al., 2022)
	Transfer of knowledge	Organizations are more open to share knowledge	(Khouja et al., 2021; Lycett et al., 2004; Maylor et al., 2006)
	Improving learning curve	Sharing of knowledge horizontally and vertically can improve the knowledge for future projects	(de Groot et al., 2022; Geraldi et al., 2022; Pellegrinelli, 1997; Thiry, 2002)
Social drivers	**Reducing opportunistic behaviour**	Introducing collaborative approaches will increase of building trust between the parties, and thus, individualistic mind-set is reduced	(Khouja et al., 2021; Zhang et al., 2022)
	Effective resolution of conflicts	Implementing informal approaches, such as informal meetings to talk about each other's concerns, instead of using legal measures	(Golicic & Mentzer, 2005; Khouja et al., 2021; Ling et al., 2014)
	Building long-term relationships	Knowing each other in a formal and informal setting will create long-term relationships	(Deep et al., 2021; Khouja et al., 2021; Ning & Ling, 2013; Pellegrinelli, 1997; Zhang et al., 2022)
	Maintaining previous relationships	If collaboration is successfully achieve, it will incentive these parties to collaborate in the future	(Golicic & Mentzer, 2005; Khouja et al., 2021)

As shown in table 3.2, there are a variety of motives why a public client chooses to aim for more collaborative approaches in the infrastructure sector. However, it is important to highlight that partnering is not suitable for every project (Eriksson et al., 2008); it will vary according to the level of complexity, customisation, unpredictability, project size, and time pressure. Therefore, the public client should design a governance form that facilitates a reasonable degree of collaboration by selecting appropriate procurement methods suitable to the project or programme features (Eriksson & Nilsson, 2008).

3.3.2. Barriers to inter-organizational collaboration

In the past decades, public clients are increasingly choosing collaborative relationships in the infrastructure sector, but many have failed to execute them properly. Failure is often due to the risks that collaboration brings to the companies. For instance, Deep et al. (2021) mention that some barriers to collaboration are a breach of trust, lack of commitment and lack of communication. Also, an unfair risk transfer may impact the collaborative relationship. Moreover, Ling et al. (2014) state that the lack of experience or knowledge in relational contracting can impede the adoption of it, as well as the misalignment aiming project participants, an adversarial environment, the cost and time effort needed to implement a relational contract, and the resistance and conservative culture of the organization.

In this research study, the barriers found in the literature on projects are categorised according to Eriksson et al. (2008), which classifies three types of barriers: cultural, organizational and industrial. First, cultural barriers are the qualities of individuals and attitudes. Secondly, organizational barriers are related to the parent organisation's resources, processes, and routines. In contrast, industrial barriers might include competitive pressures, government laws, and powerful labour unions. Table 3.3 summarises the cultural, organizational and industrial barriers found in the literature on projects.

Table 3.3: Inter-organizational collaboration barriers [own compilation]

Category	Barrier	Description	Author
Cultural barriers	**Conservative culture**	Organizations are resistant to new ideas and lack of flexibility	(Eriksson et al., 2008; Ey et al., 2014; Ling et al., 2014)
	Loss of identity	As organizations become part of a greater cooperative	(Ey et al., 2014)
	Adversarial attitudes	Due to incompatible personalities that focuses mainly on individual goals causing win-lose attitudes	(Ng et al., 2002; Suprapto, 2016)
	Different goals and cultures	There is clashing of differences in culture and goals between parties	(Ey et al., 2014)
	Short-term perspective	Goals focus on short-term perspective such as cost and time without focusing on the whole life cycle of the project	(Eriksson, 2015)
	Exclusion of key actors	Goals are determined without including key actors, such as subcontractors, leading to a low commitment for partnering	(Ng et al., 2002)
	Uncertainty	Uncertainty is regarded as a risk rather than an opportunity	(Khouja et al., 2021)
Organizational barriers	**Lack of new competencies**	There is the need to explore and develop new competencies (technical and managerial) as organizations structures might change and projects specifications are more complex that requires new training	(Eriksson et al., 2008; Ling et al., 2014; Ng et al., 2002)
	Traditional organizations	Competitive tendering habits that focus on lowest bidder hampering the integration of tasks and decreasing commitment of project parties	(Eriksson et al., 2008; Ng et al., 2002)
	Late involvement of the contractor	Not involving the contractor in an early stage can affect the knowledge sharing and the integration of the supply chain	(Eriksson et al., 2008)
	Lack of commitment	No commitment from project participants. Lack of senior commitment is considered to hamper new approaches	(Chan et al., 2003; Deep et al., 2021; Ng et al., 2002)
	Loss of control and power	Client losing control and power over the contractors	(Ey et al., 2014)
	Lack of experience	Parties do not know how to work in relational contracting	(Eriksson et al., 2008; Ling et al., 2014)
Industrial barriers	**Procurement law**	Legislation focuses on competition impeding prior-work experience	(Eriksson et al., 2008; Ng et al., 2002)
	Standardised contracts	Standard contracts leaves no room for tailor made contracts that can facilitate collaboration	(Eriksson et al., 2009)

As it is possible to observe in table 3.3, some barriers are external to the organizations, and others are intrinsic to project-based organizations and traditional ways of working. Literature in programmes also highlights that organizations face challenges when collaborating. For instance, Vosman et al. (2020) found that some relational barriers inherent to project-oriented organizations do not incentivise imple-

menting a programme-based approach in the infrastructure sector. The barriers identified were that (1) there is a low level of trust between the client and the contractor, (2) the parties do not have the motive to share their knowledge, and (3) the parties have different interests. These aspects impede implementing programmes in the infrastructure sector since one of the main characteristics of programmes is to have long-term relationships based on trust, sharing knowledge, and achieving a common goal. Moreover, Lutt (2021) identified that the public client must have the capabilities and the willingness to participate in a long-term collaboration.

The findings from both literature reviews clearly explain why organizations in the infrastructure sector refuse to form collaborative relationships. Although only a few barriers were identified in the literature on programmes, they overlap with those spotted in the literature on projects. The findings from the literature on programmes are limited as there is a lack of research focusing on inter-organizational collaboration in programmes. Thus, there may be barriers that still need to be identified in this research. Therefore, the exploratory interviews in chapter 4 allow for exploring additional barriers experienced by practitioners in the infrastructure sector.

3.4. Conceptual model and framework of the research

As mentioned previously, public clients choosing a more collaborative approach depends on the context, which in this study refers to the characteristics and the goals of the programme and the environment where they evolve. Furthermore, to overcome the difficulties generated by these barriers previously explained, it is necessary to use governance mechanisms, which serve as enablers for inter-organizational collaboration in projects and programmes (Khouja et al., 2021). These mechanisms facilitate cooperation and can help overcome a number of the cultural, organizational and industrial barriers to collaboration between the public client and contractor (Black et al., 2000; Chan et al., 2004; Eriksson et al., 2008; Meng, 2011; Suprapto, Bakker, & Mooi, 2015). Figure 3.2 represents the conceptual model of the aspects that influence the inter-organizational collaboration in the programme and thus, its contribution to the programme goals. The conceptual model is defined as follows:
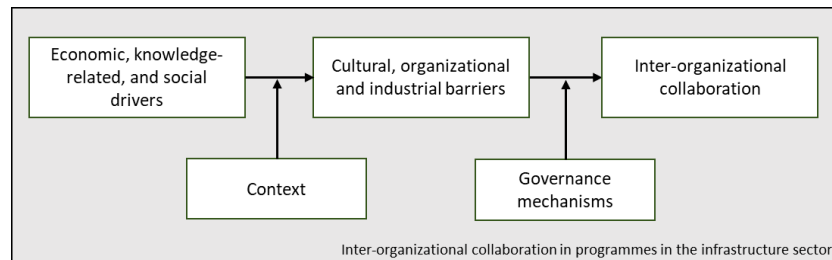
Figure 3.2: Conceptual model of aspects affecting the inter-organizational collaboration in programmes [Own compilation]

Economic, knowledge-related and social drivers make public clients aim for inter-organizational collaboration with the contractor in programmes, but cultural, organizational and industrial barriers arise depending on the context. Governance mechanisms set in the early stages of a programme provide structure, processes, actions and decisions that enable inter-organizational collaboration between client-contractor, helping to overcome the barriers and, thus, contributing to the programme goals.

The conceptual model provides an overview of how the barriers and drivers identified in this section can affect inter-organizational collaboration in the programme. The drivers refer to why public clients seek collaborative relationships; however, barriers emerge due to the environment and organisational characteristics. Implementing specific governance mechanisms can overcome the barriers and thus facilitate inter-organizational collaboration between client and contractor. During the case studies, it is zoomed in on the governance mechanism aspect, where the framework proposed by Kujala et al. (2021) will be tested to identify how the programmes are organized and managed by the public client.

3.5. Conclusions

This section concludes with the critical findings from the literature and its possibility to answer partially SRQ2 and SRQ3. In addition, the findings serve as input to develop a framework for organizing governance in the early phases that facilitates the collaboration of the public client and the contractor in infrastructure programmes, thus, contributing to the programme goals.

Thorough research was done on inter-organizational collaboration in projects and programmes. This research defines inter-organizational collaboration as *two or more organizations cooperating to achieve a shared objective that a single organization cannot accomplish. These organizations share resources, information, and capabilities and facilitate the creation and exchange of new knowledge advantageous to all parties (Hardy et al., 2003)*. Moreover, this research sees governance as enabling inter-organizational collaboration in programmes. To achieve the programme goals, programme governance establishes organizational processes, decision-making simulations, and management tools. However, it is important to highlight that collaboration needs the willingness of all parties to put effort into achieving it. As a basis for the case studies, this research selected the framework proposed by Kujala et al. (2021), in which governance is divided into six dimensions (goal-setting, capability building, rewarding, roles & decision-making, coordination and monitoring). Although the governance framework provides a tool for understanding how governance is organized in project networks, this research finds this information beneficial as some characteristics of project networks overlap with programmes. Therefore, the governance framework is used in this research to understand how governance is determined in the early phases to facilitate the inter-organizational collaboration between the public client and the contractor in the case studies. Each dimension from the framework includes its corresponding governance mechanisms that will be analysed in the case studies as shown in table 3.1.

Moreover, in the literature, it was possible to identify the main drivers and barriers to collaboration in projects and programmes. The main drivers for forming a partnership between the public client and the contractor are economical, knowledge-related and social drivers. It is expected that joint collaboration between these two parties increases project performance, improves sharing of resources and enables access to new knowledge and technologies. Both parties can learn from each other while conflicts are reduced and stronger relationships for future projects are built. Public clients willing to implement more collaborative approaches must be aware that cultural, organizational and industrial barriers make it difficult to achieve a collaborative approach. It is possible to observe that cultural and organisational barriers are inherent in traditional organisations driven by a self-interested, conservative culture that fears experimenting with new ways of working and losing control over projects. In contrast, industrial barriers are from external sources that cannot be overcome. However, depending on how it is established in projects or a programme, governance can help overcome these barriers. In the same way, governance facilitates collaboration between the public client and contractor, thus contributing to the programme's objectives. An overview of the findings of this chapter is summarized in table 3.4, which provides a preliminary list of drivers, barriers and governance mechanisms identified in the literature.

This research identified the drivers and barriers that affect inter-organizational collaboration, as well as the governance mechanisms that enable it. Even though programmes can be considered to be somehow similar to project networks due to overlapping characteristics, some aspects are different. Thus, conducting exploratory interviews with experts can enrich the findings on the mechanisms, drivers and barriers that might be inherent to programmes that could not be found during the literature review.

Table 3.4: Preliminary list of drivers, barriers and governance mechanisms

Drivers	Barriers	Governance mechanisms
Economic Drivers Better distribution of risks New Resources and capabilities Increasing competitiveness Increasing performance	**Cultural Barriers** Conservative culture Loss of identity Adversarial attitudes Different goals and cultures Exclusion of key actors Uncertainty	**Goal-setting** Joint performance goals Clarity of the goals Flexibility of the goals
Knowledge-related drivers Innovation and technology Generating new knowledge Better transfer of knowledge Improving learning curve	**Organizational barriers** Lack of new competencies Traditional organizations Late involvement of the contractor Lack of commitment Loss of control and power Lack of experience	**Capability building** Selection of capable partners Training & continuous learning **Rewarding** Rewards tied to performance Risk sharing mechanisms Reputation
Social drivers Reducing opportunistic behaviour Building long-term relationships Maintain previous relationships	**Industrial barriers** Procurement law Standardised contract	**Roles & decision-making** Clear roles and responsibilities Management structure Decision-making authority **Coordination** Common management practices Shared culture Effective communication Change management Conflict Resolution **Monitoring** Formal control and monitoring Informal control and monitoring Monitoring and auditing via third party

4

Exploratory interviews

Exploratory interviews were conducted to enrich the findings in the literature review and are used as input to build a conceptual framework for the case studies. This chapter presents the information of the interviewees' and, subsequently, the results. In addition, this chapter aims to compare experts' perceptions about the topic, modify the barriers and drivers in line with the responses from the interviews, and thus modify the governance framework.

This chapter is divided into five sections. First, the interview procedure (section 4.1) and the sampling of the interviewees (section 4.2) are stated. Then, the results obtained from the exploratory interviews are shown in section 4.3. Next, in section 4.4, the final list of drivers and barriers for inter-organizational collaboration in programmes is compiled, and the governance framework used in the case studies is modified. Lastly, the conclusion of the chapter is expressed in section 4.5.

4.1. Interview procedure

Exploratory interviews were held with four experts from Witteveen+Bos. The interviews provided valuable input for understanding a programme-based approach and exploring the enablers and barriers of inter-organizational collaboration in the context of programmes. The interviews were recorded and transcribed and lasted approximately 30 minutes. In appendix B is possible to find the interview protocol used for the exploratory interviews.

4.2. Sampling of Interviewees

Table 4.1 provides an overview of the experts interviewed [coded] from Witteveen+Bos and their expertise in programmes. The criteria for selection of interviews is if they had previous experience in Dutch infrastructure programmes. Moreover, this research only held four interviews given the time constraints and number of people available. However, the sample size provided sufficient in-depth information that could draw conclusions on the topic (Kvale, 2007).

Table 4.1: Interviewee sampling exploratory interviews

Code	Department at W+B	Expertise in programmes	Date of interview
EI1	Relational contracting	Contract development of a project in a programme	28-07-2022
EI2	Relational contracting	Strategic contract advice for a programme	18-08-2022
EI3	Relational contracting	PhD in programmatic collaboration	19-08-2022
EI4	Planning studies and process management	Project manager of a programme	19-08-2022

4.3. Input from the exploratory interviews

The results and conclusions from the exploratory interviews are summarised in this section. This section presents the findings regarding the concept of programmes and the benefits of implementing a programme-based approach in the infrastructure sector 4.3.1 and their perception of the drivers and barriers in inter-organizational collaboration in infrastructure programmes 4.3.2. The results serve as input to build the conceptual framework this research uses for the case studies in Chapter 6.

4.3.1. Advantages and disadvantages of the programme-based approach

During the exploratory interviews, interviewees were asked to define a 'programme' while also providing their perception of implementing a programme-based approach in the infrastructure sector. The following are some findings from the interviews:

All of the respondents were able to define the concept of 'programmes' in a similar way, where they referred to programmes as a cluster of similar projects that are connected in some way to accomplish something greater that is not possible if the projects are in solitary [EI1, EI2, EI3, EI4]. Additionally, they mentioned some characteristics that are in line with the theory. For instance, projects within a programme must have similar types and sizes of works [EI1, EI2, EI3], the importance of learning during the programme life cycle [EI1, EI2], and how projects can be organized sequentially or in parallel to achieve the programme goals [EI1], and the long-term relationship duration [EI2]. Therefore, it is possible to conclude that the definition of programmes stated by the interviewees goes in line with the definition selected from the Project Management Institute (2017) in this study.

Moreover, the interviewees mentioned that a programme-based approach has several benefits for the organization; thus, some organizations are interested in implementing it. The following are some of the reasons why the industry is leaning towards this approach:

- The sector's challenges are getting bigger and more complex, making it impossible to handle them as one project [EI1, E14], which reinforces the problem definition stated in this research. Therefore, there is a need to be more efficient and effective [EI1].
- The programme-based approach incentives contractors to perform better and to learn as they can provide more tasks according to their performance [EI2, EI4]. It also stimulates collaboration since the client enters into a long-term relationship with the contractor [EI3], where both parties get to know each other and align their interests for the programme's benefit.

- Innovation and standardisation are key drivers for the programme-based approach because the contractor can spread out the high costs of innovation in multiple projects and by learning from each project is possible to apply the lessons learned to the next project within the programme [EI1, EI3, EI4]

Even though implementing programmes in the infrastructure sector can benefit organizations, the interviewees expressed that it is still not so commonly implemented in the infrastructure sector. The following are some reasons that the interviewees mentioned:

- The procurement law is a barrier to the programme-based approach since it is necessary to bring some competition between contractors, which limits the possibilities of using it [EI1]. However, not all the interviewees agreed that this was a limitation since it is possible that the public client can organize the programme in a certain way to comply with the procurement law [EI2]
- Programmes have an increasing interest in the infrastructure sector [EI3, EI4]; however, this approach implies that organizations need to change some aspects to implement it [EI3]. For instance, their organizational structure, governance, the contract types used, and even how the projects are financed [EI2]. Therefore, the organization's capability to transition from a project-based to a programme-based organization requires effort, and not all organizations are able to do it.
- In the past, the projects were not too complex, and thus there was no need for this approach [EI4].

4.3.2. Inter-organizational collaboration in Dutch infrastructure programmes

In the second section of the interviews, the interviewees were asked how important inter-organizational collaboration between the public client and the contractor is for infrastructure programs, as well as their perceptions of the barriers and governance mechanisms that allow these parties to collaborate toward a common goal.

Drivers
All the interviewees mentioned that due to the long-term nature of programmes, it was necessary for both parties, client and contractor, to collaborate. Also, similarly to the theory of projects, they agreed that the level of collaboration depends mostly on the complexity of the projects within the programme and the scope of the programme's goals. For instance, if the programme's goals are complex, like aiming for sustainability, there is a need to collaborate closely [EI2, EI3, EI4]. However, both organizations must know that the project collaboration might not be similar to when working on regular projects since another level is added to the governance structure [EI1, EI4]. Even though the interviewees mentioned that it was difficult to state if collaboration in programmes differs from projects, they identified aspects that characterize and drive collaboration at the programme level. The following is a summary of these aspects:

- In contrast to projects, programmes facilitate that both the client and the contractor build a **learning curve** during the programme [EI1, EI2, EI3, EI4]. The first project executed by the contractor works as a pilot to learn, which might not always be cheaper [EI4]. But the contractor can use knowledge to **perform** better in the projects within the programme [EI1, EI2, EI4].
- Collaborating can encourage organizations to find efficient ways of working, for example, developing a systematic approach [EI2] or allowing modular building [EI3], and thus, increasing **performance**.
- Certainty and predictability for future works facilitate the collaboration between the client and the contractor [EI2, EI3]. However, sometimes it is hard to predict the number of future works since the public client might not have the financial muscle to give what they promised [EI3].
- Programmes facilitate innovation as the high costs of innovation can be spread through the projects [EI3]

Barriers

Similar to the findings in the literature, interviewees mentioned that some barriers do not allow the public client and the contractor to collaborate, which are:

- Programme parties do not feel comfortable sharing their knowledge as they believe that their **competitive advantage** will be affected [EI1]. There is a lack of **trust** between the client and contractor [EI4].
- **The procurement law** limits public clients to collaborate and must ensure competition [EI1].
- There is a **high fluctuation in personal** of the project and programme teams, and therefore, it is impossible to achieve the desired learning curve and store knowledge [EI1, EI3, EI4].
- Public clients enter into a long-term agreement with a contractor, in which is a possibility that they do not perform as desired, and thus, the client gets **"stuck" with the same contractor** [EI2].
- Public clients do not providing sufficient **follow-up works** for the contractor and therefore damage their relationship [EI3].

Governance mechanisms

The interviewees were asked about their perceptions of the governance mechanisms used for inter-organizational collaboration in programme contexts. The following are the governance mechanisms expressed by the interviewees:

- **Early contractor involvement** facilitates collaboration between the public client and the contractor from the early stages of the programme [EI1].
- **Predictability of the works** can give certainty to the contractor, thus, facilitating the collaboration [EI3].
- **Clear roles and responsibilities** clarify how all actors should collaborate in a complex governance structure [EI1, EI3].
- **Aligning interests** and understanding each other's needs and objectives allow parties to bond and work together for mutual goals [EI2, EI3, EI4].
- Hiring an external **coach** facilitates collaboration between the public client and the contractor as it can serve as a mediator for putting the right discussions on the table, for conflict resolution and aligning interests [EI2, EI3, EI4].
- A **longer tender phase** can build trust between the public client and the contractor, thus, enhancing collaboration [EI1]. However, this enabler is also quite costly.
- **Building trust** is an essential enabler for collaboration; interviewees mentioned that parties need to know each other in a formal and informal setting [EI1, EI2, EI3, EI4].
- Public client and contractor representatives working for the programme level should work at a **shared location** [EI2, EI3] to facilitate collaboration.
- **Team building activities** such as project kick-off and workshops enhance collaboration [EI3].
- Including **softer aspects in the contracts**, such as the contractor's capability to work collaboratively, can facilitate a collaboration environment [EI1, EI3].
- **Senior management commitment** promotes collaborative working practices in the programme [EI2].
- **Stable teams** are considered an essential factor in enabling collaboration in programmes since, without a stable team, it would not be possible to obtain the learning curve desired in the programmes [EI3, EI4].

Analysing the exploratory interviews, it was perceived that 'Building trust' was the most relevant element for client-contractor collaboration [4/4]. However, to build trust, both parties must put effort into it by creating spaces where they can get to know each in professional settings and in a personal way. For instance, 'Aligning interests' is a critical factor for building trust, as both parties can understand each other needs and motives, finding common ground to work toward a shared goal [3/4]. Some of the interviews also mentioned that hiring an external **coach** can facilitate collaboration between client-contractors. This external party can work as a mediator that facilitates conflict resolution and support each party to learn and improve how they should work together [3/4]. Furthermore, aspects such as early contractor

involvement, knowledge sharing, shared location, commitment from senior management, shared culture, team building activities, clear goals and responsibilities and capabilities of selected partners were identified in both theory and practice of programmes. Practitioners see each aspect as crucial for improving the relationship between client-contractor. Nevertheless, the interviews also provided insights into different governance mechanisms, such as predictability of works, longer-tender phase and stable teams. Both predictability of works and longer tender phase were mentioned by only one interviewee, while two interviewees mentioned stable teams. Moreover, it was possible to infer from the interviews that there are different levels of governance in a programme; the programme level and the contracting level. This can be inferred as different governance mechanisms are established by a certain party. For this reason, the results of these interviews will be used to modify the governance framework used for the case studies, considering that the governance approach is established by two levels (see section 3.2).

Overview of findings from experts

The findings of the exploratory interviews regarding inter-organizational collaboration in programmes confirm that it is essential that the public client and the contractor collaborate closely. Nevertheless, as mentioned before, it will depend on the context where the programme evolves, which refers to the programme's characteristics, such as the complexity and type of works within the programme, the external environment, and the programme goals. Furthermore, findings from practice and theory align similarly in the case of the drivers, barriers and governance mechanisms for inter-organizational collaboration, but also new aspects were identified from the interviews. The following are new findings of drivers, barriers and governance mechanisms that are inherent to programmes according to practitioners:

Table 4.2: New findings from the exploratory interviews

Aspect	Description	Interviewee
Drivers for inter-organizational collaboration in programmes		
Standardization	Close collaboration of client-contractor in a programme can provide efficient ways of working, such as introducing systematic ways of working and modular buildings that can also be applied in future works, increasing performance	[EI2, EI3]
Certainty	The programs provide security and predictability for future work for contractors, which is why the contractor is willing to collaborate with the public client while safeguarding its reputation so that it will be considered for future programme projects	[EI2, EI3]
Barriers for inter-organizational collaboration in programmes		
High fluctuation of personnel	Most of the barriers mentioned by the interviewees were already identified in the literature. However, the high personnel fluctuation works as a barrier to programme collaboration. The exit of key programme stakeholders can make it difficult to collaborate on programs because important information may be lost, and new staff must be found and trained, which takes time. As a result, it can affect the progress the programme has made	[EI1, EI3, EI4]
Insufficient follow-up works	Cancellation of future works and insufficient follow-up work on a programme can affect the collaboration between client and contractor, as it requires a thorough preparation of the contractor's organization in terms of resources and risks	[EI3]
Governance mechanisms for inter-organizational collaboration in programmes		
Predictability of works	Clients should have a clear overview of the amount of work that compromises the programme in the early phases of the programme to provide certainty to the contractors	[EI3]
Longer tender phase	Extending the tender phase can facilitate the collaboration between client-contractor as they can get to know each other better before the execution of works, increasing the trust between them	[EI1]
Stable teams	Creating stable teams in the programme can ensure that essential information won't be lost, facilitating learning curves, and thus, collaboration	[EI3, EI4]

4.4. An adapted list of drivers and barriers and modification of the governance framework

The exploratory interviews provided new findings regarding drivers, barriers and mechanisms for inter-organizational collaboration in programmes. The new drivers and barriers are incorporated in the preliminary list built in the literature review, which are differentiated using a green font colour. It is important to mention that even though the practitioners did not mention each of the drivers and barriers found in the literature for inter-organizational collaboration in programmes, a vast majority of them were covered. The reason behind this was that the interviewees were given freedom during the interviews to express their most important opinion on both drivers and barriers instead of discussing each driver and barrier found in the literature. The new findings were placed in the corresponding categories identified previously. The following list 4.3 is the compilation of the findings from both literature and exploratory interviews.

Table 4.3: List of drivers and barriers for inter-organizational collaboration

Category	Drivers	Category	Barriers
Social drivers	Reducing opportunistic behaviour Effective resolution of conflicts Building long-term relationships Maintaining previous relationships	Cultural barriers	Conservative culture Loss of identity Adversarial attitudes Different goals and cultures Short-term perspectives Exclusion of key actors Uncertainty
Knowledge-related drivers	Innovation and technology Generating new knowledge Better transfer of knowledge Improving learning curve Standardization of works	Organizational barriers	Lack of new competencies Traditional organizations Late involvement of the contractor Lack of commitment Loss of control and power Lack of experience High fluctuation of personnel Insufficient follow-up works
Economic drivers	Better distribution of risks New resources and capabilities Increasing competitiveness Increasing performance Certainty of works	Industrial barriers	Procurement law Standardised contracts

Furthermore, the exploratory interviews provided new mechanisms inherent to programmes. Hence, the governance framework from Kujala et al. (2021) (see figure 3.1) is modified as shown in figure 4.1. The framework modification consists of implementing in each dimension the findings from table 3.1 and the findings from the exploratory interviews. The framework provides an overview of the governance mechanisms that can be used in the early phases of a programme to enable inter-organizational collaboration.

1.1. Joint performance goals
1.2. Clarity of the goals
1.3. Flexibility of the goals
1.4. Predictability of works
1.5. Longer tender phase

6.1. Formal control and monitoring
6.2. Informal control and monitoring
6.3. Monitoring and auditing via third party

2.1. Selection of capable partners
2.2. Training & continuous learning

5.1. Common management practices
5.2. Shared culture
5.3. Effective communication
5.4. Change management
5.5. Conflict resolution
5.6. Stable teams

3.1. Rewards tied to performance
3.2. Risk sharing mechanisms
3.3. Reputation

4.1. Clear roles and responsibilities
4.2 Management structure
4.3 Decision-making authority

Figure 4.1: Modification of the governance framework for the case studies

4.5. Conclusions from the exploratory interviews

In the Netherlands, public clients have become increasingly interested in implementing a programme-based approach. Public clients bundled projects to overcome the challenges they currently face, such as the increase in public works renovations and the fragmentation that has caused project delays and cost overruns. From the exploratory interviews, it can be concluded that the industry is aware of the benefits programmes could bring to organizations in the infrastructure sector. For instance, implementing programmes in the Dutch infrastructure sector improves the efficiency and effectiveness of how projects are executed. In addition, they stressed that collaboration is vital when dealing with highly complex programmes, as it is necessary to work together to achieve the demanding objectives of the programme. The exploratory interviews enriched the results of the literature review. Thus it is possible to answer SRQ2 and SRQ3, where an adapted list of drivers and barriers for inter-organizational collaboration in programmes was compiled, as well the governance framework selected in chapter 3 was modified, according to the findings of this chapter.

Furthermore, the interviewees emphasized that the level of collaboration required between the client and the contractor will depend on the characteristics and objectives of the programme. However, programmes require collaboration between multiple organizations in order to create synergies between the projects. For instance, collaboration in programmes facilitates sharing knowledge and resource pooling, allowing them to learn from each other or even develop something new. If the collaboration is effective during the projects within the programme, it will establish long-lasting relationships that will provide the opportunity to work together on future projects. Furthermore, during the interviews, it was possible to identify motives intrinsic to infrastructure programmes, which were the possibility of creating standardisation within the programme, increasing the learning curve, and providing certainty for future work. However, to achieve these benefits, certain governance mechanisms need to be implemented that incentivize the parties to work collectively for them. These aspects show the potential of the programmes in the infrastructure sector, as they will allow for more project efficiency. For instance, parties can learn from previous mistakes and improve them in the consequent projects of the programme, as well as introduce standard ways of working that will shorten the project's life cycle.

The relationship between the client and the contractor is crucial to the programme's benefits. However, organizations are used to working traditionally, where distrust and self-interest are intrinsic factors in these companies. In line with the literature, interviewees mention that distrust is the main reason why these parties in programmes do not want to collaborate and usually have different interests. They be-

lieve they will lose their competitive advantage and fear signing long-term contracts with a partner who does not perform as expected. In projects, organizations hide behind formal agreements with little focus on collaboration to safeguard their culture and individual objectives. In infrastructure programmes, interviewers also mentioned relevant reasons why clients and contractors do not collaborate effectively. For example, fluctuating staff prevents knowledge from being safeguarded in the programme and leads to reprocessing, as incoming people need to be trained and brought up to date. Consequently, public clients must have clarity from the start of the programme on the number of works to be carried out throughout the programme, as insufficient numbers of future projects will not encourage contractors to be willing to accept so much risk. Furthermore, promising a fictitious number of works will damage the relationship between these two parties.

To promote good client-contractor relations in infrastructure programmes, it is necessary to organize governance following the programme's objectives. From the programme's initial phases, the public client must establish certain governance mechanisms to facilitate the relationship between organizations. Literature and interviews highlight that building trust and aligning interests (to work towards a mutual goal) is most important to achieve collaboration between the two parties. For instance, joint development of the goals, flexibility and clarity of the goals are some mechanisms that contribute to aligning the different interests of the parties. In addition, early contractor involvement contributes to building trust and helps the public client to gain crucial knowledge in the early phases of the programme. Moreover, it is important to note that governance mechanisms should focus on both hard and soft aspects while selecting capable partners and control mechanisms. In this way, it allows the parties to get to know each other in an informal setting that helps the relationship to flourish while reducing conflict. During the interviews, the formation of stable teams was highlighted as being of great importance, as without them, it will not be possible to obtain the lessons learned that will lead to increased performance and a learning curve. Promoting stable teams in the programme would overcome the barrier of high personnel fluctuation. Similarly, the lengthening of the tendering phase is a mechanism that the interviewees also mentioned. This mechanism can contribute to better aligning culture and interests, creating commitment and establishing how they will work together for the rest of the project. From both literature and interviews, it is concluded that without these mechanisms in a programme, it would be impossible to get these parties to collaborate in the desired way towards a mutual goal.

For this reason, the governance framework set out in this chapter (see figure 4.1) is used in the case studies to understand the governance approach and the mechanisms that were used in the early phases of the programme to facilitate collaboration. The 22 governance mechanisms identified will be reviewed in the case studies. Moreover, by using the framework 4.1, it will be analysed whether or not these mechanisms were appropriate to the programme and whether they contributed to the relationship between different programme parties.

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Methodology in-depth case studies

The study's empirical portion is to better understand the inter-organisational collaboration between the contractor and the public client, how governance is organized, and which governance mechanisms were used when using programmes in infrastructure programmes. A case study is selected to gain concrete, contextual, in-depth knowledge about the topic of interest (Yin, 2018). Two case studies were chosen for this study as it is advised to use a minimum of two comparative case studies to eliminate the possibility of deductive theory confirmation (Yin, 2018). The case studies will be compared and analysed using the applied thematic analysis by Guest et al. (2011).

This chapter is divided into four sections. First, section 5.1 describes the selection criteria used in this research for choosing the case studies. Second, after an established selection criteria, two cases are selected and are briefly described in the section 5.2. Then, in section 5.3 the data retrieving process for the case studies is explained. Finally, section 5.4 defines essential concepts for this research providing clarity to the reader.

5.1. Case selection criteria

Selecting appropriate case studies is crucial for conducting a multiple case studies methodology. Thus, before collecting data, it is necessary to conduct a screening procedure to identify suitable cases for the research (Yin, 2018). In this research, the screening will involve querying people knowledgeable about the potential case studies. Some criteria have been identified to streamline the case selection. The following are some of the criteria:

1. **The case study must follow programme criteria:** As mentioned in the literature study, people may misinterpret the definition of a programme. Therefore, it is essential to verify if the selected cases follow the definition and characteristics previously stated in chapter 2.

2. **The case study is an infrastructure programme in the Netherlands:** All case studies must be infrastructure programmes. This scopes down the number of programmes suitable for this research study. Additionally, various types of infrastructure programmes were selected so that the outcome of this research can be suitable for any infrastructure programme. However, all the programmes should be located in the Netherlands to be comparable in context.

3. **The programme typology must be compliance programme:** As mentioned in chapter 2, programmes can be classified into different typologies. In this research study, the types of programmes suggested by OGC (2011) are selected as it focuses on the urgency of the programme's creation. However, this research focuses solely on the category of compliance programmes, in order to be comparable to each other. In other words, the programme are externally driven by the need to comply with new laws and regulations set by the government (Prevaas, 2018).

4. **The cases selected must have already passed or are at the end of the early phase of the programme:** As stated in chapter 2, programmes follow a cyclic lifecycle consisting of five main phases: (1) initiation, (2) definition and planning, (3) project delivery, (4) renewal and (5) dissolution. The early phase is the combination of phases (1) and (2), as it is the focus of this research

study since it is when public clients organize programme governance. Therefore, to be able to able to analyze the governance approach in each case study, they must have finished or are finalizing the early phase.

5.2. Cases selected

Based on the previously mentioned criteria, two different Dutch infrastructure programmes have been selected for this research study—the Flood Protection Programme (HWBP)[1] and the Multi-Annual Noise Remediation Programme (MJPG) [2]. The nomenclature of each programme comes from its name in Dutch.

5.2.1. Brief description of the HWBP

The Flood Protection Programme (HWBP) is the largest dyke improvement operation in the Netherlands, which compromises more than 1500 km of dykes and 500 locks and pumping stations. The aim is to reinforce all primary flood defences in an austere and effective manner by 2050 to comply with the water safety standards.

Figure 5.1: Dutch Flood Protection Programme (Source: (Avoyan, 2022)

5.2.2. Brief description of the MJPG

The Multi-Annual Noise Remediation Programme (MJPG) covers the planning and execution of noise-reduction measures along national highways and railroads as a result of noise laws. This includes identifying all remediation objects along all national roads and railways in the Netherlands, designing effective measures based on detailed acoustic studies, developing remediation plans, incorporating remediation plans into the formal public consultation procedure, managing public consultation communication, and ensuring the feasibility of noise-reduction measures. The main objective of the MJPG is to reduce noise along national highways and railroads in compliance with existing legislation and regulations by 2027.

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[1] Hoogwaterbeschermingsprogramma
[2] Meerjarenprogramma Geluidsanering
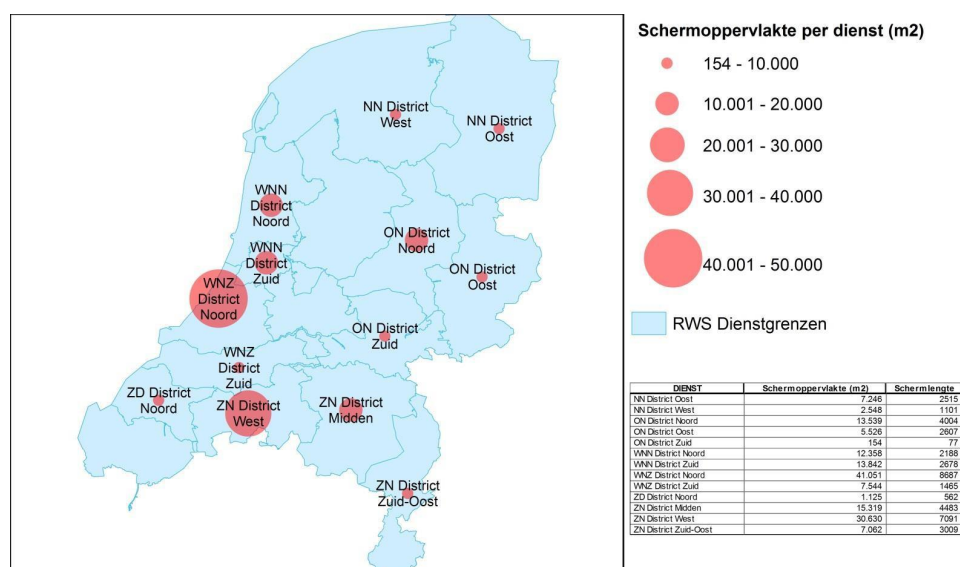
Figure 5.2: MJPG national highways (source: Market consultation 2019)

5.2.3. Overview of selected cases

In table 5.1, the criteria of each programme are shown.

Table 5.1: Criteria cases selected

Criteria	HWBP	MJPG
1. The case study must follow programme criteria		
Multiple interdependent projects	✓	✓
Organisation of projects	Parallel and sequentially	Parallel and sequentially
Duration	2020-2050 (30 years)	2015-2027 (13 years)
Sharing common resources	✓	✓
Centrally controlled	✓	✓
Complexity	Different water authorities working for 1500 km of dikes and 500 locks and pumping stations. Many stakeholders are involved	Different stakeholders are involved. Introducing complex tasks regarding circularity and biodiversity in 150 noise barriers
Primary goal	Reinforce all primary defences to meet statuary standards	Repair or build noise barriers to comply with the legal limits established
Secondary goal	Innovative solutions to guarantee efficiency and affordability	Ensure the re-use of materials and the use of natural resources, ensuring circularity and promoting and encouraging biodiversity at the noise barriers

Criteria	HWBP	MJPG
2. The programmes are infrastructure programmes in the Netherlands		
Location	Across the Netherlands	Across the Netherlands
Infrastructure programmes	✓	✓
Type of assets	Dikes, locks and pumping stations	Noise barriers
3. The programmes typology is a compliance programme		
Typology	Compliance	Compliance
4. The programme is or has already passed the early phase		
Current stage of programme	Project delivery	Last phase of plan development

5.3. Data retrieving process

Both programme documents and semi-structured interviews with participants are undertaken to collect data. Programme documents were solely retrieved from the internet. The interviewees correspond to professionals in the programme and are associated with the client or contractor. Therefore, using several input sources in a case study provides a more comprehensive interpretation (Yin, 2018). Furthermore, using different sources can complement each other and provide more accurate results (Yin, 2018).

5.3.1. Reviewing programme documents

Publicly available documents were retrieved from the internet to identify relevant information related to this research study's six governance dimensions. In appendix C.1, it is possible to find the programme documents used in this study and the information they intended to obtain from them.

5.3.2. Semi-structured interviews

Semi-structured interviews are conducted for each case study to test and enhance the conceptual framework selected in the previous chapter. Semi-structured interviews were selected since they allow the researcher to ask more questions regarding a particular subject (Kvale, 2007). The interview questions were designed to address how the governance was organized during the early phases of a programme, covering the different dimensions identified in the governance framework to understand which mechanisms facilitate the collaboration client-contractor. Due to the time constraint, a minimum of four interviews were conducted in this research to collect information and to ensure continuity per case. However, the sample size provided sufficient in-depth information that was necessary to draw conclusions about the governance approach in each case study.

The interviews are conducted with people with different roles in the programme to illuminate how different parties perceive the governance approach. Therefore, this research interviewed people representing the public client and the contractors to get the perspectives of both sides. However, since the research focuses on the early phases, the contractor may not yet be selected. For this reason, instead of interviewing someone from the contractor side, people from the engineering firm working closely with the public client are interviewed to get insights on what is expected to happen related to the client-

contractor relationship. The criteria for selecting the interviewees are that they should be (1) linked to the public client or contractor, (2) involved in the programme as early as possible and (3) should have sufficient knowledge of how the programme governance was organised. The interviewees' profile is shown in table 5.2. Each interviewee was coded by [nomeclature of the programme]+[order of the interview].

Table 5.2: Interviewee sampling case studies

Programme	Participant	Code	Date of interview
Flood Protection Programme (HWBP)	Project control (Contractor)	HWBP1	20-09-2022
	Contract manager (Client)	HWBP2	23-09-2022
	Tender strategy (Linked to client)	HWBP3	28-09-2022
	Project Manager (Contractor)	HWBP4	04-10-2022
Multi-Annual Noise Remediation (MJPG)	Contract Manager (Client)	MJPG1	12-09-2022
	Project Manager (Linked to client)	MJPG2	14-09-2022
	Systems engineer (Linked to client)	MJPG3	15-09-2022
	Procurement advisor (Client)	MJPG4	21-09-2022

Before approaching the interviews, it was necessary to ask for permission from the public client if the research could use the programme as a case study; for this reason, a one-pager (see appendix C.2) was created and was sent to the public client via Witteveen+Bos contacts. Moreover, all potential interviewees were approached via email, explaining the research topic and the purpose of the interview (see Appendix C.3). Most of the interviews were conducted through Microsoft Teams since it provided flexibility. Additionally, an informed consent was shared to ensure that interviewees agreed on how the data was managed in this research—for instance, ensuring that all participants agreed on the consent to record the interviews as it helps the researcher focus on the conversation rather than taking notes. Appendix C.4 shows the interview protocol followed during the interviews. The interview protocol was divided into five main parts. Firstly, a brief introduction was provided of the research, the researcher, and the data management plan. Then, the second part was intended to ask general questions about the interviewee and the programme itself. Thirdly, the interview covered the six dimensions of the theoretical framework. Lastly, the fourth and fifth part was intended to wrap up the meeting by getting insights into the lessons learned and the most significant challenges they experienced.

5.3.3. Methodology for data analysis

As the research compromises a case study research, qualitative data analysis methods are frequently used for this type of research (Verschuren & Doorewaard, 2010). This research works with different data sources, for instance, interviews and programme documents. The applied thematic analysis is used in this research to analyse the data collected from the case studies. The applied thematic analysis is a data analysis procedure that entails combing through data collection, identifying patterns, methodically coding, generating themes, and developing a story (Guest et al., 2011). According to Guest et al. (2011) is the most effective method for capturing the nuances of meaning inside a textual data collection, and thus it is suitable for this research. The following figure 5.3 shows the procedure of the applied thematic analysis that was followed in this research:

- **Data collection:** This research uses two different types of sources for data collection-interviews and documents. On the one hand, the documents were selected according to the information they contained. On the other hand, the interviews conducted were transcribed in order to be able to code the information. A brief summary of the interviews is provided in Appendix C.6
- **Create initial codes:** The initial codes were determined by deductive analysis, meaning that the 22 governance mechanisms established in figure 4.1 are used for the qualitative analysis. In appendix C.5, it is shown the 22 codes with their corresponding keywords.
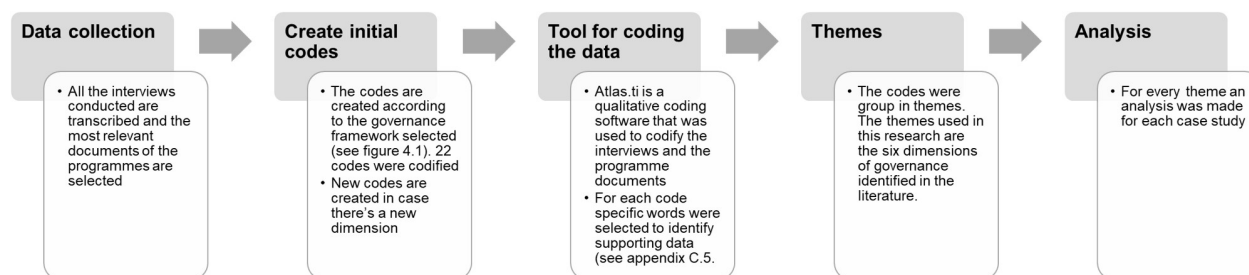
Figure 5.3: Methodology for data analysis according to Guest et al. (2011)

- **Tool for coding the data:** Atlas.ti is a qualitative coding software that was used in this research to codify the documents and the interviews. Using keywords facilitated the identification of quotes and valuable information in the collected data. This process was performed for both cases. In appendix C.7, it is presented the results of the coding for both cases using the coding software.
- **Themes:** Ones the documents and the interviews were coded, the information was clustered into themes. The themes selected in this research are accordingly to the six dimensions of governance that were identified in the chapter 3-goal setting, capability building, rewarding, roles & decision-making, coordination, and monitoring.
- **Analysis:** The coded data in the themes were analysed thoroughly. The results of the analysis follow a narrative going through each dimension respectively in order.

5.4. Defining essential concepts for the case studies

For this research, it is necessary to define some concepts to clarify for the reader. Therefore, concepts such as contractor and client are defined, and their roles in the programmes are expressed.

5.4.1. Definition of public client

Public clients in the Dutch infrastructure sector are legal entities that design, purchase, and deliver infrastructure projects via a supply chain process that includes purchasing and selling responsibilities. The term 'public client' refers to the contracting authority in the Netherlands, which compromises: *"the central government, a province, a municipality, a water authority or an institution under public law"* (PIANOo, 2014). Regardless of its jurisdiction, each contracting authority is responsible for managing its public procurement procedure.

In infrastructure programmes it is possible to find multiple public clients, but there would be only one contracting authority responsible for the procurement procedure. The role of each public client will vary depending on the programme and the needs of the programme. Hence one public client may be in charge of structuring the programme, while another public client is responsible for purchasing and delivering the projects within the programme. For this reason, in this research, the public client refers to all the legal entities involved in the programme, while contracting authority refers to the one responsible of tendering the projects within the programme.

5.4.2. Definition of contractor

A contractor, also known as the main or prime contractor, can be either an organisation (or occasionally a person) or a group of people who work together in a consortium that the public client hires to execute a construction project. Usually, this main contractor does not have all the expertise to execute the project; thus, they involve sub-contractors. Hence, contractors are responsible for managing the rest of the supply chain to ensure the completion of the project and are accountable for the quality of the work being delivered to the public client. On the other hand, public clients are responsible for selecting appropriate contractors to execute the works. Therefore, it is essential to mention that contractors are significant actors; without them, delivering the project would be impossible.

Contractors in infrastructure programmes are responsible for carrying out and executing the projects within the programme. Therefore, it is possible to find many contractors involved in programmes. Therefore, a contractor in this research would be any organisation or consortium responsible for executing the projects within the programme. Moreover, if the contractor is still not selected for the programme, they will be referred to as the market instead of calling them contractors.

Case studies: Results and analyses

This chapter aims to answer *SRQ4: What governance mechanisms are present in ongoing Dutch infrastructure programmes and what governance mechanisms do these cases share?*.

After conducting the interviews and reading the programme documents, all the collected data are analysed separately for each case study. This chapter provides the findings of these analyses, which is divided into four main sections. Firstly, in section 6.1 and section 6.2, the case studies are presented correspondingly, expressing their programme goals and organisational structures. It also provides the results from each case study based on the six governance dimensions. Then, in section 6.3, the governance mechanisms identified in each case study are compared to find similarities and differences that can be translated into lessons learned. Finally, section 6.4 provides the conclusions for this chapter.

6.1. Flood Protection Programme (HWBP)

6.1.1. Characteristics of the HWBP

The HWBP aims to comply with the safety standards by reinforcing all primary flood defences in an austere and effective manner before 2050. The goals of HWBP are to increase effectiveness and improve efficiency, in which they have the target to complete an average of 50km/year and reduce the cost per kilometre. Currently, the programme compromises more than 1500 km of dikes and 500 locks and pumping stations. However, the number of works varies depending on the water authorities' assessment of the flood defences. The water authorities must undertake assessments every 12 years to ensure that flood defences continue to fulfil legislative criteria. If the criteria are not satisfied, the responsible authority may request funds through the HWBP.

In 2012, the central government, represented by Rijkswaterstaat (RWS) and 21 water authorities, allied to protect the country against flooding. They are responsible for the programme's implementation, financing and knowledge development. They work together based on six alliance principles: best for the programme, solidarity, pure in their roles, transparency, predictable and surprise-free and reliable. In addition, they introduce development themes along the programme that add value and contribute to the realisation of the goals and ambitions of the programme. For instance, they focus on spatial quality, sustainability, sharing essential knowledge, and dealing with the market, among other things. The alliance partners acknowledge the importance of working with the market to achieve the programme goals. Moreover, the strategy from the HWBP is to have a controlled realisation of the task by focusing on the regulated realisation of the reinforcement task while being sufficiently flexible to adapt to changes and demands in the environment. Table 6.1 shows an overview of information about the HWBP:

Table 6.1: Flood Protection Programme Overview

Aspect	Description
Organization	Rijkswaterstaat and 21 water authorities
Contracting Authority	water authorities
Duration	2020-2050
Compliance Programme	Reinforce all primary flood defences to meet statuary standards
Secondary Goals	Innovative solutions to guarantee efficiency and affordability. As well as implementing development themes when possible
Drivers for collaboration	Protect of the Netherlands against floods while introducing sustainability and innovative solutions. Efficiency, better transfer of knowledge. Increasing performance. Continuous learning and development.
Barriers for collaboration	A high number of different organization, where each organization have different goals and cultures, and are considered a traditional organization. Also, there is a lack of experience in using programmes in the infrastructure sector. High fluctuation of personnel can affect the progress of the programme.

Organizational structure HWBP

The HWBP consists of multiple public clients and main contractors. The organizational structure of the HWBP is shown in figure 6.1. The programme board is responsible for administrative responsibilities and compromises equal representation of directors from the water authorities and Rijkswaterstaat. The programme directorate governs, facilitates, and tests the implementation of the HWBP. In addition, the programme directorate manages the alliance's available resources in an economical, efficient, and regulated manner to fulfil the programme objectives collectively. Also, the programme directorate has a sparring partner, the directors' council, who provides advice and focuses on the long-term strategic agenda of HWBP. The directors' council consists of secretary-directors of the four regions of the water authorities and directors of RWS and the Ministry of Infrastructure and Water Management.

Moreover, the meeting of official principals (BAO)[1], compromising members of the water authorities and RWS, link administrative and tactical issues and operational project implementation. Essential elements such as annual production, knowledge development, and planning are prepared and discussed between members of the BAO and the programme directorate. Each water authority is responsible for the planning and execution of the projects, and each project team can ask for help from the guidance teams. The guidance teams are formed by the programme directorate, which consists of: (1) a programme supervisor, (2) a team member that focuses on control, and (3) a team member that focuses on technology, knowledge and innovation-it can also be filled by other professionals such as programme management, administrators or the market. However, this will vary depending on the phase of the project. The primary responsibility of the guidance team is to support project teams of the HWBP to achieve the programme goals.

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[1]BAO: Bijeenkomst Ambtelijke Opdrachtgevers
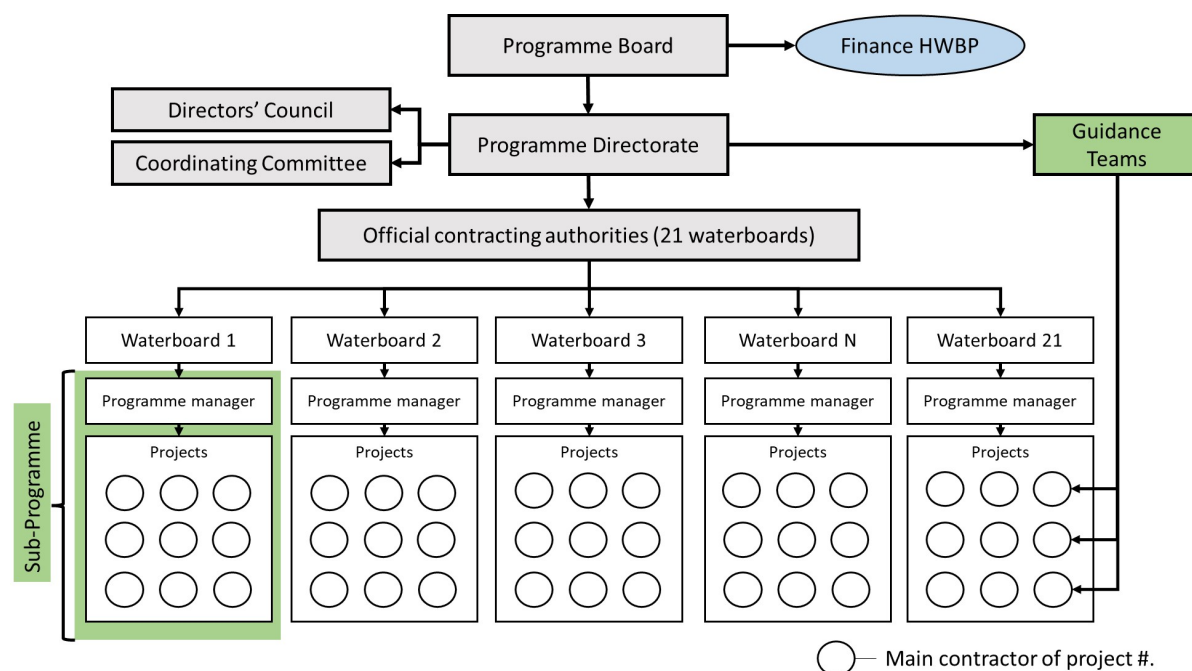
Figure 6.1: Organizational structure of the HWBP (own compilation)

6.1.2. Governance approach in the HWBP

Goal-setting

The water authorities (21 water authorities) are in charge of 90% of the principal flood defences, while RWS is in charge of the remaining 10%. The flood defence assets must be assessed every 12 years to satisfy the statutory protection level. Based on this shared duty, an implementation organization comprised of the water authorities and central government members was established in 2012 to establish the HWBP further and begin the reinforcing work. The state covers the entire cost of upgrading flood barriers under the RWS authority. At the same time, the HWBP finances the costs of establishing and upgrading primary flood defences managed by water authorities (up to 90% of estimated costs). As a result, the assets assessed by the water authorities that do not meet the safety standards can be submitted to the HWBP. Hence, the programme's ability to *predict works* within the HWBP, will depend solely on the regular assessment of the water authorities.

Moreover, the programme's mission, established by the alliance between the water authorities and RWS, is that all principal flood defences must satisfy applicable criteria by 2050. This is possible by reinforcing defences and engineering structures and fulfilling other social goals such as spatial quality and sustainability. To achieve the mission and the end goal, the HWBP intends to strengthen an average of 50 kilometres of primary defences yearly while keeping the average cost per km under €7 million. The programme directorate provides *clear goals* and frameworks to the contracting authorities to prepare and implement the reinforcement tasks:

> "The programme goal is very clear. In the year 2050, we must make the Netherlands resistant to high water levels and also, the budget for those projects is already reserved. It's about 1800 kilometres to reinforce. It's a clear programme. We have designed rules which need to be followed. We started with the projects which have the most impact on safety, and we will end with the smaller projects" [HWBP1].

> "..the programe goals should be 1:1 with project goals. So if you achieve a project goal, it should fit into the programme goals. That is the main rule which we obey" [HWBP4].

Furthermore, *flexibility* is essential for achieving the programme's goals. For instance, the HWBP

acknowledges that the approach must be flexible, providing sufficient room for the water authorities to include and respond to other development themes (HWBP, 2019). For this reason, HWBP has included special schemes that provide grants to the water authorities when innovation and new techniques are included in the projects of the HWBP. In sum, some requirements and guidelines are drawn up as HWBP, and the requirements are flexible enough for the water authority to decide which approach will take and transfer these requirements to the project level:

> "The programme funds 90% and the water authority for 10%, so of course, HWBP can demand that projects are delivered, but it is up to the water authority how they will do it. But they have to make a plan upfront and show how they will do it to the programme level, so the HWBP can give inputs or don't give the funds if it's not done properly. On a high level, the programme level asks some requirements to the client, and those requirements from the programme to the water authorities are also transferred to the contractor, but they can be changed to some extent" [HWBP3].

Flexibility in the HWBP is reflected in the fact that the contracting authorities can select the market approach that suits best the projects. Moreover, in terms of *joint performance goals*, the interviewees acknowledge that when it is included sustainability and innovation in their project, early contractor involvement is critical to translating the programme's objectives and understanding how the water authorities and contractors can achieve these goals:

> "Personally, I think we can only achieve this goal by collaboration. Because otherwise, we don't have enough capacity to make it. So, we must collaborate on the aspects of open knowledge, innovation, and ways to collaborate. And we also do it a lot as a market; although we are competitors, we share knowledge about innovations and how we collaborate in the project to help each other to get to a higher level. And that way, we want to achieve the goal of 2050" [HWBP1].

> "..the client and the contractor are equivalent in collaboration because you, as a client, can use the contractor's experience in the early stage of the project. And that's important because you can reduce the risks and the issues and discuss these aspects before you set a price. The contractor has a lot of experience with risks in these types of projects, and you, as a client, can use their experience in the early stage; you can see all the risks and all the potential costs, and then you can look at the building of the project totally insightful. And then you can ask the HWBP, I need a hundred million euros, and then I can build this dike. And that's very important in the early stage.." [HWBP2].

One of the contractors mentioned that the early contractor involvement in the projects of HWBP differs from the regular projects because the contractor does not only share their knowledge but is involved in the design and development plan of the project, which intrinsically *elongates the tendering phase* [HWBP3] [HWBP4]. Moreover, although it is highlighted that early contractor involvement at the project level can help reduce risks and provide a better plan development to the HWBP, interviewees mentioned that not all water authorities implemented it in the projects. For instance, one mentions:

> "This is my first real big collaboration work with the construction team. Other projects that I have participated in the HWBP, were purely traditional, so engineering and construct design and RAW. So we also had no designing component but only built. But there is a tendency that collaboration is coming. But this is my first big collaboration project" [HWBP4].

Early contractor involvement in the projects has been a governance mechanism used by the contracting authorities that have shown that it contributes to a better alignment between the contractor and the client, overcoming cultural and organizational barriers for inter-organizational collaboration. Early contractor involvement promotes *joint performance goals* while *extending the tendering phases* and reducing project risks. Additionally, when contracting authorities do not have a straightforward approach for a specific project, guidance teams formed by the programme directorate provide support, and advice, steering contracting authorities by using project start-ups to formulate the best market approach. Similarly, Taskforce Deltatechnologie, a mix of client and market experts, can advise the contracting authorities during the early stages to select an appropriate market approach [HWBP2]. Thus, advice from the guidance teams and the Taskforce Deltatechnologie can be seen as valuable input for the *joint performance goals* of the programme.

Capability Building

Capability building compromises the selection of capable partners and training & continuous learning. In terms of *selecting capable partners*, as mentioned previously, the contracting authorities have the freedom to select the tender strategy that best suits their projects. The HWBP created the "Planning Guide (HWBP, 2014)", a guideline for the contracting authorities to select the partners, stating several advantages and disadvantages of different types of contracts when implemented for the HWBP projects. The guideline also states that the water authorities can focus on process and product when selecting the contractor. For instance, the contractors interviewed mentioned that the contracting authorities during the first phase of the tender focused mostly on hard aspects, referring to the technical expertise of the contractors, where they "should have done some dike reinforcement in the past" [HWBP3]. During the second stage of the tender, the contractors were evaluated according to soft aspects (e.g. their perspective regarding collaboration). Questions such as 'what is your vision for collaboration?' or 'which aspects are important in collaboration?' were asked by the client to the contractors:

> "The selection of the contractor was a two-stage approach. First, from many contractors to a selection of 3-4 contractors. And then from 3-4 contractors to 1. During the first stage, we look into more hard aspects, and then during the competitive dialogue, we can get to know each other, by interviewing them and speaking to them. The more compatible for us the more points for the contractor" [HWBP2].

> "..in the tender, we were not scored or judged on our price, but we were only scored on our plan, the quality of the plan, and how it helped to achieve the objectives. Also, we were scored and judged by the people working on the project. So the capabilities of the people were very important for the water authority, and judgment for the contractor was involved with that. So that was a pretty big thing. If you look at the normal projects, that's not how it's done" [HWBP4].

The contractors and the contracting authorities acknowledge that the selection criteria are challenging for both parties. For the public client, "selecting appropriate criteria is challenging" [HWBP1], but the HWBP gives enough "freedom to choose the best suitable partner" [HWBP2]. Similarly, the contractors mentioned that the contractors during this phase need to be aware that everything that they are promising has to be realized. Hence, honesty and openness are key factors during the tendering phase [HWBP4].

On the other hand, regarding *sharing knowledge and continuous learning*, it is considered as one of the most critical aspects of the HWBP. For instance, the HWBP highlights that continuous learning and improvement by sharing knowledge contributes to a more effective and efficient process (HWBP, 2019). As a result, the programme directorate assists programme managers in building and sharing expertise through guiding teams and cross-project explorations (POVs[2]). The aim of the POVs is to gather the lessons learned from innovative projects inside the HWBP and be able to apply these lessons in future projects. This platform facilitates sharing of innovative knowledge in the programme. Additionally, the HWBP invests in staff training which allows a better sharing of knowledge and experiences inside the HWBP. Although the interviewees mentioned that there are some practices to share knowledge between the different parties in the programme, it is still constrained compared to the size of the programme:

> "Sometimes we do visits to other projects from other water authorities and they do visits to our project. We listen, and we learn. We talk about the project and the innovation, and people listen, but they do their own thing in the end. I think we can learn much more from other water authorities" [HWBP2]

> "Personally, I think sharing knowledge in the programme is done too little. It could be done more. There are some events in the Netherlands where the market and the clients share knowledge, but it's once a year.." [HWBP4].

> "To reach the programme objectives, we as a sector should be more efficient and effective in our way of working. And therefore, I think the POVs were set up, and they aim to learn

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[2]Project Overstijgende Verkenningen

and share knowledge, but you can only do it if there is a proper price. The collaboration is
also enhanced by this market vision, about sharing knowledge" [HWBP3].

In the programme, it is possible to identify that the knowledge-sharing can be between the programme
level to the project level and between projects. However, although the HWBP implement mechanisms
to facilitate knowledge-sharing between actors in the programme, they still experience some barriers to
sharing knowledge. For instance, one interviewee experiences that sharing knowledge between con-
tractors is complex and that the market experience the phenomenon of coo-petition in this programme:

"Sharing knowledge between contractors is complicated; I mostly see this so-called phe-
nomenon of coo-petition. It's cooperation and competition at the same time. But only a few
companies can maintain this coo-petition in this sector. It's our mutual goal to reduce risks
and lower cost levels. So sharing knowledge between us will help too" [HWBP1].

Rewarding

At a programme level, the HWBP incentives innovative projects by providing grants to these types
of projects. Thus, innovative solutions are rewarded. Moreover, regarding *risk sharing mechanisms*
in the HWBP, the contracting authorities choose a contract which influences the distribution of tasks,
roles, responsibilities and risks between the water authorities and the contractors. However, for the
contractors and the clients, the basic principle of risk allocation is that the risks are borne by the party
that is best able to bear them:

"In the mainstream, you allocate the risk to the party who can best manage the risk. So there
are particular risks we as a contractor can manage best, and those are risks set to the client.
And in the HWBP, when there is a risk that no one can manage (client or contractor), we
call it exogenous risk, is allocated to the HWBP. So, each risk is allocated. The main idea is
that the party who can manage the risk, the risk is allocated to that party" [HWBP4].

As a results, risks are allocated fairly to the party that can manage them better. However, when there
is early contractor involvement during the project's design process, a scenario is established in which
joint responsibility for the proposed solution and the related risks is assumed, thus, fostering a sense
of ownership among the contractor and the water authorities. As a result, the risks are shared by both
the client and the contractor:

"In the first phase, which was the design phase, we had one risk register together. So, the
risks were not divided but shared. That worked well because we worked jointly on risk
management, openly and with mutual goals. And now in the second phase, we have clearly
allocated the risks described in the contract. But at the same time, we manage to keep the
same level of mutual responsibility for all the risks. So, we help the client and the client help
us" [HWBP1].

On the other hand, in terms of *reward mechanisms tie to performance*, apart from subsidies provided
to innovative projects, contractors believe that collaborating with the contracting authorities is a reward
because they "can work faster with fewer disputes" [HWBP1]. In addition, the contractors interviewed
consider that selecting the contractor according to how well they collaborate is seen as a reward:

"I think the benefit of the selection criteria for the contractors, is that openness is being
scored. Normally, if openness is not taken into the criteria, you must go on price or planning
or that sort of case. So, openness and honesty are rewarded. And I think the water authority,
HWBP, and RWS benefit because the contractor is also responsible. Not in a hard aspect,
but in a soft way, in which the contractor feels responsible for the result of the project, feeling
also responsible for the risks like the water authority and the HWBP. And I think that is a
huge benefit" [HWBP4].

Reputation is essential to HWBP contractors, which is why they strive to build trust and demonstrate
openness in their work. For example, one contractor mentioned that they build a good reputation during
the work to generate opportunities for future projects [HWBP4]. Similarly, another contractor mentioned
that when a contractor has a good reputation in the programme, they can ensure that they can stay
involved in the programme until the end of the programme, ensuring work for the following years to come
[HWBP1]. Therefore, contractors see collaboration and strive for early contractor involvement as they
find it beneficial because it allows lower risks profile for them while securing future work [HWBP3].

Roles and decision-making

The programme uses different governance mechanisms for roles and decision-making. For instance, the *roles and responsibilities* of RWS and the water authorities around the HWBP are clearly defined in the "bestuursakkoord water", the administrative agreement on water. As mentioned before, RWS and the water authorities have a joint responsibility in reinforcing all the primary flood defences in the Netherlands. The HWBP programme directorate supervises the project teams. It assesses grant applications submitted by water authorities and contractors and provides direction and support on the joint development themes chosen by the alliance. In contrast, the water authorities manage and execute the projects.

In comparison, the roles and responsibilities of the contractors vary depending on the market approach selected by the contracting authorities. If early contractor involvement is applied, where the contractor jointly designs the proposal with the water authorities, their roles and responsibilities are equal. After approval of the development plan, the distribution of tasks and responsibilities varies, where the contractor's responsibilities are laid down contractually [HWBP3].

On the other hand, *decision-making* in the programme is based on consensus. For instance, the programme board has equal representation of people from the water authorities and the central government. The programme committee's chairman rotates between the water authorities' representatives and the State. Both the programme board, the programme committee, and the parties falling underneath the organizational structure of the HWBP make decisions under the principle "best for the programme" (HWBP, 2019). Furthermore, it is possible to see that decision-making in the programme is under the *management structure* and the roles and responsibilities of the parties:

> "The contract and price setting are purely for the contractors. At the programme level, where the water authority relies on HWBP, HWBP makes the most important decisions. But when the contract is established, and prices are set, the decisions are passed from HWBP to the water authority" [HWBP4].

In short, the water authorities and the partnership jointly prioritise projects according to the urgency of reinforcement. While separately, at the programme level, the HWBP makes grant decisions and approves decisions at the project level. Moreover, at the project level, contracting authorities decide on the market approach and development issues they wish to include in their projects. When the water authorities prepare the project proposal, they ensure that all relevant perspectives are included in the decision-making process (HWBP, 2019). However, as one interviewee mentioned, "the people who are involved at the project level are pretty much preparing the decisions but not making the decisions" [HWBP4]. Consequently, the final decision rests with the programme directorate and board, where the alliance implements and organises consultations to get a reliable picture of the consideration and interests of the parties involved to help decision-making at the different levels of the programme (HWBP, 2019).

Coordination

The HWBP highlights the importance and balance between programme and project management, where cooperation between the different organizational levels and within the levels is crucial for achieving the programme's goals. Cooperation focuses on effective information exchange, knowledge sharing, quality assurance, efficient processes and transparent decision-making. The HWBP implement different governance mechanisms for coordination focusing on common management practices, shared culture, effective communication, change management, conflict resolution and stable teams.

In terms of *shared culture*, as mentioned previously, an alliance was formed between RWS and the 21 water authorities to achieve the goals. Their alliance is based on six common principles, where sharing knowledge and experience is the aim. The six principles are (1) best for the programme, (2) solidarity, (3) role purity, (4) transparent, (5) predictable and surprise-free, and (6) reliable (HWBP, 2019). The alliance intends that all parties involved in the HWBP work accordingly to these principles. However, although the contracting authorities and the contractors identify a culture at the project level, they consider that it is something built between them rather than something imposed by the programme level [HWBP1] [HWBP2] [HWBP4]. Additionally, one of the interviewees mentioned that there

is some distrust from the programme directorate towards the contracting authorities that are executing the projects, where money is only relevant:

> "I think at the project level, we have a culture to be sincere. But in the programme, I think there is distrust. The people of the programme are the ones who provide the money for the projects, and most of the conversations between the HWBP and the water authorities are more related to money, for example, 'have you done that', 'why do you do it this way. There are so many questions related to money...In the future, we have to collaborate better between the programme and project levels in an open culture... So, I think to improve the collaboration between the programme and the project level, then people from the programme level should go to the location where people from the project level are working" [HWBP2].

Similarly, the two contractors mentioned that an open culture openness at the project level contributed to a better alignment between the parties and collaboration. For instance, one of the respondents mentioned:

> "For me, the biggest lesson is, if you are not open about your problems and concerns, the other party can't help you and won't help you. So, openness is, for me, the key to a good collaboration. In a project that I have worked on before with another water board, the water board was not always open. So, we couldn't help them in fixing their problems. So it's a two-way issue from water boards to contractors and the other way around. So, that, for me, is the biggest lesson, to be purely open about the things in the project" [HWBP4].

Furthermore, the HWBP has implemented some *common management practices* to coordinate all projects well. For example, guidance teams were created to connect the programme to the project level, where the guidance team organises and explains the tasks of the programme management towards a project. The guidance team ensures the reliability and consistency of information flow from the programme to the project, thus achieving *effective communication*. Guidance teams provide a guidance agenda during project kick-off meetings, where agreements are defined on when and by whom evaluations will be carried out to achieve a learning organisation (HWBP, 2019). In addition to the meetings, after the project start-up, there are follow-up sessions where these agreements are verified, and some other meetings focus solely on collaboration. Three respondents highlight the importance of this effective communication for *conflict resolution*. They emphasise that although each project has a formal conflict escalation model, they usually focus more on collaborative conflict resolution.

> "In theory, we have this model of escalation. But, we found out in this project that when you have a good relationship on the management level, you can talk about all kinds of problems and really understand the interests of the other party. Then you can together find a solution. So, you don't have to escalate to higher levels. That's what we found out. And that's what we've proven on this project more than once" [HWBP1].

> "As a team, we were working together, mostly with the waterboard. So, we have project startups, and project follow-ups once a year. We also have meetings every two weeks, or every four weeks where the subject of the meeting is collaboration. So, we discuss with each other: 'How are we standing?', 'Are there any conflicts?', 'Do we see any conflicts coming?', 'How are people behaving?', 'is everybody having fun in its work?'. That was some of the mechanisms we used to manage the project" [HWBP4].

Moreover, the HWBP, as well as the water authorities and contractors, stress the importance of having *stable teams* to achieve the programme's objectives. On the one hand, the HWBP expresses in their documents that a stable programme requires stable projects, in which they provide a variety of guidelines to the contracting authorities for them to use optimally for decision-making (HWBP, 2019) and for ensuring continuity in their teams (HWBP, 2014). Additionally, the programme directorate ensures continuity in their teams by recruiting staff who commit longer than five years. On the other hand, the contracting authority expressed the following about stable teams:

> "Something that I haven't mentioned before is continuity. People that worked in the early stages should continue working in the execution phase. That's very important. When you change the people, then the history and the culture are all lost. And you must do it all together. So that's very important the continuous of people" [HWBP2].

While one of the contractors stated:

> "..one important thing is to keep the teams together. Because now we have a change of some key people on the client side, we can manage it and keep the collaboration good. But that's a risk for long projects and for collaboration. As I mentioned, we have been working together for four and a half years now" [HWBP1].

As a result, stable teams are crucial for all parties in the programme to retain knowledge and have continuous learning, so all the parties apply the lessons learned in future projects of the HWBP. Therefore, mechanisms such as implementing contracts where people commit to extended periods (HWBP, 2019) or ensuring that staff who worked on a past HWBP project work on a future HWBP project [HWBP4] allows for more stable programme teams. Lastly, *change* is acceptable in the HWBP as they have an approach that depends on the lessons learned gathered the way of working might vary accordingly to them (HWBP, 2019).

Monitoring
For controlling and monitoring, quantitative performance indicators crucial to accomplishing programme goals and hence, the alliance's success. The indicators focus not only on financial metrics but also on other areas, such as the quality and effectiveness of internal procedures, the alliance's ability to adapt and develop, and the social impact of this. The indicators are as follows according to HWBP (2019):

- Societal indicators: # of km to be reinforced until 2050, required vs available budget, % of defences in order.
- Internal processes indicators: timeliness of grant award, overhead costs regarding programme management and budget, open vacancies with the alliance
- Financial indicators: price per kilometre, stability in the budget, flexibility in pre-finance projects, over/under subsidisation
- Learning and innovation indicators: cooperation, % of the investment for knowledge and innovation, costs savings achieved due to innovation, % improvement actions realized on time

As a result, the HWBP focuses on controlling the programme and the projects by the use of *formal control mechanisms* using measurable indicators. According to HWBP (2014), the HWBP also have multiple layers of control, the first line made by the project and corporate controllers of the contracting authority and the second line formed by the programme management. An independent programme controller will be appointed to complete the third line and will report to programme management. In line with this, one respondent mentioned that "on a high level, the programme should accept all the steps that the client will want to make" [HWBP3], and the programme team tries to steer and guide the decisions of the contracting authorities through the guidance teams.

In contrast, as mentioned previously, the contracting authorities controlled use *informal control mechanisms* for their collaboration with the contractors, where more informal meetings take place to understand each other concerns [HWBP2]. Additionally, the respondents mentioned that both the contractor and the water authority decided to hire a *third party*, a coach, to improve their collaboration during the project:

> "What we did, and that's something we chose together, was independent coaching. So, regularly, once every three months, we have all-day independent coaches to work on our collaboration that will help you and guide you to have the right talk between the public client and the contractor" [HWBP1].

> "For the project startups and follow-ups, we have a coach, which they are helping us with the form of the teams and, also, the scoring and the performing of the teams, so we can help each other" [HWBP4].

Table 6.2: Governance approach in the HWBP for inter-organizational collaboration

Governance Dimension	Approach
1. Goal-Setting	
1.1. Joint performance goals	Joint responsibility allows a better alignment between the contracting authorities and the programme team [HWBP3] Early contractor involvement is applied for reducing risks profiles [HWBP1] [HWBP2] [HWBP3] [HWBP4] External advice from Taskforce Deltatechnologie to select an appropriate market approach [HWBP2] Equal responsibilities between the contractor and contracting authorities during the design process [HWBP2]
1.2. Clarity of the goals	There is clarity on how the projects are organized and prioritised [HWBP1] Guidelines and frameworks are created for the contracting authorities to use and follow (HWBP, 2014, 2019)
1.3. Flexibility of the goals	Flexibility is provided in the programme as contracting authorities can select the market approach and include relevant aspects such as innovative solutions [HWBP1] [HWBP2] [HWBP3] [HWBP4]
1.4. Predictability of works	Regular assessment of the flood defence assets [HWBP2] (HWBP, 2019)
1.5. Longer tender phase	Contractors and water authorities are jointly responsible for the development plan of the project [HWBP1] [HWBP2] [HWBP3] [HWBP4]
2. Capability Building	
2.1. Selection of capable partners	The contracting authorities are free to select the market approach that best suits the project [HWBP1] [HWBP2] [HWBP3] [HWBP4] Contractors selected by both hard and soft aspects [HWBP1] [HWBP2] [HWBP4]
2.2. Training & continuous learning	Cross-project explorations to learned from innovative project [HWBP3] Guidance teams link the learning from projects and programmes (HWBP, 2019) Regular staff trainings (HWBP, 2019) Visits to other projects from other water authorities [HWBP2] Once a year, there are events where the sector meets to share knowledge [HWBP4] Coo-petition between contractors incentives them to share knowledge between them to reduce risks and lower costs levels [HWBP1] sharing of knowledge between teams is not done so regularly [HWBP1] [HWBP2] [HWBP4]

Governance Dimension	Approach
3. Rewarding	
3.1. Rewards tied to performance	Collaboration, honesty and openness is rewarded during the tender phase [HWBP1] [HWBP2] [HWBP4]
3.2. Risk sharing mechanisms	Risks are allocated to the party that can bear it best [HWBP4] During the joint development plan, parties shared equally the risks [HWBP1]
3.3. Reputation	Good collaboration from the contractor side is seen as beneficial for future projects [HWBP1] [HWBP4]
4. Roles and decision-making	
4.1. Clear roles and responsibilities	Roles and responsibilities are defined clearly in the "bestuursakkoord water" (HWBP, 2019) The contractors' responsibilities are laid down contractually and can vary in the different stages of the programme [HWBP3]
4.2. Management structure	The organizational structure is in accordance with the roles and responsibilities established (HWBP, 2019)
4.3. Decision-making authority	Grant decisions and ultimate decisions are made by the alliance [HWBP4] The decision-making following the principle 'what's best of the programme' (HWBP, 2019) The contracting authorities choose the market approach, however, it must be approved by the programme level [HWBP1] [HWBP2] [HWBP3] [HWBP4] Consultations are done from part of the programme level to control the decision-making from other levels (HWBP, 2019)
5. Coordination	
5.1. Common management practices	Guidance team to link programme and project management (HWBP, 2019) Project start-ups and follow-up meetings to align interest between parties [HWBP4]
5.2. Shared culture	An alliance was formed between the water authorities and RWS (HWBP, 2019) Lack of trust between the programme level and the contracting authorities [HWBP2] Open culture between the contracting authorities and the contractors [HWBP1] [HWBP2] [HWBP4]
5.3. Effective communication	Guidance teams provide effective communication between the two levels of management (HWBP, 2019) Regular meetings to get to know each better [HWBP4]
5.4. Change management	The working approach is analysed to understand if changes are needed in the guidelines for future projects (HWBP, 2019)
5.5. Conflict resolution	Formal model of conflict escalation [HWBP3] Joint conflict resolution through informal meetings [HWBP1] [HWBP2] [HWBP4]
5.6. Stable teams	Implementing contracts where personnel have to commit more than 5 years (HWBP, 2019) Arranging your teams according to their previous experiences in projects [HWBP4]
6. Monitoring	
6.1. Formal control and monitoring	Quantitative performance indicators to measure society, internal processes, finance and learning & innovations (HWBP, 2019) Guidelines are created that the contracting authorities are expected to follow and read. The development plan of the project has to follow certain frameworks created by the programme team (HWBP, 2019) The programme team provides flexibility to the contracting authorities to select the market approach, however, the approach needs to be approved by the programme team (HWBP, 2019) Guidance teams steer and support the project level decisions (HWBP, 2019) Multiple layers of control that need to be coordinated (HWBP, 2019)
6.2. Informal control and monitoring	Informal meetings between the contracting authorities and the contractors to understand their concerns and the progress [HWBP1] [HWBP2] [HWBP4]
6.3. Monitoring and auditing via third party	Contracting authorities and contractors hire coaches to improve their collaboration and bring the right conversation to the table [HWBP1] [HWBP4]

6.2. Multi-Annual Noise Remediation Programme (MJPG)

6.2.1. Characteristics of the MJPG

The MJPG aims to reduce the noise level along the national highways and railroads due to the new legal limits established by 2027. RWS is responsible for identifying all the remediation objects and incorporating remediation plans along the national roads, while Pro-rail has the same responsibility but for the railways. The programme is budget-driven, which is roughly 900 million euros. However, based on the sustainable ambitions that RWS have, aspects such as circularity and biodiversity are considered essential in this programme. It is important to highlight that this research focuses solely on the noise-reduction measure for the national roads in the Netherlands, which involves around 155 noise barriers, with 44 km of length and 155,000 m2 of screen area.

Currently, the MJPG is in the last phase of the plan development; the acoustic studies and remediation are planned as the design files when finalising this phase. The national team draws a model tender based on the design files to realise the noise barriers. The total number of noise barriers is clustered into five regional areas, in which the model tender would be delivered and transferred to the regional teams. Table 6.3 shows an overview of information about the HWBP:

Table 6.3: Multi-Annual Noise Remediation Programme Overview

Aspect	Description
Organization	Rijkswaterstaat
Contracting Authority	Regional teams
Duration	2015-2027
Compliance Programme	Repair or build noise barriers to comply with the legal limits established
Secondary Goals	Ensure the re-use of materials and the use of natural resources, ensuring circularity and promoting and encouraging biodiversity at the noise barriers
Drivers for collaboration	Standardization, and uniformity in building noise barriers across the Netherlands while introducing circularity and biodiversity. Efficiency, better transfer of knowledge. Increasing performance
Barriers to collaboration	A high number of different organisations, where each organization has different goals and cultures and is considered a traditional organization. Also, there is a lack of experience in using programmes in the infrastructure sector. High fluctuation of personnel can affect the progress of the programme

Organizational structure MJPG
The MJPG consists of different public clients, and multiple main contractors are expected to be involved. On behalf of the Minister of Infrastructure and Water Management, ProRail is carrying out the noise-reduction work for the railways, and RWS is carrying out the noise-reduction work for the national

highways. As mentioned previously, the research focuses only on national highways. RWS developed a model tender dossier to realise the noise barriers, which then is transferred to five regional teams responsible for the tender and contract document for the market approach. Each region is responsible for completing the model tender, tendering, and executing the projects.
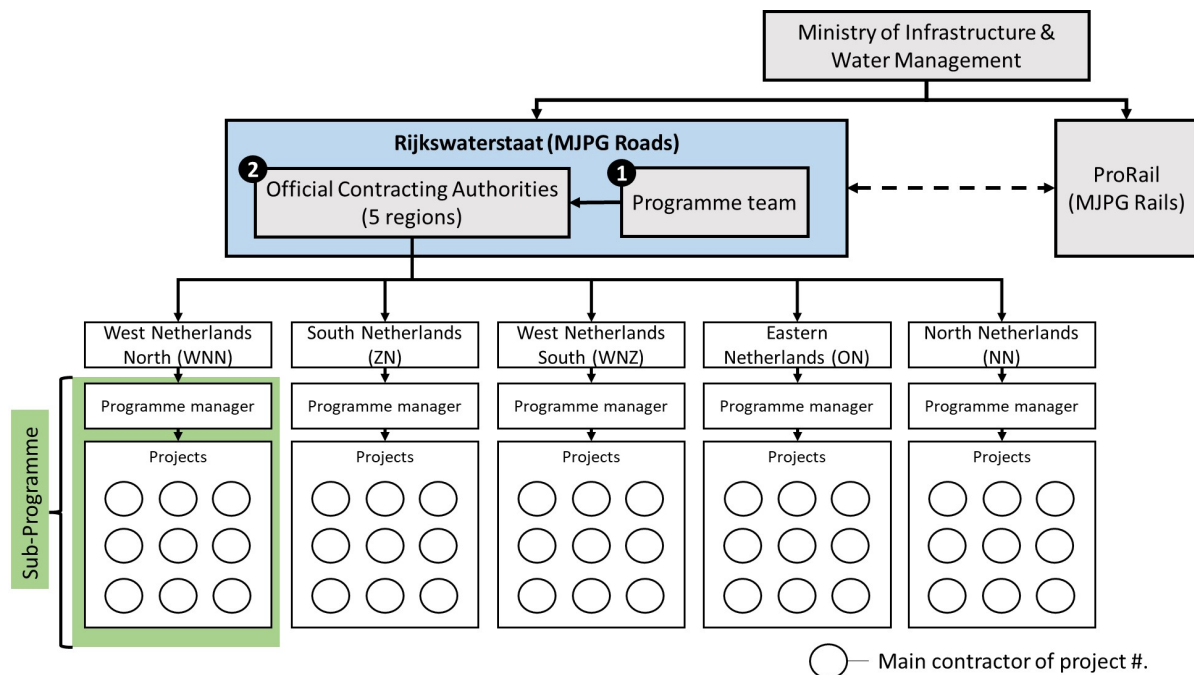
Figure 6.2: Organizational structure of the MJPG

6.2.2. Governance approach in the MJPG

Goal-setting
With the entry of a new chapter of the Environmental Management Act in 2012, the Ministry of Infrastructure and Water Management formulated the programme's primary goal, reducing the noise level of the national highways and the railways. RWS is carrying out measures for noise reduction on national highways. RWS had a clear goal to calculate the noise level at the facades of all dwellings; when the dwellings have a higher noise level, measures have to be implemented; the first measure would be to implement quieter asphalt. However, a noise barrier will be built or renovated when quieter asphalt does not reduce sufficiently. In sum, the primary goal is formulated based on the new regulation of the government and RWS the obligation to fulfil it:

> "The setting of the goals comes from higher up, and then we (RWS) just have to give more words to it and understand how are we going to achieve these objectives". [MJPG4]

After identifying the need to build or renovate more than 155 noise barriers along the national roads, the programme team has the vision that the realisation of the works should be sober and effective while also contributing to the ambitions of RWS of sustainability. Therefore, the themes of circularity and biodiversity are introduced in the programme as secondary goals. Moreover, to create uniformity and safeguard the vision of the programme level to the project level, the programme team created a tender model dossier that will be delivered to five regions in the Netherlands responsible for the tender procedure [MJPG1, MJPG2]. Thus, this tender model provides *clarity on the goals* that the programme wants to achieve in the projects.

For the creation of these tender model dossier, the programme team approach the market via market consultations. The main objectives of consulting with the market are to understand how the programme

should be organised so that the market is not overwhelmed by the task and to obtain information on the possibilities of implementing circularity and biodiversity in the programme objectives by understanding how the market could achieve these objectives [MJPG2]. These market consultations provided essential information for goal setting, which can be seen as a *joint performance of goals*, as information from the market is considered to build the programme goals. Moreover, RWS formulated the tender model dossier without finalising it [MJPG1]. The aim was to provide sufficient *flexibility* for the contracting authorities to include relevant aspects that are necessary for a specific location: "there are some aspects that the contracting authority needs to include and pick what is best for their location [MJPG3]". Also, the tender model dossier provides a clear overview of the requirements that are required from the contractor. In short, the programme team delivers a task to the contracting authorities where all noise barriers that need to be realised across the Netherlands are identified, and a standardised document is provided. Thus, the *predictability of the works* provides complete certainty to all parties involved as all the works to be carried out are known. However, delivering the tender model requires alignment between the programme team and the contracting authorities. For this reason, the programme team arranged more meetings to help and facilitate the alignment by answering the contracting authorities' questions regarding the documents that were delivered to them [MJPG1, MJPG3, MJPG4].

Capability Building
With the input from the market consultations, the programme team drew up a tender model dossier to find a *suitable partner* based on the best quality-price ratio. For this reason, the programme team is implementing a competitive dialogue light, where four appropriate parties will be selected to submit a tender using a funnel product. The funnel product consists that the contractors should provide an opportunity plan for sustainable chain cooperation, resulting in a lower environmental cost indicator and a higher circularity level:

> "..We have a document that states that we want a partner that can come with what we call a sustainable chain, and also they need to describe how they envision being that partner with us..the market needs to make a plan as to why and how they are gonna be that partner. But in essence, we don't ask how they will collaborate with us; that was not the question." [MJP3]

The tender dossier provides some boundary conditions in terms of minimum criteria regarding the capabilities and experience of the contractors; however, the contracting authorities have the flexibility to include other aspects in these criteria. For instance, one respondent mentioned the following:

> "..We have some selection criteria already formulated. But it also depends on the teams who will contract the businesses to complete that. So we know we will select at least based on circularity and use the environmental cost indicator. And furthermore, it's up to the teams that are selecting the contractors to decide on which other criteria they want to use to select the best company for their project." [MJPG4]

According to the interviewees, to understand how the market reacts towards the tender model, the realization phase starts with a pilot project called pilot A17. Pilot A17 aims to test on a small scale whether the tender dossier of the MJPG achieves the desired effect on the market. It consisted of five noise barriers in the North Brabant region and was intended to start Q1 2022. It is expected that from this pilot, the programme team will catch the lessons learned and identify if a change is needed in the tender model for future projects:

> "The idea is that we have pilot locations those will be the first ones to go out for tender, and from there, a review will be done, or lessons learned will be gathered, and we need to see if we need to change something on a programme level or at least learn from what we did at those pilot locations and see how we can implement that in the other projects that are still upcoming." [MJPG3]

Lessons learned from the pilot, and first projects can enable the contracting authorities and the programme team to adapt their ways of working and share knowledge for future projects. Two interviewees mentioned that the programme team could absorb all lessons learned from the regions, working as a pivot that connects the other regions and sharing things that can be improved or to be aware

of when implementing new projects [MJPG1, MJPG3]. Thus, this pilot project is seen as a learning mechanism and provides mechanisms related to *flexibilty and change management*, as from this pilot, the programme team would evaluate the lessons learned and change the tender dossier model accordingly.

Rewarding

Before the organisation of the MJPG, the market consultations served to reduce risks for the MJPG [MJPG3], as it was possible to identify if sufficient parties could execute the works. In the initial market, consultation was exposed that the number of specialised contractors is limited; in particular, contractors from the SME segment can meet the market demand if the realisation does not exceed EUR 5 million. As a result, it was concluded from the market consultation that trust and cooperation with the market are crucial in mitigating risks.

Moreover, rewarding in the MJPG is done accordingly to the project delivery method selected for the projects within the programme: Design & Construct (D&C). RWS uses standard purchasing documents for the D&C contracts based on the UAV-GC 2005, in which rewards and *risks allocation* mechanisms are based on the standardized legal-administrative conditions that this contract compromises. Hence, *rewarding tie to performance*, apart from the formal contractual mechanisms, only comes into question during the tender phase, in which the contractors get a fictional discount on the price according to MEAT criteria. Thus, it can be considered an incentive for the contractor to develop better solutions. Thus, MJPG 'rewarding' is still made similarly to how it is done in a project-based approach, which is confirmed by one of the interviewees [MJPG3]. However, as the projects are not yet tendered, new mechanisms related to the rewarding dimension may arise from the regional team level. On the other hand, *reputation* in the MJPG is not identified as the contractors are not yet involved in the programme.

Roles and decision-making

Roles and decision-making in the MJPG are tied to the programme's organisational structure. For instance, each level at the *programme organisational structure* has its roles and own management. Thus, there are different management levels in the programme:

> "In a programme, there is the management of the programme, then they're going to divide it into different projects within the programme, each having its own management, that needs to report back to the programme management. So you create extra layers of management in a programme. If that's always handy, I'm not sure. But you create many islands, and all the islands need to have a connection of some sort..."[MJPG3]

However, each layer of the programme has *clarity in their roles and responsibilities* within the MJPG. The programme team, to provide clarity to each management level, produced certain documents where the responsibilities of each party were clearly defined:

> "We have drafted a document on who is responsible for what, our responsibilities, and the regional team's responsibilities. So we made it explicit in a document, which also contains a lot of instructions" [MJPG4]

Moreover, the roles and responsibilities of the contractor for project execution are described in the D&C contract. The programme team chose specific requirements to steer the contractor's responsibility. For instance, the tender documents state that the contractors are responsible for including at least 30% of circular materials in their projects. If they want to aim for a higher percentage, there would be a fictional discount during the tender.

Regarding the *decision-making* in the MJPG the programme team is in charge of establishing the programme's primary goals, in which they established the minimum requirements and wishes of the MJPG in the tender model dossier, which cannot be changed by the contracting authorities [MJPG3]. In contrast, the regional teams are responsible for finalising the tender strategy for each location. Therefore, they have sufficient freedom to include additional relevant aspects from the local context of the projects. However, the final strategy needs to be approved by the programme team:

"The regions give us a plan on how they will do the tender for the market, and there is a grey area and trust area. We help them, and we stay on board if they have questions, they can ask us, and we can tell them how and why it was organized this way, and we give this information. That's very difficult. We also told all the parties it was not possible to make a contract 100% because every region has their own restrictions and characteristics for the highways" [MJPG1]

Coordination

The MJPG aims for uniformity in building noise barriers across the Netherlands. To achieve uniformity, the programme team chose to create a *common management practices* via standard designs and documents that facilitate the achievement of this uniformity:

.. this model contract provides uniformity so that the contracts in all regions look the same. They are standardized. However, standardization is not maximal; every location has specific parts. [MJPG1]

Nevertheless, building the tender dossier and delivering it to the contracting authorities requires *effective communication* between the parties. For instance, the market consultation provided crucial information about what the market can handle. With this information, the programme team organized the projects within the programme in a way they could execute them:

"We planned them to be sequential because we see they already have much to do in this market." [MJPG4]

As the market is limited regarding companies that construct noise barriers, the programme team needs to coordinate the projects inside a programme, so they do not over-flood the market [MJPG2]. Additionally, the interviews acknowledge that having limited parties able to execute the projects is a risk for the programme:

"..we do need to do it for a certain amount of money. So, if there's only one contractor and he knows he's the only one, he can increase his price a lot." [MJPG3]

"The market has more influence because there are not many businesses that actually do build sound barriers. Thus, they have more influence on the price, their wishes and their needs." [MJPG4]

Therefore, one interviewee acknowledges that collaborating with the market parties is vital for the programme to meet the deadlines of the MJPG and reduce risks:

"I think collaborating with the market is very important because all the noise barriers have to be built in a short amount of time. There's an end date in 2027, where we have to meet the requirements according to the noise acceptance. And that's the European regulations. So it's very important to meet those deadlines, so it's necessary to collaborate well between the client and the market."[MJPG2]

Additionally, good collaboration is essential between the contracting authorities and the programme team. For instance, communicating with the contracting authorities is essential for clarifying their roles and responsibilities. Delivering the model and the tender documents should be done in the proper time, considering that the contracting authorities are also required to prepare their teams for the projects and understand the content of these documents [MJPG1]. Therefore, alignment between the programme and regional teams is essential to clarify the model contract used in the tenders.

Moreover, regarding *conflict resolution* in the MJPG is done accordingly to the standard D&C contracts of RWS [MJPG2]. However, as the programme has not tendered the project yet, informal conflict resolutions could still be present in the programme. Additionally, the programme team mentions the importance of *stable teams* in a programme. One of the interviewees explained that key personnel leaving the programme caused some problems in the progress of the programme:

> "We have five regions on board since 2015. Their teams are switching. People go, people come, and that was very difficult for us. So, we make an agreement with man or woman 'A', and now we have somebody else; a new captain, new rules. That's difficult. Because it is seven years in RWS, people change careers and projects. And seven years is a very long time. So, we have had a few people in our projects since 2015, and the rest have been switched. That is something that we must consider in the future, how we will take care of the information and the agreements we make with those people still stand and will follow up." [MJPG1]

On the other hand, in terms of *change management*, as mentioned in the section of *capability building*, the pilot and the early projects of the programme are used to understand what needs to be improved in the tender model for future projects. Therefore, the programme team acknowledge that *flexibility* is necessary to improve efficiency and performance for upcoming projects [MJPG2]. Moreover, regarding *shared culture*, the interviewees mentioned that there is no distinguished culture in the MJPG.

Monitoring

The monitoring and control from the public client and the contractor is still not wholly arranged as the contracting authorities will be the ones to set the final rules for control and monitoring with the contractor [MJPG2]. Nevertheless, the interviewees mentioned that some *informal control and monitoring mechanisms* is performed by the programme team to support the contracting authorities before and during the tendering process by answering questions and approving the final tender procedure [MJP1] [MJPG4]. Furthermore, as the programme team included some requirements regarding the contractor's approach for ensuring 30% of circular material and sustainable chain cooperation, there is verification and validation of these requirements to make sure that is an actual number:

> "So we put requirements into the system and put a verification and validation aspect to each, which is also coming up in the tender documents. So we're asking the contractor for his calculation for circularity and their plan for sustainable chain cooperation. We are asking them how they're going to make sure that the calculation will be the case so that they don't just give us a number; in the end, it doesn't even come close to that number. Instead, show us how they are going to ensure that they achieve this number. And with that calculation and those documents, we measure them during the execution of the projects. So it's already coming up in the tender phase."[MJPG3]

Thus, it is possible to identify that the MJPG has *formal control mechanisms* for both the contracting authorities and the project level. On the one hand, the contracting authorities are controlled strictly by the programme teams regarding the decision-making since the complete tender procedure should be approved form the programme team. On the other hand, the contractors have formal control mechanisms accordingly to the requirements and what was offered during the tender procedure. Furthermore, it is impossible to identify the third party for controlling and monitoring as the contractor is not yet involved in the programme.

Table 6.4: Governance approach in the MJPG for inter-organizational collaboration

Governance Dimension	Approach
1. Goal-Setting	
1.1. Joint performance goals	The primary goal is set by the law, and RWS has the obligation to fulfill it [MJPG1] [MJPG2] [MJPG3] [MJPG4]
	Market consultations were held for organizing the programme in a proper way without overflooding the market with the task and to understand how the market could achieve circularity and biodiversity when including them as secondary goals in the programme [MJPG1] [MJPG2]
1.2. Clarity of the goals	A tender model dossier is created to create uniformity in the programme
	The contractor provides clear plans for achieving the requirements of circularity, biodiversity and sustainable chain cooperation
1.3. Flexibility of the goals	The tender model dossier is created without finalized it completely so that there is flexibility for the contracting authorities to include other aspects in it [MJPG1] [MJPG2] [MJPG3] [MJPG4]
	Sequential bidding of works to allow for adjustments later on [MJP1] [MJPG2] [MJPG3] [MJPG4]
1.4. Predictability of works	All the works that need to be executed are identified by the programme team [MJPG1]
1.5. Longer tender phase	Not applicable: the tender phase has not started yet.
2. Capability Building	
2.1. Selection of capable partners	Best quality-price ratio, meaning that the contractor will not be selected by lowest bid [MJPG1]
	Minimum criteria, in terms of circularity and biodiversity, are selected by the programme team to ensure them in all projects [MJPG3] [MJPG4]
2.2. Training & continuous learning	Pilot project to gather lessons learned and apply them for future projects [MJP1] [MJPG2] [MJPG3] [MJPG4]
3. Rewarding	
3.1. Rewards tie to performance	Contractual mechanisms based on UAV-GC 2005 [MJPG1] [MJPG2] [MJPG3]
	Fictional discount on price during tender phase according to MEAT criteria [MJPG3] [MJPG4]
3.2. Risk sharing mechanisms	Risks are allocated accordingly to the standard D&C by RWS using UAV-GC 2005, in which most of the risks are allocated to the contractor [MJPG1] [MJPG3]
3.3. Reputation	Not identified
4. Roles and decision-making	
4.1. Clear roles and responsibilities	Documents and meetings stating clearly the responsibilities and roles of different parties [MJPG4]
	Roles and responsibilities for each party are contractually specified accordingly to D&C, as is the effect of roles in interactions [MJPG1] [MJP3] [MJPG4]
4.2. Management structure	Organizational structure provides different levels of management [MJPG3]
4.3. Decision-making authority	Decision-making from the contracting authorities based on the local context of the projects
	Decisions by contracting authorities need to be approved by the programme team

Governance Dimension	Approach
5. Coordination	
5.1. Common management practices	A tender dossier model that provides uniformity in all regions [MJPG1] Several programme managers representing each contracting authority [MJPG3] Key concepts and agreements among parties (e.g., budget, delivery deadline, quality standards, and safety criteria) are contractually established [MJPG1] [MJPG2]
5.2. Shared culture	Not identified
5.3. Effective communication	Market consultation for organizing works accordingly to what the market can handle [MJPG4] Regular meetings with contracting authorities for alignment [MJPG4] Proper timing in communicating with the contracting authorities and the market so they can prepare their teams [MJPG1]
5.4. Change management	Based on the lessons learned from the pilot and early projects, the tender model dossier will be updated and changed [MJP3]
5.5. Conflict resolution	Good collaboration is needed with the market as they have the power to influence the price Formal conflict resolution accordingly to the D&C contract [MJPG2]
5.6. Stable teams	Lack of stable teams at the programme level and contracting authorities level affected the progress of the programme [MJPG1]
6. Monitoring	
6.1. Formal control & monitoring	The contractor will be controlled and monitored accordingly to the requirements of circularity and sustainable chain cooperation that were asked during the tender phase [MJP3]. Additional aspects included in the tender dossier model by contracting authorities need to be approved by the programme team [MJPG1] Final control and monitoring mechanisms will be set by the contracting authorities [MJPG2]
6.2. Informal control & monitoring	Not present at the moment
6.3. Monitoring & auditing via third party	Not applicable: the contractor is still not selected

6.3. Comparison between programmes

This section compares and analyses the results of the two cases to find similarities and differences in their governance characteristics and approaches to translate them into a model that captures lessons learned inducted from the comparison. The results from the governance mechanisms identified corresponding to each dimension are organised according to the level that establishes it.

6.3.1. Comparison of programme's characteristics

The HWBP and the MJPG are compliance programmes, and their primary goal is to comply with the legislation set by the Dutch government. Although the programmes are born with the same purpose, their characteristics and governance vary in certain aspects, and thus their organisational structure differs. Both programmes are a group of related projects that need to be accomplished before a target year. The objective of the programme-based approach is to be more efficient and effective in how the projects are executed while adding value. On the one hand, the HWBP wants to execute at least 50 km per year at no more than 7 million per km. On the other hand, the MJPG wants to build the sound barriers in a standard way to create uniformity at a fair cost. Both programmes are organised by Dutch public entities, where a specific public entity is responsible for contracting and executing the

projects. However, the public entities in each programme have different legal liabilities. For example, all public entities in the HWBP are legally responsible for ensuring that flood defence assets comply with safety standards. In contrast, the programme team in MJPG is liable for reducing highway noise levels, whereas the contracting entities do not have a legal liability to guarantee sound levels.

Moreover, it can be observed that secondary objectives are included in both programmes, such as aspects related to sustainability and innovation, which should be translated by the procuring entities when carrying out the projects. However, depending on the boundary conditions established, the public contracting entities have some flexibility in implementing these objectives in their projects. Also, the programmes intend to execute the first projects sequentially to generate an early learning curve so that the subsequent projects can implement the lessons learned from previous projects. In addition, both programmes have the characteristic that the market is limited, with a limited number of contractors that can carry out these projects. Therefore, both projects try to limit their parallel projects to avoid over-saturate the market with the task.

6.3.2. Comparison of governance approaches

Goal-setting mechanisms
Several similarities between the two programmes can be found in the goal-setting dimension. For example, both programmes set secondary objectives offering flexibility to the contracting authorities to implement them, and thus, the contracting authorities must translate them into the projects. Furthermore, in both programmes, to understand the capacity of the market and its ability to achieve these main objectives and sub-objectives, multiple market consultations were carried out, which are seen as input for establishing the programme goals.

There are many differences in the programmes' mechanisms implemented for the goal-setting dimension. Regarding joint-performance goals, on the one hand, the public entities of the HWBP have joint responsibility for performing the projects, where they prioritise the project jointly based on the urgency of the projects. In contrast, the MJPG has no joint responsibility. The programme team needs to align with the contracting authorities about the requirements established at the programme level to realise them in the projects. On the other hand, the HWBP predictability of works changes according to the assessment of the assets, while the MJPG has identified all the works to be realised from the early phases of the programme. In other words, the number of projects in the HWBP may increase as assessments are performed during the programme. Moreover, the flexibility in terms of the contract varies for both programmes. The HWBP has given the contracting entities complete flexibility to select the type of contract used for projects. In contrast, the MJPG has established a D&C contract for all projects within the programme. However, the respondents mentioned that the regional teams still have a certain flexibility in including relevant aspects in these contracts, depending on the conditions of the specific location. Lastly, both programmes provide standard guidelines and documents for the contracting authorities to tender the projects.

Furthermore, regarding the contracting authorities level, it is identified that at this level, both the MJPG and the HWBP have the purpose of translating the secondary goals established at the programme level at the project level, linking the project goals to the programme goals. Despite the similarity in the contracting authorities level, it was identified in the HWBP mechanisms such as joint development plan and early contractor involvement for the joint-performance goals that are not present at the MJPG. Early contractor involvement in the programme is used to gain knowledge from the contractors in the early stages of the project that could benefit the project. However, several contracting authorities from the HWBP also used early contractor involvement to work jointly on the project's proposal for funding. Moreover, another aspect that differentiates both programmes is that water authorities from the HWBP get advice from external parties when needed for developing the market approach. In contrast, the MJPG, in collaboration with an engineering firm, established the programme goals at the programme level. Table 6.5 summarises the governance mechanisms used in both the HWBP and the MJPG.

Table 6.5: Comparison between goal-setting mechanisms

Level	HWBP	MJPG
Programme	- Joint responsibility - Flexibility in secondary goals - Assessment every 12 years of their assets - Joint prioritization of project - Flexibility for selection of contract type - Market consultations - Guidelines to follow	- Market consultations - Flexibility in secondary goals - Identification of all works - Selection of contract type - Standard tender model dossier
Contracting authorities	- Translation of secondary goals - Joint development plan for projects - Early contractor involvement	- Translation of secondary goals

Capability building mechanisms

The dimension of capability building varies significantly according to the flexibility provided by the programme level. For example, in the HWBP, the water authorities set contractor selection criteria exclusively. In contrast, the programme team in the MJPG sets the minimum requirements for contractors in terms of circularity and biodiversity, and the contractors must provide a plan to ensure that they implement sustainable chain cooperation while executing the projects. Thus, in the MJPG, the regional teams are only in charge of the selection process via competitive dialogues and have the flexibility to include in the tender document project-specific aspects depending on the project's location.

As for the knowledge-sharing and continuous training of the programme, the HWBP establishes governance mechanisms to ensure knowledge-sharing is done continuously during the programme's execution, in which each governance mechanism involves all levels of the programme organisation. For instance, yearly knowledge-sharing events offered by the HWBP are a space for public entities and contractors to share knowledge and experiences of the projects executed. Likewise, cross-project explorations carried out by the HWBP are made to identify innovative projects that can serve as examples for future projects. In addition, guidance teams and project visits are offered for contracting entities and contractors to learn from other programme projects and connect with each other. However, the interviewees in the HWBP highlight that knowledge-sharing could be done more often to improve the way they work, increasing performance. In comparison to the MJPG, the interviewees of the MJPG mentioned that the programme team established a pilot project to gather lessons learned and to be able to adjust the requirements founded by the programme team. Table 6.6 shows the governance mechanism used in each programme.

Table 6.6: Comparison between capability building mechanisms

Level	HWBP	MJPG
Programme	- Knowledge-sharing events - Cross-project explorations - Guidance teams for sharing knowledge - Staff training - Visits to projects	- Best quality-price ratio - Minimum criteria for primary and secondary goals - Pilot project for gathering lessons learned - Funnel product to prove requirements
Contracting authorities	- Contractually dependent mechanisms - Coopetition phenomenon - Collaboration as a selection criterion - Documenting lessons learned	- Finalizing requirements for selection criteria - Documenting lessons learned

Rewarding mechanisms

Most differences between the two programmes can be found in the reward dimension. As seen in table 6.7, in the HWBP, all the governance mechanisms related to rewards are established by the water boards. In contrast, in the MJPG, all the governance mechanisms are established at the programme level. This difference is mainly due to the entity that selects the type of contract to be used in the project, as most of the reward mechanisms used by both programmes are inherent to the type of contract used in the programme's projects. However, as seen in table 6.7, both programmes have similar governance mechanisms but are set up at different programme levels. For instance, rewards mechanisms such as contractual reward mechanisms, no monetary rewards and contractual risk allocation are found in both programmes

Furthermore, there are some differences in the rewards mechanisms used in the programmes. For instance, the HWBP selects contractors based on process and product. As mentioned by the interviewees, collaboration in the selection criteria is viewed as a reward mechanism that incentive them to have a good reputation so they can be considered for future projects of the programme. Therefore, reputation in the HWBP is relevant for the contractors. In contrast, the MJPG uses a fictional discount as a reward mechanism to guide contractors to excel in their bids' circularity and biodiversity aspects.

Table 6.7: Comparison between rewarding mechanisms

Level	HWBP	MJPG
Programme		- Contractual risks allocation - Fictional Discount for MEAT criteria - Contractual reward mechanisms based on UAV-GC 2005 - No monetary rewards
Contracting authorities	- Jointly identification of risks - No monetary reward - Contractual risks allocation - Reputation important for future projects - Collaboration is rewarded - Contractual reward mechanisms	

Roles & decision-making mechanisms

In the roles and decision-making dimension, the programmes implement similar governance mechanisms. Both programmes' roles and responsibilities are established in contracts or governmental documents. However, if roles are not sufficiently clear for the contracting authorities, the programme team, via meetings and documents, supports the clarity of the roles. In addition, both organisational structures are clearly defined with comprehensive reporting lines, where decisions at all levels are supervised and finally approved by the programme team. In addition, both programme teams can decide on grant subsidies and thus have the ultimate word. As mentioned by one of the interviewees from the HWBP, the contracting authorities, with the support of the contractors, are in charge of preparing decisions that then must be approved by the programme before they can realise them.

Although most of the governance mechanisms are similar in both programmes, some differences can also be identified. For instance, the HWBP have the support of an external party that can guide the contracting entities in the preparation of decisions. This external party is Taskforce Deltatechnologie which is a group of public clients and contractors with experience in HWBP projects and in the water management sector in the Netherlands, where they provide advice on the market approach selected for the projects in the HWBP. Additionally, it is essential to highlight that the roles and responsibilities of the contractors vary from project to project and are contractually dependent. For instance, the contractors in the HWBP mentioned that their roles and responsibilities changed depending on the market approach selected by the water authorities. Furthermore, they emphasised that when early contractor involvement is chosen in the projects, the roles & responsibilities change completely from phase to

phase, which was considered challenging to them. Table 6.8 shows the governance mechanisms identified for the roles & decision-making dimension for both programmes at the programme and contracting level.

Table 6.8: Comparison between roles & decision making mechanisms

Level	HWBP	MJPG
Programme	- Roles laid down in the law - Clear governance structure with clear reporting lines - All decisions need approval from the programme team - Granting subsidies - External parties steering decision-making - Supervision for decision-making	- Contractually defined roles - Clear governance structure with clear reporting lines - All decisions need approval from the programme team - Granting subsidies - Roles clarified via meetings and documents
Contracting authorities	- Contractually dependent - Change of roles varies depending on the stage of the project - Preparing decision-making	- Preparing decision-making

Coordination mechanisms

In the coordination dimension, the programmes are similar at the programme level because they want to standardise how projects are executed by employing documents delivered to the contracting entities on how projects should be carried out. On the one hand, MJPG creates the tender dossier model, where the programme team creates most of the tendering process where the contractor's minimum requirements are defined. For example, it is stated that in all projects, it must be fulfilled that the contractor uses at least 30% of recycled materials in the constructions and that they demonstrate sustainable cooperation with their supply chain. On the other hand, the HWBP establishes that projects must take into account the guidelines created by the programme level so that contracting entities can use them to make decisions on their projects.

In addition, both programmes establish common programme management and project management practices for coordinating their projects, focusing on programme efficiency and effectiveness at a fair cost. Moreover, it can be observed that the HWBP has project start-up and follow-up sessions once the projects start. In contrast, the MJPG has not yet established coordination rules because the programme is still in the tendering process of the projects. Nevertheless, some interviewees mentioned that the programme team at the MJPG carries out alignment meetings with the contracting entities for the tendering process to resolve doubts regarding the standard document and to receive input for improving it.

In terms of communication, both programmes highlight the importance of the flow of information between the different parties; for example, the HWBP highlight the importance of sharing information on lessons learned for future projects. In contrast, one interviewee from the MJPG mentions the importance of sharing information at the right time for the different parties to prepare their teams for the next phases of the programme and the realisation of the projects. Moreover, both programmes have a formal escalation of conflicts based on the programme's organisational structure and the contract. However, the HWBP, at the project level, also establishes informal conflict resolution mechanisms, where conflicts are discussed jointly to find a joint solution.

In terms of the organisational culture of the programme, a difference can be identified between the two programmes.

On the one hand, the HWBP establishes an alliance between all the public clients involved to establish a set of rules and values, so the projects in the programme follow these rules. On the other hand, although the HWBP has this alliance, one of the interviewees mentioned that the programme level does not provide sufficient trust at the contracting authority level as there is too much control over decision-making. Moreover, contractors and contracting authority interviewees mentioned that their projects have an open and trusting culture. However, it is essential to highlight that the interviewers

emphasised that this culture varies depending on the procuring entity, as not all procuring entities work similarly.

On the other hand, in the MJPG, interviewers mention that there is no established culture as the projects have not been tendered yet.

Furthermore, both programmes establish a flexible approach to dealing with possible future changes. Both programmes state that their approach at the programme level is flexible enough to adapt as lessons are learned during the execution of the projects. For example, the HWBP has guidance teams that collect lessons learned and support future projects with their acquired knowledge. At the same time, the MJPG wants to conduct a pilot project to acquire lessons learned, understand how the market reacts to it, and then adapt the tender dossier for future projects according to the results. Therefore, both programmes regard change as an opportunity for improving their future projects.

Similarly, interviewees from both programmes highlight the importance of having stable teams. On the one hand, one of the MJPG interviewees mentions that the loss of staff in the programme team has been challenging, as information is lost and training is needed for the new employee coming in, which is a time-consuming and tiring process. Therefore, the interviewee stresses that it is crucial to establish stable teams. On the other hand, at the programme level of the HWBP, they use defined time staff contracts to ensure stability in the programme teams, i.e. people working in teams such as the programme directorate or the programme board have to commit at least five years to the team. Furthermore, as mentioned by one interviewee of the HWBP, the departure of crucial staff from the programme and the project team is a risk.

Moreover, the contractor and the contracting authorities allocate project teams to upcoming projects based on their previous experiences; for instance, if they have previously worked on a project of the HWBP, they ensure that these teams are involved in the new projects of the HWBP. Interviewees from the public client and contractor mentioned that these mechanisms ensure that information is retained and utilised for future projects in the programme. Table 6.9 shows an overview of the governance mechanisms used by each programme.

Table 6.9: Comparison between coordination mechanisms

Level	HWBP	MJPG
Programme	- Programme vs project practices - Project start-ups follow-up sessions - Alliance between public clients - Formal channels of communication - Formal escalation of conflicts - Contractual personnel commitment (5years) - Change according to lessons learned	- Programme vs project practices - Standard tender document for projects - Proper timing communication for preparation of teams - Regular meetings for alignment with contracting authorities Formal escalation of conflicts Contractual conflict resolution - Change according to lessons learned Dialogues for sharing concerns (between public entities)
Contracting authorities	- Decision making varies according to the contracting authority Joint conflict resolution Formal & informal channels of communication Open and trust culture	- Decision making varies according to the contracting authority

Monitoring mechanisms

For the monitoring dimension, both programmes have strict control in the decision-making, where the programme team has the final saying in the decisions. As previously explained, the programme teams approve all decisions at different levels. Moreover, both programmes focused on formal control mechanisms, implementing key performance indicators to measure the programme and the projects. However, the main difference between the two programmes regarding these indicators is that the HWBP

sets project cost, social, financial and learning indicators at the programme level. In contrast, the MJPG indicators focus more on the contractors' performance. For instance, the indicators focused on the contractors' meeting the requirements established during the project tender. Additionally, it is possible to identify that both programmes complement the key indicators with follow-up sessions to supervise the contracting entities and, therefore, the projects.

On the other hand, comparing the contracting authorities level, it can be observed that the water boards in the HWBP also establish governance mechanisms (see table 6.10. For example, they establish formal and informal sessions. The interviewees mentioned that these mechanisms helped them to understand the progress they are making and share their concerns, improving the collaboration between the public client and contractor. In addition, interviewees from the HWBP expressed that both parties jointly hire an external organisation to support them in improving their collaboration, which supports building their relationship and reducing conflicts.

Table 6.10: Comparison between monitoring mechanisms

Level	HWBP	MJPG
Programme	Key performance indicators (Hard & soft) Strict control for decision-making Follow-up sessions	Strict control for decision-making Follow-up sessions Key performance according to MEAT criteria
Contracting authorities	Formal & informal follow-up sessions Hiring coach for steering collaboration	

6.4. Conclusions

This section discusses the findings of this chapter and answers the SRQ4.

The modified framework based on Kujala et al. (2021) (see figure 4.1) was used to identify the governance mechanisms applied in each case study. Tables 6.2 and 6.4 summarise the results of the governance approach used by HWBP and the MJPG.

The analysis identified that the MJPG still has some uncertainties that may change the research results as new mechanisms may emerge when the programme starts to tender projects. Although this is a limitation of this research, it did not impede identifying governance mechanisms shared by both programmes. For instance, both public clients have strict control over their programme with clear boundary conditions, in which both programmes have centralized decision-making for granting subsidies for the projects. Additionally, both programmes use contractual and relational mechanisms that facilitate the collaboration of all parties.

Contractual mechanisms refer to aspects that are inherent to the project delivery selected. For the MJPG, all the projects use a design and construct project delivery method in which the mechanisms for rewards, risks, roles and responsibilities are based on the UAV-GC 2005. In contrast, the water authorities in the HWBP can select a distinct project delivery in which the contractual mechanisms can vary drastically from project to project.

Moreover, relational mechanisms governed by social interactions play an essential role in both programmes as they facilitate the creation of synergies. For example, knowledge sharing in the programmes is crucial for continuous improvement, making the programme more efficient and effective. In the MJPG programme a pilot project is used, allowing learning from the standard contract and then improving it for subsequent projects. Similarly, the HWBP facilitates a team that supports contracting entities and provides them with lessons learned from the past to implement at the start of a new project. Moreover, including mechanisms that contribute to stable teams reduces the possibility of losing relevant information and contributes to a smoother process for decision-making.

Furthermore, although there are similarities in the mechanisms implemented by both programmes,

several differences can also be found. One crucial difference between the programmes is that only in the HWBP all of the 22 governance mechanisms were identified. This difference is because the MJPG still needs to start the bidding phase. Furthermore, even though both programmes have a programme and a contracting level, different mechanisms were present at each level. The most significant differences can be identified in capability building and rewarding dimensions. In capability building, the mechanisms vary depending on whether the programme level chooses the market approach.

The programme level of the HWBP let contracting authorities choose the market approach and therefore contracting authorities established more governance mechanisms, providing sufficient flexibility for decision-making. Accordingly, less mechanisms were established on the programme level.

In contrast, the MJPG programme team selected a standard market approach that all projects must follow. Consequently, contracting authorities have less flexibility in decision-making, and therefore fewer governance mechanisms are established at this level. Correspondingly, more mechanisms were already created at the programme level.

It can therefore be concluded that depending on the level of flexibility established at the programme level, more or fewer mechanisms would be present at the contracting authorities' level. Nevertheless, both levels contribute to establishing the governance approach that projects will follow.

Besides, both programmes use a mixture between programmes and project practices. The programme level focuses on governance mechanisms that ensure coordination, adaption and safeguarding exchanges in the programme so that the different actors involved work towards the programme goals while benefiting from synergies between interrelated projects. Whereas the contracting authorities level focuses on translating the programme goals to their projects in which collaboration with the contractors is essential for the delivery of the projects. For instance, in the HWBP, collaboration with the contractors is beneficial for developing the project plan and identifying all the risks of the projects, as well as keeping a good relationship for future projects.

Moreover, the results show that a lack of alignment between the different programme levels may be a barrier to inter-organizational collaboration. Therefore, it is concluded that alignment between the programme level and the contracting authorities is necessary to ensure the programme goals' achievement.

Finally, to conclude, the specific governance mechanisms identified in each case study can be found in section 6.3, where multiple comparison tables show the similarities and differences in each dimension. Furthermore, a model is developed in the next chapter based on the lessons learned from these two programs. This model helps the organization of governance in Dutch infrastructure programmes to facilitate inter-organizational collaboration.

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Model & Evaluation

This chapter explains the development of the PGO model. It is divided into five main sections. First, section 7.1 describes the design process followed in this research to develop the model. Second, section 7.2 describes the lessons learned from the case studies linking them with literature and a preliminary model is provided. Then, section 7.3 expresses the results from the evaluation model. After, section 7.4 provides the final model that captures the lessons learned answering SRQ5. Finally, in section 7.5, a brief conclusion of this chapter is given.

7.1. Design procedure of the model

In figure 7.1, the design procedure of the model is shown. The design procedure consisted of six steps, in which input from the literature review, exploratory interviews and case studies allowed the creation of the model. A brief explanation of each step is described below. However, this chapter focuses mainly on steps 6, 7 and 8 and further explains them in the following sections.

Figure 7.1: Model design procedure

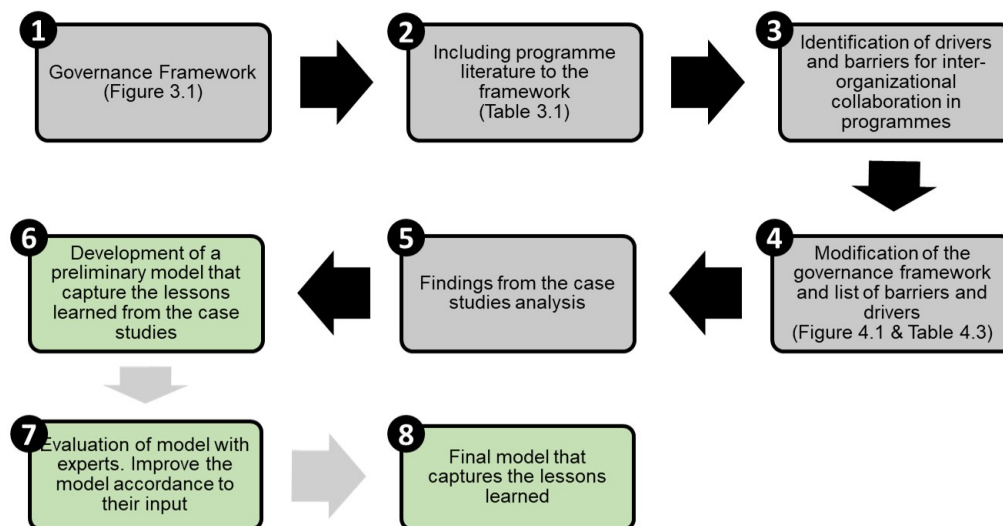1. The governance framework by Kujala et al. (2021) was selected for this research (see figure 3.1). The framework identifies six governance dimensions (goal-setting, capability building, rewarding, roles & responsibilities, coordination and monitoring). Each dimension includes several governance mechanisms identified in the literature for inter-organizational collaboration in project networks.

2. The framework includes six dimensions of governance mechanisms on project networks. However, governance mechanisms from the literature of programmes were included (see table 3.1, since project networks, to some extent, differ from programmes.

3. A preliminary list of barriers and drivers for inter-organizational collaboration in programmes were identified (see table 3.4).

4. The governance framework selected in the literature review was modified with the findings from the exploratory interviews, where it was possible to identify new governance mechanisms that are inherent to programmes, such as stable teams, longer tender phase, and predictability of works (see figure 4.1. Also, new drivers and barriers were included in the preliminary list according to the exploratory interviews (see table 4.3).
It was also possible to identify that two distinct levels are in charge of establishing the governance approach: the programme level and the contracting authorities level.

5. Figure 4.1 was used in the case studies to identify the governance approach of each case study regarding the six dimensions of governance. It was possible to identify multiple shared governance mechanisms between the two programmes. However, some differences were also found (see section 6.3).
The findings of the case studies helped to develop the model that can serve as a guide on how to organize governance in the early stages of a programme that facilitate the inter-organizational collaboration between the public client and the contractor

6. The preliminary model is developed by 1, 2, 3, 4, and 5 together.

7. The preliminary model is evaluated by experts, in which their recommendations and input is used for the improvement of the model.

8. The final model is developed.

7.2. Development of preliminary model

This section describes the main input for the model following the research findings, linking them with the literature review. After, a preliminary model is provided and explained.

7.2.1. Compliance programmes in the Dutch infrastructure sector

This research focuses primarily on the typology of compliance programmes, which stem from the requirement to comply with new laws and regulations. According to OGC (2011), the benefits of programmes can be expressed in terms of compliance, achievement and avoidance of negative consequences rather than in quantifiable performance improvements. However, the findings show that public clients in the Dutch infrastructure sector use compliance programmes as an opportunity to include development issues associated with the Dutch government's sustainability ambitions while also ensuring performance in project delivery. For example, the HWBP programme must comply with safety standards in primary flood defences, where development issues associated with spatial quality and sustainability are also included in the projects. In parallel to this, they ensure that they improve the delivery performance of their projects as they learn from the projects implemented.

Similarly, the MJPG must renovate and construct sound barriers to meet the noise levels produce by the national roads. In addition, the MJPG includes circularity and biodiversity and motivates the main contractor to have a more integrated supply chain while implementing a standardised design to improve the performance of their projects. For this reason, it can be concluded that, although compliance infrastructure programmes in the Netherlands are formed so that the organisations comply with emerging regulations, they include sustainability ambitions while ensuring increased performance in executing the projects within the programme.

One of the main reasons public clients in the Dutch infrastructure sector include these sustainability ambitions in their programme is that they must also meet the ambition to be circular by 2050 (Ministerie van Infrastructuur en Waterstaat, 2021). Therefore, in line with Hertogh et al. (2018), renovation programmes that follow a compliance typology are an opportunity to make them fit for future needs. Thus,

secondary goals that focus on sustainability ambition in compliance programmes contribute to future needs.

7.2.2. Preliminary conditions

Collaboration between the public client and the contractor in infrastructure programmes is essential to achieve the programme goals (Frederiksen et al., 2021; Prevaas, 2018). In line with the literature, both case studies highlight the importance of collaborating in the programme with different actors. For instance, public clients in both programmes rely exclusively on a limited market, where the programme configuration must be chosen accordingly to the market's capability to execute the task. As a result, the number of parallel projects should not exceed the market's capability. Moreover, as programmes have a high number of projects to be executed in a limited market, it is necessary to build good relationships with the contractors since it is likely that they would be involved in several projects of the programme.

However, as was found in literature and exploratory interviews, the context of the programme impacts inter-organizational collaboration. On the one hand, the characteristics of the organizations play a significant role, in which the organizations working for infrastructure programmes are typically project-oriented organizations (Vosman et al., 2020) that are characterized by prioritizing individual interests with different cultures, resulting in clashing attitudes (Eriksson & Nilsson, 2008; Ng et al., 2002; Suprapto, Bakker, Mooi, & Moree, 2015). As a consequence, these characteristics serve as barriers to collaboration. On the other hand, the characteristics of the programme and the projects within the programme also impact inter-organizational collaboration. From the case studies, the programme's size played a significant role, as there was a need to align multiple parties to work towards a mutual goal. Therefore, collaboration was essential for the HWBP and the MJPG to align and integrate all actors to achieve the programme goals, which was facilitated by the use of governance mechanisms that helped to overcome the barriers inherent to the market and clients' characteristics.

7.2.3. Different levels for a governance approach

The exploratory interviews identified that two levels within the programme establish governance mechanisms in the projects within the programme; the programme level and the contracting authorities. Furthermore, the findings confirmed that these two levels establish the governance approach, in which each level can be considered a distinct organizational space serving a distinct purpose (Frederiksen et al., 2021). For instance, the programme level in both the HWBP and the MJPG have the purpose of establishing strategic decisions by providing direction on how the programme is organized and managed and the synergies they want to achieve. In comparison, the contracting authorities have the purpose of linking the programme level and the project level, as they are in charge of translating the strategic decisions from the programme level to operationalize them in the projects and tendering the projects. Finally, the project level has the purpose of executing the projects according to what is established by the two other organization and have the purpose of learning while executing the projects.

Nevertheless, in contrast to the research of Frederiksen et al. (2021), the division of organizational spaces in the MJPG and HWBP is the result of the involvement of different public clients instead of different programme team members such as the steering committee and the programme office, which the division in their research. Moreover, as the programmes compromise multiple public clients, each contracting authority is responsible for a bundle of projects within the organization's boundaries. Thus a sub-programme level emerges, which can be interrelated with the contracting authorities level. However, this sub-programme level must align with the programme level since organizational fragmentation can present a risk to the programme's success (Frederiksen et al., 2021). As a consequence, governance mechanisms are implemented at the two levels because these mechanisms facilitate integration in the programme and provide direction on how the interaction should be between the levels (Kujala et al., 2021). In which the governance mechanisms established by the programme level ensure safeguarding processes, exchanges and synergies as a programme as a whole. Meanwhile, the contracting level establishes mechanisms accordingly for the project location.

7.2.4. Flexibility in the programme

The literature recognizes the importance of flexibility in programme governance, as the governance approach may change throughout the programme's life cycle, adapting to the demands of the various programme phases (Miterev et al., 2020). In line with the literature, the case studies establish a flexible governance approach in which both recognize that as projects are being delivered and lessons are learned, they may need to adapt their governance, contributing to better results for future projects. However, in the HWBP and MJPG, the governance approach was not only flexible in terms of the upcoming demands of the programme, but also the programme level provided sufficient flexibility to the contracting authorities for them to have sufficient room to include aspects from the local project context. Therefore, following Rijke et al. (2014), infrastructure programmes compromising multiple public clients should provide decentralized decision-making with centralized boundaries contributing to the programme goals.

Even though both the HWBP and the MJPG give flexibility to the contracting authorities for decision-making, the decision-making is more preparation of decisions rather than making the decisions since the programme level must approve all decisions. Thus, decentralized decision-making transforms into decentralized preparing decision-making with centralized decision-making governed by the programme level. Moreover, from the results, contractual governance mechanisms slide from level to level, depending on the organizational level that determines it. Thus, if the programme wants to integrate contractual governance mechanisms into the project level, it is necessary that the contract is chosen at the programme level rather than sliding the responsibility to a contract manager from the contracting authorities. However, the programme level must know that projects follow similar characteristics and all can fall under the same project delivery method. As a result, the contractual governance mechanisms from project to project would be similar, improving the efficiency in project execution since the contracting authorities do not need to consume time in preparing the selection of the market approach.

7.2.5. Preliminary model

In appendix D, figure D.1 shows the preliminary model created in this research. This model will be updated with the input from the evaluation with experts. In addition, the development of a final model intends to include the literature and case studies findings. Therefore, an explanation of this model is not provided, as the final model will be explained in detail.

7.3. Evaluation of model

This section provides the evaluation procedure of the model developed in this research (see figure D.1. This section is divided into three sections. First, the selection of the experts is described. Second, the findings from the discussion with the experts are expressed. Lastly, some conclusions are provided.

7.3.1. Selection of experts for model evaluation

Discussions were held with experts with knowledge of infrastructure programmes to evaluate the proposed model in this research. These sessions aimed to gather feedback on the model that will result in its improvement of it. Unfortunately, due to the time constraint, the evaluation of the model was only done with two experts, which limited the model's applicability in practice. However, the findings provide sufficient insights that can contribute to the model.

The experts that provided feedback were already interviewed before in this research for the exploratory interviews. These experts were selected again as they already knew about this research topic, which facilitated the discussion. Table 7.1 provides an overview of the experts involved in the model evaluation discussion.

Table 7.1: Expert discussion for model evaluation

Code	Expertise in programmes	Date of discussion
[1]	Contract development of a project in a programme	03-11-2022
[2]	PhD in programmatic collaboration	03-11-2022

The evaluation of the model started with a general explanation of the model, and the essential input used to develop the model was expressed. Aspects such as (1) what is intended with the model, (2) the initial conditions of the model, (3) why there are different levels in the model and (4) the importance of flexibility in the governance approach. After explaining the model, open questions were asked to gain some insights from the experts. Below are some of the fundamental questions that were asked during the discussion:

- What do you think about the model? Do you think it expresses the concept that I'm describing to you?
- What is not completely clear for you from this model?
- What aspects do you highlight beneficial from the model?
- In terms of applicability, do you think this model can contribute to public clients organizing the governance in programmes? Why is it applicable, or why is it not applicable?
- What would you improve for the model?

7.3.2. Discussion of model evaluation

This section is divided into the main themes arising during the discussion with the two experts.

Different levels
The division of the levels of the model triggered both experts, in which the experts had a lot of questions regarding this division. First, it was necessary to clarify the reasoning behind dividing it into three levels. Then, after some discussion and explaining the contracting authorities level, both agreed that a middle level exists, which consists of the team that tenders the projects in the programme, which is a different team from the one that organises and manages the programme. Thus, to improve the model, it is necessary to define each level to clarify the model. Additionally, each one provided interesting insights from this division of levels.

On the one hand, expert [2] expressed that identifying this division between the programme level and the contracting authorities is valuable for public clients organising programmes in the infrastructure programmes, as this level shows another level that requires alignment. For instance, when it is the case of multiple clients, each organisation have their own culture and interests, and it is implied that that there must be tensions between these two levels. On the other hand, expert [1] expressed that a distinct division between the contracting authorities and the project level is more blurred since the project level starts with setting these steps. However, the expert agreed that the sub-level dimension is since each contracting authority also has a set of projects that must be handled. Therefore, a possible solution to improve the model is to remove the project level and focus only on the programme and the contracting authorities' level.

Parties involved in each level
Both experts expressed that the model would have more clarity if the model provided the parties involved in each level with an overview of the parties that help set the governance mechanisms for the programme. However, every programme might involve different stakeholders at each level, and thus standard parties that are involved are the public clients and the contractors. A possible solution is to provide the roles and responsibilities of the parties change at each level, providing the purpose that each level must fulfil.

A governance approach that differs from projects
Both stated that they could see that going through the six governance dimensions guided in establishing certain aspects of a programme. However, each dimension's statements should be clearer to identify how they differ from organising a conventional project. Expert [2] expressed that the process is not linear and that during the establishment of specific steps of the model, it might be necessary to go back to previous steps. Hence, the model should provide a visual aspect that shows that it is not a linear process.

Food for thought
The experts mentioned aspects that can be included in the model that might be missing and also provided some ideas for making the model applicable for practice.

- Improvements:

    - Key stable teams should provide a clear definition of what it means, for example, continuity of previous teams to future teams [1].
    - From a linear process to a non-linear process. There should be a connection between the two levels [2].
    - Technical requirements in the capability building should be taken out as it is unclear and doubled with the contracting level authority [1].
    - The project level is confusing as it goes through the six dimensions with the contracting authorities. Maybe the project level should be left out from the image in order to avoid confusion. [2]

- New aspects to include:

    - In the goal setting, the alignment of key stakeholders should be included at the contracting authorities level [1].
    - Definition of each level, including the parties involved in each level. [1] [2]

- Food for thought

    - How do different public clients collaborate to align and achieve the programme goals [2]
    - Each programme will establish different boundary conditions, meaning that the flexibility will vary from programme to programme. Thus, it is difficult to imagine to set what is fixed and what can be flexible, as it depends solely on the programme team [1].
    - Decision-making also occurs in the contracting authorities, where the programme level controls not all decisions. However, critical aspects, such as the tender procedure, must be approved [1].

7.4. Improvement of the model

The Programme Governance Organizational (PGO) model provides an overview of organizing programme governance during the early phases of compliance infrastructure programmes. Accordingly to the findings and the literature review, it is possible to argue that the governance framework by Kujala et al. (2021) (see figure 3.1), compromising six governance dimensions with its corresponding governance mechanisms that facilitate inter-organizational collaboration, is applicable for infrastructure programmes. However, the findings from this research propose a two-step approach for organizing programme governance and identified governance mechanisms inherent to programmes enriching the model by Kujala et al. (2021). The two-step approach is divided into the two levels identified; programme level and contracting authorities, where each level goes through the six dimensions, fulfilling the purpose of each level. In PGO model, it is assumed that the market approach is chosen by the contracting authorities.

Furthermore, the primary goal and the preliminary conditions shape the governance approach that the programme will design. Certain governance mechanisms must be implemented to overcome barriers that might impede the synergies that want to be achieved in the programme. Once the programme

level establishes the boundary conditions for each dimension, it is delivered to the contracting author-
ities with sufficient flexibility. Then, the contracting authorities finalize the boundary conditions and
translate the programme goals to the project goals aligning them to the local project context. Moreover,
the contracting authorities are the public clients that will collaborate with the contractors to execute the
projects. Nevertheless, the governance mechanisms established at the early phases from both the
programme level and the contracting authorities will shape the relationships between the contracting
authorities and the contractor. This findings are summarized in figure 7.2.

From these lessons it is possible to developed the PGO model (figure 7.3) that can serve as a guide
for organising governance in future programmes. Importantly, this model is suitable for a compliance
infrastructure programme that compromises multiple public clients. Below it is a brief guideline of the
model:

- The model is developed for infrastructure programmes compromising multiple public clients.
- Step 1 - Identifying the typology of the programme: it is necessary to indicate the typology of
  the programme as they impact the governance approach. In this case, compliance infrastructure
  programmes were examined in which they arise due to the need to comply with new regulations.
- Step 2 - Analyze preliminary conditions: Understand the characteristics of the clients organiza-
  tion, the market characteristics and the pre-conditions of the projects that will be bundle. This will
  set the configuration of the projects (parallel-sequential). Additionally, understanding the charac-
  teristics of the clients and market will set the potential barriers that might arise and the limitations
  of each.
- Step 3 - Set boundary conditions: In this moment the public client must establish what will be the
  boundary conditions for the projects to follow. For instance, establishing the level of flexibility that
  will be given to the contracting authorties' for decision-making.
- Step 4 - Setting the governance approach during the early phases: The programme governance
  is established by the programme level and the contracting authorities' level. The programme
  level is the team that will set the coordination of the projects and the people in the programme.
  The contracting authorities' translate the programme goals to the projects according to the local
  context of the projects. Each level shall go through the six dimension of governance and include
  aspects that are essential for the programme to be able to fulfil the programme goals. Some
  things to keep in mind when going through the process of establishing the governance approach:

  - Circular process instead of a linear process: A governance approach is more a circular
    process than a linear process, so it is possible to go to other dimensions when needed.
  - Two loops inside the programme governance: The green line represent the programme level
    establishing the boundary conditions. In contrast, the yellow line represents the contracting
    authorities linking the programme goals to their projects. Each level goes through the same
    six dimensions with different purposes. The purpose of each level is described in the model,
    as well as the parties that can be involved in defining the governance.
  - Each quadrant provides the must do's at each level for each dimension. It is important to
    highlight that this model assumes that the contracting authorities select the project delivery
    method. Thus, the governance mechanisms inherent to the project delivery are distinct with
    a red colour.

Additionally, figure 7.4 was developed to complement the model, which provides a variety of gover-
nance mechanisms for each dimension that may facilitate the inter-organizational. The governance
mechanisms expressed in the table are drawn up according to the results and analysis from the case
studies.

7.5. Conclusions

The evaluation of the model provided valuable insights that contributed to its improvement of the model.
Even though the model evaluation was only held with two participants, it still enriches the research. Af-
ter evaluating the model, one can conclude that the preliminary model is complex and contains a large
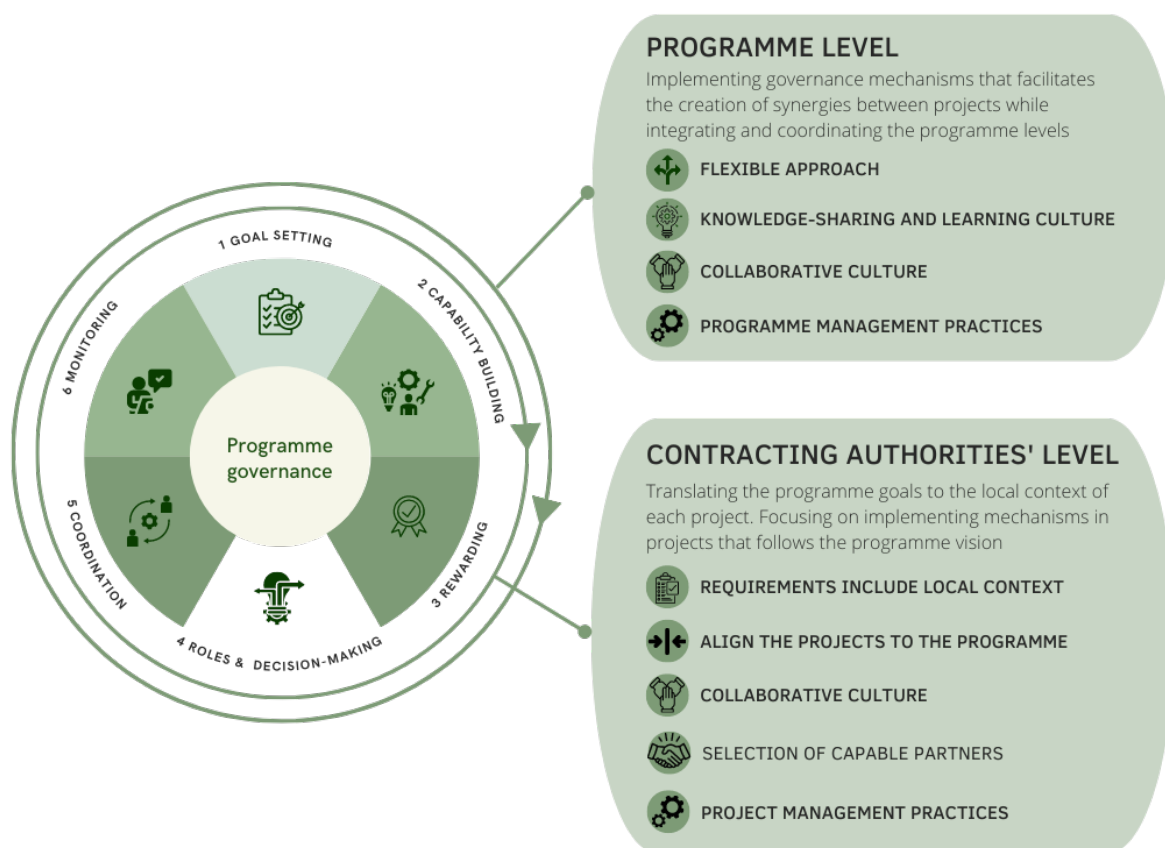
Figure 7.2: Lessons learned from the case studies

amount of information that cannot be processed without a detailed explanation, in which some improvements are required to use it in practice. However, the experts highlighted that the model provides fruitful insights for practice. For instance, the contracting authorities are the link between the programme and the projects, and it is necessary to align this middle level to avoid tensions in the programme. Moreover, the experts mentioned that they could see that these six steps provide a framework for the most relevant aspects that must be included when organizing the governance for an infrastructure programme. Still, a further explanation of each step should be provided. Therefore, the preliminary model was updated accordingly to the experts' recommendations.

As a result, the PGO model was developed 7.3, and table 7.4 was created to clarify the model. The model covers all the lessons learned gathered in this research. Still, instead of including specific governance mechanisms in each goal dimension, it provided more guidance on aspects that should be taken into account when establishing the governance mechanisms for the programme to facilitate the inter-organizational collaboration between the client and the contractor. Meanwhile, the formulation of table 7.4 provides a clear description of each dimension of the model, providing some governance mechanisms identified in the case studies. It is important to emphasise that the model and the table were created assuming that the contracting authorities had the liberty of selecting the market approach. However, this condition can change from programme to programme as the programme level decides fixed aspects. Thus, the model provides a red distinction to these aspects that can slide from the contracting authorities to the programme level. Due to time constraints, the model was not re-evaluated, therefore, its applicability in practice is unknown. However, the PGO model and table 7.4 serve as a good starting point for practice since they can offer guidance when organizing an infrastructure programme that encompasses multiple public clients.

INFRASTRUCTURE PROGRAMMES (with multiple public clients)

Step 1: Typology of the programme
Compliance programmes surge for the need for organizations to comply with new regulations. Therefore, secondary goals in compliance programmes should focus on development themes in order to contribute to future needs.

Step 2: Analyze preliminary conditions
- Characteristics of the programme & projects within the programme
- Preconditions (policy, environment, market)
- Points of attention during construction & operation (opportunities & risks)

Step 3: Set boundary conditions
- The team organizing the programme should set the boundary conditions, establishing the level of flexibility that would be provided to the contracting authorities level.

Step 4: Setting the governance approach during the early phases

4.1 PROGRAMME LEVEL

Purpose:
- Establishing strategic decisions by providing direction on how the programme is organized, managed and the synergies they want to achieve.

Parties involved:
- Public clients
- Key stakeholders

4.2 CONTRACTING AUTHORITIES (sub-pogramme level)

Purpose:
Linking the projects to the programme, by translating the strategic decisions from the programme level to operationalize them in the projects, and tendering the projects

Parties involved:
- Contracting authorities tendering the projects
- Contractors
- Key stakeholders

Goal setting

Programme level must do's:
- Draw-up secondary goals jointly with stakeholders
- Establish flexibility and & design rules
- Introduce joint responsibility to increase awareness
- Get advice from external key parties (market)
- Establish clearly the number of projects in the programme

Contracting authorities' level must do's:
- Development of tender and selection of market approach
- Translating primary and secondary objectives to projects
- Joint development of goals

Monitoring

Programme level must do's:
- Establish formal control using measurable indicators controlling the programme's performance
- Establish Informal control for building trust
- Steer decision-making by continuous support

Contracting authorities' level must do's:
- Establish formal control using measurable indicators controlling the project's performance
- Informal control for building trust in the project
- Hiring a third party for controlling and steering behaviour in the projects

Coordination

Programme level must do's:
- Programme management practices-incentive synergies
- Establish an open and trust culture
- Provide sufficient communication channels
- Build a flexible approach that can be change according to lessons learned
- Include formal & informal conflict resolution mechanisms
- Ensure continuity in teams

Contracting authorities' level must do's:
- Programme & Project management practices
- Include formal & informal conflict resolution mechanisms
- Ensure continuity in teams

Capability Building

Programme level must do's:
- Establishing minimum criteria for selecting capable partners
- Providing sufficient spaces for knowledge-sharing and incentive a continuous learning in the programme

Contracting authorities' level must do's:
- Selection of suitable project delivery method that aligns with programme goals
- Establishing selection criteria (hard & soft requirements)
- Ensuring knowledge-sharing and continuous learning during project life cycle

Rewarding

Programme level must do's:
- Joint responsibility in risks

Contracting authorities' level must do's:
- Risk allocation based on contract chosen
- Include gain or/and pain mechanisms
- Steer behaviour with reputation

Roles & Decision-making

Programme level must do's:
- Provide clear roles and responsibilities
- Provide a clear management structure
- Decision-making is centralized with a decentralized preparation of decisions.
- Centralized decision-making for granting subsidies.

Contracting authorities' level must do's:
- Establish roles according to contract selected
- Preparing decisions to be approved

Programme governance

1 2 3 4 5 6

* Mechanisms inherent to project delivery method

Figure 7.3: Programme governance organizational model (PGO Model) for compliance infrastructure programmes

		Programme Level	Contracting Authorities' Level
	Purpose of level	Implementing mechanisms that incentive the creation of synergies between the projects and include mechanisms that contribute to the alignment between programme levels. Create an approach that can adapt to the local context.	Translating the programme goals to the local context of each project. Focusing on implementing mechanisms in projects that incentive collaboration in the projects.

Goal Setting

| Sub-dimension	Governance mechanisms	Governance mechanisms
Joint performance goals	Market consultations / Joint responsibility between public clients / Joint prioritization of projects / External advice from key parties	Joint development of the goals / Early contractor involvement / External advice from key parties
Clarity of goals	Standardized documents and guidelines / Alignment between public clients / Clear development themes	Alignment with contractors / Clear requirements to the contractors
Flexibility	Sequential configuration of projects / Flexibility in market approach / Flexibility in secondary goals	Mechanisms dependent on programme level
Predictability of the works	Clear number of works that compromise the programme / Constant assessments if new projects should be include	N/A
Longer tender phase	N/A	Joint development of goals

Capability building

Sub-dimension	Governance mechanisms	Governance mechanisms
Selection of capable partners	A tender procedure that not only focuses on price / Pilot project to evaluate the programme governance approach	Selection criteria involves soft & hard aspects / Requirements based on primary and secondary goals / Contractually dependent mechanisms
Training & continuous learning	Events for sharing knowledge / Cross-project explorations / Visits to other projects / Documenting all lessons learned /Training staff / Support team from programme level that facilitates sharing of knowledge	Coopetition phenomenon (contractors) / Documenting all lessons learned

Rewarding

Sub-dimension	Governance mechanisms	Governance mechanisms
Rewards tied to performance	Granting subsidies for innovative projects	Contractual pain mechanisms / No monetary rewards / Collaboration is rewarded / Fictional discount in the selection criteria
Risk sharing mechanisms	Risk sharing for joint-responsibility	Risk sharing during joint development of goals / Risk allocation during execution according to contract type
Reputation	N/A	Collaboration is rewarded / Consideration for future projects in the programme

Roles & Decision-making

Sub-dimension	Governance mechanisms	Governance mechanisms
Clear roles and responsibilities	Roles laid down in official documents / Roles in line with programme organization	Roles & responsibilities dependent on contract choic
Management structure	Clear governance structure with clear reporting lines	N/A
Decision-Making authority	Steering decision-making on lower levels / Grating subsidies / Approving highly complex decisions (e.g. final tender procedure) /Decentralized preparation of decisions with centralized decision-making / Flexibility for contracting authorities in decision-making	Preparing decisions for the development of the project

Coordination

Sub-dimension	Governance Mechanisms	Governance Mechanisms
Common management practices	Joint prioritization of projects / Configuration of projects (parallel or sequentially) / Project start-ups & follow-ups / Standard documents for projects/ Regular meetings with contracting and project level	Balance between programme vs project practices / Decision-making varies on the contracting authoritie
Shared culture	Relational norms (e.g. trust and openness)	Relational norms of the programme
Effective communication	Regular meetings / Communicating important information in a proper time	Regular follow-up meetings / Formal & informal channels of communication
Change management	Re-evaluation of management approach / Change according to lessons learned	Re-evaluation of management approach / Change according to lessons learned
Conflict resolution	Formal escalation of conflicts / Joint problem resolution of conflicts / Dialogues for sharing concerns	Joint conflict resolution / Formal escalation of problems / Dialogues for sharing concerns
Stable teams	Defined contract commitment of personnel	Continuity of personnel from project to project

Monitoring

Sub-dimension	Governance Mechanisms	Governance Mechanisms
Formal control & monitoring	Key performance indicators / Centralized decision-making (for granting subsidies and market approach)	Key performance indicators
Informal control & monitoring	Support in project start-up / Follow-up sessions	Follow-up sessions
Monitoring & auditing via third party	N/A	Hiring a coach for monitoring their collaboration

Figure 7.4: Governance mechanisms for infrastructure programmes

8
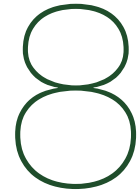
Discussion

This chapter is divided into the research findings and the limitations of this research. First, the research findings are summarized in section 8.1, which discusses the importance of collaboration in infrastructure programmes 8.1.1, the governance mechanisms identified 8.1.2, and the applicability of the PGO model in practice 8.1.3. Second, and lastly, the limitations of this research are exposed in section 8.2.

8.1. Research Findings

The programme-based approach in the Dutch infrastructure sector helps to integrate the supply chain and facilitate the coordination of projects. However, although the literature highlights that collaboration is the preferred way to deliver complex projects involving multiple parties, little attention has been given to inter-organizational collaboration in programmes (Artto et al., 2009; Chen, 2020; Frederiksen et al., 2021; Martinsuo, Teerikangas, et al., 2020; Miterev et al., 2020). Therefore, this research investigates how inter-organizational collaboration is governed in Dutch infrastructure programmes.

The findings indicate that inter-organizational collaboration among programme actors is crucial for achieving the programme goals; however, some barriers impede collaboration due to characteristics inherent to project-oriented organizations. Therefore, implementing governance mechanisms at the early stages of the programme shapes the downstream relationships facilitating collaboration.

8.1.1. Inter-organizational collaboration in Dutch infrastructure programmes

The results supports the theory that the programme-based approach serves as a vehicle to improve efficiency and effectiveness. Its characteristics are beneficial as it facilitates better communication lines, better transfer of knowledge between the projects, improves project performance, and achieves synergies that won't be possible if projects were executed individually (Geraldi et al., 2022; Lycett et al., 2004; Miterev et al., 2020; Pellegrinelli, 1997; Rijke et al., 2014; Shehu & Akintoye, 2009). However, collaboration is essential for infrastructure programmes in order to align multiple parties towards a mutual goal. Likewise, this research identified that public clients seek for inter-organizational collaboration in programmes to improve learning curves, promote standardization and provide certainty in the number of works. For instance, learning curves within the programmes are indispensable to improve delivery of projects, while having predicitability in the number of works provide certainty to the contractor for future works. In contrast, standardization is perceived in the case studies as a barrier instead of a driver for inter-organizational collaboration because rigid standards incentivise inflexibility which provides a challenge to adapt projects accordingly to their local context (Rijke et al., 2014).

8.1.2. Governance for inter-organizational collaboration in programmes

This study reveals how inter-organizational collaboration is governed in Dutch infrastructure programmes. Section 3.2, based on literature, provides an understanding of how governance mechanisms can facilitate collaboration in project networks, and then, section 4.3.2 explores how it can be translated to the context of programmes. The study applied the modified framework (see figure 6) based on Kujala et al. (2021) to understand how public clients organize and manage inter-organizational collaboration in programmes. The literature and empirical study findings contributed to the current knowledge regarding governance mechanisms on inter-organizational collaboration for infrastructure programmes.

For instance, the study verified that inter-organizational collaboration in programmes is governed by the six dimensions proposed in the framework by Kujala et al. (2021) for project networks-goal setting, capability building, rewarding, roles & decision-making, coordination and monitoring. However, this research revealed that when infrastructure programmes compromise multiple public clients or different team organizations from a public entity, the framework is followed by two levels from the programme's organisational structure; the programme level and the contracting authorities. Consequently, the whole governance structure evolving decision-making, processes, coordination and capabilities for project execution is a combination of input from both levels. Thus, it is concluded from the results that, for preparing decisions for infrastructure programmes the governance approach is decentralized. On the other hand, the actual decision-making is centralized by the programme level since it establishes the boundary conditions that must be followed.

Moreover, the study exposed that the programme level and the contracting authorities' level are compartmentalized organizational spaces serving different purposes but working towards a mutual goal. According to Frederiksen et al. (2021), these compartmentalized spaces must be managed and aligned to avoid conflicts, which can impede the fulfilment of the programme goals. Governance mechanisms implemented in the programmes can provide direction and integration between compartmentalized spaces facilitating collaboration. Furthermore, they can contribute to coordination and give stability to the programme (Frederiksen et al., 2021), allowing the successful delivery of projects within a programme and the programme as a whole (Chen, 2020; Müller, 2009; Rijke et al., 2014).

Likewise, the result from the study also suggests that infrastructure programmes need to implement flexibility in their governance approach, which aligns with the findings in the literature in chapter 2 (Miterev et al., 2020; Rijke et al., 2014). The governance approach should be sufficiently flexible to adapt to each project's local context. For instance, providing flexibility for upcoming demands in the programme and sufficient room for contracting authorities to include requirements needed for each project. However, according to the flexibility provided by the programme level, more or fewer governance mechanisms are set at the contracting authorities' level. As a result, the case studies evaluated from a governance standpoint revealed various governance mechanisms established by both levels and classified according to the six dimensions.

The following summarises the main findings clustered into the six governance dimensions. These sub-sections provide the implications of the governance dimension in compliance infrastructure programmes compromising multiple public clients. Additionally, each dimension includes the governance mechanisms that may have hindered or facilitated collaboration in the early phases of the programmes.

Goal-setting mechanisms in infrastructure programmes
On a programme level, goal-setting is focused on selecting secondary goals that can add value to the projects and the programme. This is where programmes can be differentiated from projects as it allows for value creation through strategic objectives used by the bundle of projects (Liu et al., 2019). At the programme level, mechanisms such as *market consultations* and *external advice from key* were essential for developing programme goals since they provided an understanding of how the market could address the tasks. These mechanisms may be seen as co-creation sessions, which according to Liu et al. (2019), play an essential role in governing the programme. Co-creation session are interactive practices in which users actively provide their ideas to develop the programme goals. Moreover, joint responsibility and *prioritization of projects between public clients* are mechanisms found in the HWBP

that contributed to providing clarity to the programme actors regarding the programme's mission, ensuring that the objectives are similarly interpreted by all actors (Kujala et al., 2021). However, the results also showed that not involving the contracting authorities early enough generated tensions in the programme. Therefore, *early collaboration and involvement of key stakeholders* in the programme could contribute to a better alignment between the programme actors with fewer disputes (Kujala et al., 2021). Additionally, the *sequential configuration of projects* in the case studies promoted a flexible approach that allowed changes at a later stage while contributing to the learning curves of the programme. As a result, *flexibility* in the scope of the projects facilitates readjusting to unforeseen risks and opportunities (de Groot et al., 2022; Kujala et al., 2021; Trzeciak & Jonek-Kowalska, 2021).

Furthermore, governance mechanisms identified at the contracting authorities' level were *external advice from key parties* and *early contractor involvement*. For instance, *external advice from key parties(client/market)* or *steering guidance/support teams* contributed to the development of the goal-setting for the projects. Similarly, *early contractor involvement* contributed not only to developing the project goals but also to risk identification. At the same time, it also aided their relationship by building trust from the early phases of the project. Therefore, *early contractor involvement* in a programme, as mentioned by (Farrell et al., 2019; Rahmani, 2021), facilitates the collaboration between actors by sharing risks, learning from one another, building joint organizations, and developing a shared culture from early phases.

Capability building in infrastructure programmes
Capability building compromises on selecting capable partners and ensuring training and continuous learning throughout the programme.

The results reveal that the establishment of requirements for selecting capable partners can be either at the programme level, at the contracting level or a combination of both. However, the contracting authorities are the ones who enter into legal contracts with the contractors. Therefore, they should have sufficient authority to include requirements for selecting a suitable partner. Moreover, the findings confirm the literature (Eriksson et al., 2008), which emphasises that including *softer selection criteria* ensures that contractors with appropriate competencies and abilities are selected, contributing to a more efficient way of working with fewer disputes. Furthermore, the results indicate that the project delivery method selected for the projects might influence the contractual and relational governance mechanisms that facilitate the creation of synergies. However, this research does not focus on their impact; thus, future research could explore this aspect.

Furthermore, regarding continuous learning in programmes, the research findings expose that the goals of the programme determine how learning is stimulated (de Groot et al., 2022), and thus corresponding governance mechanisms are implemented. For instance, the *pilot project* in the MJPG and the *cross project explorations* in the HWBP facilitated learning from project to programme level, whereas *visits to other projects* in the HWBP promoted project-to-project learning. The aim of these governance mechanisms was to stimulate learning and to adapt according to the lessons learned. Therefore, it can be inferred that programmes, compared to projects, offer an opportunity for continuous improvement via governance mechanisms that contribute to delivering better results as projects are delivered throughout the life cycle of the programme.

Rewarding in infrastructure programmes
The results identified governance mechanisms that are tied to the characteristics of programmes. For instance, as projects share resources, using *grant funding for innovative projects* is seen as a reward in the HWBP programme. However, most empirical findings can be associated with traditional project-oriented organizations focusing on *no monetary rewards, pain mechanisms, and contractual risk allocation*. Therefore, infrastructure programmes should implement more joint incentive mechanisms connected to the programme strategies, such as *shared pain mechanisms* (e.g. offering bonus payments depending on whether all partners achieve milestones). According to Farrell et al. (2019), *joint incentive mechanisms* can encourage innovation and knowledge-sharing opportunities. This allows a collaborative mindset to be fully embedded in the programme while counteracting traditional tensions.

Furthermore, the findings demonstrated the significance of a contractor's *reputation*, which is associated with relational mechanisms for obtaining future work within the programme (Denicol & Davies, 2022). Good collaboration may help build a solid reputation where they are more likely to be trusted, giving them a competitive advantage over other contractors (Akintoye & Main, 2007). However, reputation in the case studies was only identified at the contracting authorities level, as contractors play a significant role in this level.

Roles & decision-making in infrastructure programmes
The findings reveal that roles and responsibilities vary according to boundary conditions as well as the organisational management structure of the programme. Both cases studies have a hierarchical organisational structure, with *clearly defined roles and responsibilities* that support the decision-making process. Moreover, the programmes have a combination of *centralised and decentralised decision-making* in which the programme level must approve the most relevant decisions. Although the contracting authorities' level has decision-making power, the programme level implements mechanisms that steer the decision-making of these levels *(e.g. guidance teams)*. However, centralised decision-making in the programme led to tensions arising because tight control is seen as a lack of trust among programme actors. As a result, programmes must delegate power to management teams, and decision-making must be appropriately distributed among actors in order for governance to be effective (Kujala et al., 2021).

Coordination in infrastructure programmes
Coordination in a programme is a complex task in which it is not only about coordinating the projects but also coordinating the different compartmentalized spaces in the programme (Frederiksen et al., 2021). Programme governance facilitates the coordination of procedures and practices among the various programme levels (Frederiksen et al., 2021) and offers a structure for efficient project execution (Rijke et al., 2014).

The results exposed governance mechanisms consisting of an interplay of *programme and project management practices*. Programme management mechanisms facilitated the creation of synergies between projects and the coordination of the interrelated projects (Lycett et al., 2004; Maylor et al., 2006; Rijke et al., 2012). In contrast, project management mechanisms focused on quality, cost and time aspects during project execution (Rijke et al., 2012).

Furthermore, promoting a *shared culture* with *effective communication channels* and *formal and informal conflict resolutions* facilitates collaboration in the programme (Kujala et al., 2021). For instance, the HWBP promoted an *open and trusting culture* that facilitated the relationship between the public client and the contractor, as they could openly discuss each other's concerns. Thus, introducing relational mechanisms that aid trust and openness may contribute to building better collaborative relationships, improving communication and conflict resolutions (Suprapto, 2016).

In addition, although both programmes implemented governance mechanisms that facilitate coordination, the research reveals that the lack of stable teams is detrimental to the programme. Lack of stable teams can be linked to the barrier of high fluctuation of personnel identified in chapter 4.3.2. The high fluctuation of personnel is perceived as a barrier since the loss of relevant people in the teams firstly, affected the progress of the programme as crucial information was lost and secondly, represented a reprocessing. Thus, establishing *stable teams* can facilitate collaboration while contributing to the programme's goals. At the project level, stable teams should focus on mechanisms that incentivise continuity of personnel from project to project while at the programme level, they should focus on personnel committed to longer contractual commitment duration.

Monitoring in infrastructure programmes
The findings showed that the programmes implemented formal and informal control and monitoring mechanisms. Formal control is based on *measurable indicators*, while informal mechanisms, such as *start-up and follow-up meetings*, contribute to the alignment of the parties by sharing their concerns. The literature and the empirical findings reveals that strict control mechanisms can hamper relationships between the programme levels, causing adversarial attitudes (Lycett et al., 2004; Rijke et al.,

2014). However, insufficient control can harm the programme, as it might causes a loss of synergies (Rijke et al., 2014) and a deviation of projects from the programme's objectives. Thus, aligning with Rijke et al. (2014), it is necessary to promote a balanced control approach that provides sufficient flexibility for adapting to the project's local context while designing boundary rules that ensure the creation of synergies in the programme.

Moreover, the results highlight the importance of learning lessons for adapting the management approach for future projects. Thus, confirming Trzeciak and Jonek-Kowalska (2021), effective programme reporting and monitoring are critical for supporting appropriate preventive and corrective actions at the programme for future projects, fostering a management approach that contributes to better project delivery.

8.1.3. Applicability of the PGO model in practice

This research focused on how inter-organizational collaboration is governed in programmes. Based on the literature and the lessons learned from the case studies of this research, the PGO model was developed (see figure 7.3). The PGO model aims to provide a structural way to organize programme governance while allowing public clients to analyze their choices better.

The model offers valuable insights for practice, as it is a good starting for organizing governance in a programme. For instance, it identifies that the governance approach is a collaboration between the programme level and the contracting authorities' level. Additionally, the model provides multiple governance mechanisms that can be applied in programmes in order to facilitate inter-organizational collaboration among actors, as well as ensuring efficient project delivery.

8.2. Limitations of the research

- Programme stage: An important limitation of this research was that the MJPG is still in the early phases of the programme, where the projects are not yet been tendered, meaning that the contractors are still not involved in the programme. For this reason, it was not possible to identify specific governance mechanisms established by the contracting authorities. The governance mechanisms observed at the contracting authorities level are aspects that are given by the boundary conditions set by the programme level.
- Number of interviewees for case studies: The programme involves several parties involving multiple public clients and contractors. However, the interviewees only represent some parties involved in the programme. However, the results of the interviewees still provided sufficient information, and with the support of the reviewed documents, several governance mechanisms were identified. Additionally, only two out of eight interviewees were conducted with contractors. As a result, obtaining a sufficient perspective of the impact of governance mechanisms from the contractor side is not possible.
- Exploration character: This research has an exploratory character where there is a lack of previous research on the topic of inter-organizational collaboration in programmes. Therefore, most of the literature on inter-organizational collaboration is based on projects and project networks, which it was already stated can deviate from programmes. However, to counteract this limitation, exploratory interviews were performed that focused on inter-organizational collaboration in programmes which contributed to enriching the literature review and verifying if the literature of project and project networks was possible to use in this research.
- Evaluation of the model: Due to time constraints it was only possible to evaluate the model with two experts. Therefore, to provide more input on the applicability of the PGO model in practice is necessary to perform more evaluations.

<div align="right">9</div>

Conclusion and recommendations

This chapter responds to the research questions posed in the introduction to this study and synthesizes the most important findings of this thesis in Section 9.1. Then, Section 9.2 provides recommendations for future research.

9.1. Answering the Sub-Research Questions

SRQ1: What are infrastructure programmes?
Infrastructure programmes are a collection of interrelated infrastructure projects bundled together to accomplish objectives that a single project cannot meet. They are distinguished by their size, complexity, long duration, spiral life cycle, and central control, and they share resources with complex organizational structures. To handle the increased volume of work while integrating the supply chain, public clients have become more interested in implementing infrastructure programmes into action. The public client must have an adequate amount of interconnected work that can be bundled into a programme. The projects within the programme should be comparable in size and complexity to using the programme-based approach in the infrastructure sector. Programme management strategies will also be established following the programme's typology, objectives, and context to deliver the projects and thus meet the goals, in which this research investigates the typology of compliance programmes. Additionally, strategic objectives to create value are decided upon in the early stages of the programme, shaping the downstream relationships within the programme.

SRQ2:What is inter-organizational collaboration, and what governance mechanisms enable inter-organizational collaboration in projects
Inter-organizational collaboration is described in this research as *two or more organizations working together to complete a shared task that a single organization is unable to complete. These organizations collaborate on resources, knowledge, and capabilities while facilitating the generation and exchange of ideas that benefit all parties (Hardy et al., 2003)*. Additionally, this study views governance as facilitating inter-organizational programme collaboration. Programme governance sets up organizational procedures, decision-making simulations, and management tools to accomplish the programme's objectives. It is crucial to emphasize that for collaboration to succeed, all parties must be willing to put forth the necessary effort. The framework proposed by Kujala et al. (2021), in which governance is divided into six dimensions (goal-setting, capability building, rewarding, roles & decision-making, coordination and monitoring) identifies 19 governance mechanisms (see table 3.1 that can facilitate inter-organizational collaboration in project networks.

From the literature, it was possible to conclude that the most important aspect of achieving collaboration between the two parties is to establish trust and align interests in order to work toward a common goal, which can be achieved by establishing a shared culture. Joint goal development, flexibility, and goal clarity are some mechanisms that contribute to aligning the parties' disparate interests. Furthermore,

early contractor involvement contributes to the development of trust and assists the public client in gaining critical knowledge during the early stages. Furthermore, governance mechanisms should focus on hard and soft aspects when selecting capable partners and control mechanisms. It allows the parties to get to know each other in an informal setting, which helps the relationship thrive while reducing conflict. Therefore, this research uses the governance framework by (Kujala et al., 2021) to identify the governance approach used in the case studies. Furthermore, before analysing the case studies, the governance framework was modified as shown in figure 4.1, since the exploratory interviews provided 3 new governance mechanisms inherent to programmes.

SRQ3: What are the drivers and barriers to inter-organizational collaboration in the early phases of the programme?

This research identifies the main drivers and barriers to collaboration in the early phases of a programme through a literature review and exploratory interviews. On the one hand, the main drivers for forming a collaborative relationship between the public client and the contractor are economical, knowledge-related, and social drivers, with the expectation that joint collaboration between these two parties will increase project performance by sharing resources and access to new knowledge and technologies, learning from each other, reducing conflicts, and building stronger relationships for future projects. Moreover, it was possible to identify intrinsic infrastructure programme drivers during the exploratory interviews, which were the possibility of creating standardisation within the programme, increasing the learning curve, and providing certainty for future work. Parties, for example, can learn from previous mistakes and improve them in subsequent projects of the programme and implement standard ways of working that will shorten the project's life cycle. These aspects demonstrate the potential of infrastructure programmes as they increase project efficiency.

Nevertheless, clients in the public sector who want to implement more collaborative approaches should be aware that cultural, organizational, and industrial barriers make it challenging to achieve a collaborative approach. According to the literature review, cultural and organizational barriers are inherent in traditional organizations, driven by a self-interested, conservative culture that fears experimenting with new ways of working and losing control over projects. On the other hand, industrial barriers are imposed from outside sources and cannot be overcome. Similarly to the literature, the exploratory interviews emphasise that distrust is the primary reason why these parties in programmes do not want to collaborate and often have competing interests. They are concerned about losing their competitive advantage and signing long-term contracts with a partner who does not deliver as expected. Organizations hide behind formal agreements in projects to protect their culture and individual goals, with little emphasis on collaboration. Additionally, barriers such as high personnel fluctuation prevent knowledge from being preserved in the programme and necessitate reprocessing because new employees must be trained and brought up to speed. As well, it is important that public clients must have clarity from the start of the programme on the number of works to be completed throughout the programme, as a lack of future projects will not encourage contractors to accept such a high level of risk and promise a fictitious number of works will harm these two parties' relationship.

Table 4.3 provides an overview of the drivers and barriers to inter-organizational collaboration between the public client and contractors in the early phases of the programme found in the literature and in the exploratory interviews. However, in order to reap the benefits and overcome the barriers, certain governance mechanisms that encourage parties to collaborate must be put in place.

SRQ4: What governance mechanisms are present in ongoing Dutch infrastructure programmes and what governance mechanisms do these cases share?

The modified framework (see figure 4.1) was used to identify the governance approach implemented in each case study. Despite the fact that the programmes do not share the same characteristics, governance mechanisms shared by both programmes were identified. Furthermore, while the HWBP programme implemented mechanisms for all the sub-dimensions identified in the framework, the MJPG programme does not cover all of the governance sub-dimensions because the programme has not yet begun the tender phase. As a result, the comparison of governance approaches is made in accordance with the mechanisms established at the programme and contracting levels rather than the sub-dimensions of governance.

Table 6.2 and table 6.4 provide an overview of the governance approach used in each of the case studies, and the comparison of the programmes is provided in 6.3, in which each dimension is discussed. However, it is possible to conclude that the governance approach is a combination of the programme level and the contracting authorities level since the programmes compromise multiple public clients. The contracting authorities will have more or less room to include their input in the governance approach depending on the level of flexibility established by the programme level in decision-making. For this reason, some governance mechanisms vary from level to level.

SRQ5: How can a model capture the lessons from the case studies to be applied to future infrastructure programmes?

To answer this SRQ, findings from the literature and the analysis of the case studies are used. The PGO model captures the lessons learned from the case studies combined with the governance framework of Kujala et al. (2021). The lessons learned from the case studies are divided into four main findings; compliance infrastructure programmes, preliminary conditions, different levels for the governance approach, and flexibility in the programme.

- **[1] Compliance infrastructure programmes:** In the Netherlands, compliance infrastructure programs are formed to ensure that organizations comply with emerging regulations; they also include development themes such as sustainability ambitions while ensuring increased performance in executing the program's projects. Incorporating secondary goals with a focus on sustainability ambition helps to meet future needs.
- **[2] Preliminary conditions:** Collaboration is required in the program; governance mechanisms must be implemented following the programme goals to facilitate inter-organizational collaboration between the public client and the contractor while overcoming the barriers inherent in the market and client characteristics.
- **[3] Different levels for the governance approach:** Governance mechanisms are implemented at the programme and contracting authority levels to facilitate programme integration and guide how the levels interact. The governance mechanisms established at the programme level safeguard processes, exchanges, and synergies across the programme. Meanwhile, inherent mechanisms for project location are established at the contracting level.
- **[4] Flexibility in the programme:** The boundary conditions design at the programme level will establish the level of flexibility provided to the contracting authorities. Sufficient flexibility ensuring that the projects do not deviate from the programme. If the contracting authorities select the market approach instead of the programme level, contractual governance mechanisms would be present more at the contracting authorities' level, varying the approach from contracting authority to contracting authority.

A preliminary version of the PGO model was created. During the model evaluation, experts suggested that there are still some further improvements that need to be implemented to apply in practice. However, the model offers a good starting point for organizing governance in a programme. For instance, it guides aspects that should be considered when establishing the programme's governance mechanisms to facilitate inter-organizational collaboration between the client and the contractor. Considering the experts' recommendations, the model was updated into 7.3. The PGO model captures the lessons obtained from the case studies.

MRQ: What governance mechanisms facilitate the inter-organisational collaboration in the early phase of infrastructure programmes?

The main research question can now be answered based on the results of the sub-research questions. Inter-organizational collaboration in the early phases of infrastructure programmes is facilitated by an interplay of relational and contractual mechanisms corresponding to the six dimensions of governance: goal-setting, capability building, rewarding, roles & decision-making, coordination and monitoring. This governance mechanisms are established by the programme level and the contracting authorities'. They intend to provide a framework for organizational processes, decision-making, and coordination in the programme, while integrating the different levels of the programme. Figure 7.4 provides an overview of the governance mechanisms at each level that could facilitate the inter-organizational collaboration.

9.2. Recommendations

This section provides recommendations for Witteveen+Bos, for public clients and for future research.

9.2.1. For Witteveen+Bos:

- Witteveen+Bos can incentivize and advice public clients in the infrastructure sector to implement the programme-based approach to deal with their portfolio of projects, by increasing awareness of the benefits that programmes can bring to their projects.
- Witteveen+Bos can advice public clients to chose for collaborative relationships when using a programme-based approach to deal with the complexity of aligning multiple parties towards a mutual goal.
- Follow the six dimensions of governance as a basis of organizing inter-organizational collaboration for future programmes and projects, in which there should be an interplay of contractual and relational mechanisms.
- Advice public clients to involve key stakeholders, such as the contracting authorities and the market, during the development of the programme goals.
- The results of this research provide a model that can enable a better analysis of the governance approach for compliance infrastructure programmes. The model can be tested to see if it can be applicable for advising public clients when organizing programmes.

9.2.2. For public clients:

- A programme-based approach requires a different mentality, in which collaboration must be sought to enhance synergies in the programmes.
- Programme governance should be sufficiently flexible to adapt to the local context of the projects; however, it is essential to control and monitor so that individual projects do not deviate from the programme.
- Implementing a programme-based approach in the infrastructure sector not only contributes to better execution of projects, but it also creates a community of improvement through constant feedback received. However, there should be sufficient spaces that promote knowledge sharing.
- Promote relational mechanisms that create a sense of ownership, so there is a commitment from all parties in the programme.
- Involve the contractor from the early stages as they can provide essential knowledge to build the governance approach.
- Trust is everything in collaboration, thus, implementing mechanisms such as a shared culture, informal mechanisms, and reward collaboration can bring better results in the projects and hence, in the programme.

9.2.3. Suggestion for further research

- This research proposes a starting point for a PGO model that can contribute to organising programme governance in infrastructure programmes. However, due to time limitations, only two experts evaluated the model, and thus the model's applicability is limited. Therefore, further research is recommended that the evaluated model be improved according to the suggestions gathered in this research as well as performing new evaluations that provide insights that contribute to the applicability of the model in practice.
- It was possible to identify in this research that the management approach might adapt according to the lessons learned from the project delivery execution. Thus, further research is proposed to analyze how governance mechanisms change and adapt throughout the programme's life cycle and how this adaptation contributes to the programme's goals.

- This research focuses solely on the programme compromising multiple public clients, or different teams, in which one team is responsible for organizing the programme, while the other is in charge of procuring the projects within the programme.
- Collaboration between multiple clients was shown to be crucial for organizing the programmes. However, this research did not analyze how these parties collaborated. Thus, investigating the collaboration of multiple clients in a programme could contribute to this research as new governance mechanisms might arise from the programme level to the contracting authorities level.
- When the programmes finalize, further research could measure how the governance mechanisms set at the early phases of the programme contributed to the programme goals.
- Exploring how different project delivery methods implemented in the projects can impact the programme goals.
- In future research more contractors should be involved to capture their perspective of the governance mechanisms implemented.

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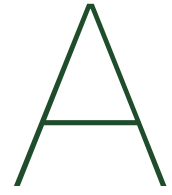
Programme typologies

Table A.1: Typologies of programmes based on literature [own compilation]

Types of programmes	Short description	Authors
1) Strategic programmes	1) Resulting from a big strategic reorientation due to a major organization-wide event that affects organizational structures, tactics and policies.	Ferns (1991)
2) Business cycle programmes	2) Project prioritization and control related to planning and budgeting cycles are the main objectives.	
3) Single-objective programmes	3) Often called megaprojects, and frequently functioning working outside the confines of a particular organization	
1) Loose programmes	The programme type differ depending on the level of control and intensity of direct management placed on projects 1) Projects only report to the parent organization	Gray (1997)
2) Strong programmes	2) Projects are manage and control closely	
3) Intermediate "open programmes"	3) Programme management promotes the flow of information so that initiatives can be coordinated without being directly controlled.	
1) Portfolio	1) Aims to take advantage of a common theme (shared resources, information, skills etc.) among relatively unrelated initiatives, resulting in increased efficiency and performance. The goal is to gain more benefits through coordinating efforts	Pellegrinelli (1997)
2) Goal-oriented	2) Exceptional, one-time projects that are not part of the organization's usual operating procedures. By properly defining, scoping and managing projects, new services, products, systems, plants or infrastructures can be developed	
3) Heartbeat	3) Attempts to improve existing systems and processes through evolutionary improvement or organizational transformation. This program type adds value by resolving divergent viewpoints and demands for change from multiple organizational actors to improve existing systems and practices while keeping operations running smoothly.	
1) Delivery programmes	1) The outcome results in a direct influx of finances to the organization	Gray and Bamford (1999)
2) Platform programmes	2) Aimed to develop the organizations infrastructure	

Types of programmes	Short description	Authors
1) Location of projects and distribution of projects	The type depends on the number of locations where the program projects are being implemented and the type of the location-project interaction. (depending on whether the projects are local or distributed, and whether any of the locations are shared or not)	Evaristo and van Fenema (1999)
1) Projects existence at launch	This typology is based on two dimensions: 1) if the projects existed at the time the programme was developed or not, and	Vereecke et al. (2003)
2) Intended outcome	whether the anticipated programme outcomes represent a major or incremental change to the organization.	
1) Bounded programmes	1) Programmes that are well-defined and of limited scope	Blismas, Sher, et al. (2004)
2) Target programmes	2) Corporate objectives, which give rise to these programs, are normally well-defined and have specific goals, although they are vulnerable to environmental pressures.	
3) Rolling programmes	3) The goals of these programs are incremental rather than step-change in nature, with a focus on continual network extension or development as needed.	
1) Vision-led	1) Top-down, ambition driven. Originated from strategy, ambitions, goals and visions for the future and wished to accomplish something	OGC (2011)
2) Emergent programme	2) Bottom-up, emergent. Originated from a need to overview and coherence between efforts. Goals are derived from the pooling of efforts	
3) Compliance programme	3) Mandatory, externally driven. Arises from the obligation to comply with new laws and regulations or other external factors.	

B

Exploratory Interviews

B.1. Interview protocol sample

Interviewee:
Date:

Introduction

First, thank you for your willingness to participate in this research. As I mentioned in the interview invitation, the purpose of this research study is to gain knowledge about how the collaboration between the contractor and the public client in the early stages of a programmatic approach can contribute to the implementation and achieving the goals of a programme. The interview will take approximately 30 to 60 minutes to complete. The data collected during this interview will be used to validate literature and gain knowledge in inter-organisational collaboration in the context of programmes. Therefore, I will ask you to provide answers to your perception of these topics. The interviews will be audio-recorded and transcribed into text. This interview consists of two parts. First, I will ask specific questions regarding programmes in the construction industry. Second, I will ask you to give your perception of the inter-organisational collaboration between the public client and the contractor in the context of programmes. I will kindly ask you to elaborate on each answer. However, if you don't feel comfortable answering a specific question, you can skip it. If you have any questions, please let me know; if not, we can proceed to start the interview.

Programmatic delivery approach

- Q1: What is your role at Witteveen+Bos, and what is your experience working with programmes?
- Q2: How do you define a programme?
- Q3: How do you define a programmatic delivery approach?
- Q4: What are the benefits of implementing a programmatic delivery approach in the Dutch infrastructure sector?

Enablers and barriers in the inter-organisational collaboration

- Q5: Why do you think the programmatic delivery approach is not implemented commonly in the Dutch infrastructure sector? (**)
- Q6: To what extent do you think the collaboration between the public client and the contractor is essential for a programmatic approach?
- Q7: What do you think are the enablers for the public client and the contractor to collaborate in a programmatic delivery approach?
- Q8: What do you think are the barriers for the public client and the contractor to collaborate in a programmatic delivery approach?
- Q9: How does the collaboration between the contractor and the public client in a programmatic approach differ from a project-based approach?

- In projects, collaboration factors such as -Commitment – shared understating -collaborative planning -Trust -shared knowledge – communication -mutual goals are present. Q11: Do you think these collaboration factors in a project-based approach differ from a programmatic delivery approach? If yes, how?
- Q12: Can you think of other factors that might be only present in a programmatic approach?

B.2. Summary of transcribed exploratory interviews

Q1.1: What is your role at Witteveen+Bos?

- EI1: I work as a contract advisor and procurement. So, writing, integrated, setting up integrated contracts. In different fields, like dike reinforcement projects and other infrastructure. I've now working on a water treatment plan. So, it doesn't really matter what the subject is. I can manage to write and set up a contract by working with technical colleagues and for procurement, I work for many different clients like RWS, waterboards, municipalities and provinces.
- EI2: My experience with Witteveen+Bos is quite extensive. I've been working here for 25 years now. I've done several things. I've been leading a couple of offices mainly the Amsterdam office until beginning of this year. I've been leading a PMC, also a group of people. And since I've been working here, I've been busy with contracting and procurement. So, I'm advising clients but also contractors about tender procedures, tender products, advising clients on the question to choose what type of contract it is collaborative or integrated or classical or whatever. I designed a tool for this Sora test it's called. But I'm also chair of the board of our pension because I have a double background. I'm an economist and I'm a construction engineer. Since I've been in the board since 2013 and since 2019 as a chair, so my week is filled with very diverse type of works.
- EI3: My role at Witteveen+Bos is as a contracting and tender advisor. So, for public clients, I help them in determining the procurement strategy and choosing between the different options that you have. Like, are we doing an integrated contract or maybe a bouwteam or so, so help them in developing the procurement strategy. Also, I help with the tender itself, preparing the tender documents and guiding them through the process of the tender. That is what I do with Witteveen+Bos, but I only work here only one day a week.
- EI4: I'm working as a project manager for mainly coastal protection projects. So, reinforcement of flood protection I have done many different things, so I'm not really an expert on one thing.

Q1.2: What is your experience working with programs?

- EI1 I'm supervisor of Gijsbert, he's looking in Amsterdam to the quay and bridges program. But mainly, I've worked in the dike reinforcement projects, part of the HWBP program. But I worked mainly on a project level, but I got some inputs on the program level during those projects.
- EI2: In the construction industry we mainly do projects. We do one thing, one project. So, we are going from a to B and then we go to the next project, and we go again from a to B, but in a different setting with a different client and different advisors, different contractor. I don't have so much experience in programs because there are not so many. I've done a program for the province of north Holland, and it was a program for underground infrastructure, so a couple of tunnels and an aqueduct. They were looking for a long-term relationship with a private company that could provide them with a maintenance and security. And we did the tender procedure, but we also did the contract. So, we designed the contract made concepts on which basis the private company had to work for 10 to 15 years. I do not know exactly if it's 10 or 15, something like that. Anyway, a long term a long-term program. So, with one. I have also worked, before I worked at the Witteveen+Bos, in the care sector, was a big client had several projects so long-term vision on housing, and they developed a sort of program in terms of, okay, we are going to do for the next 10 years. We are going to do several projects. So, we design a sort of program. So, I helped in that. You could say I was also involved, that was Witteveen+Bos a couple of years ago in the Hague for an again, a hospital, a big hospital. Also, in terms of a housing plan, long term housing plan, several elements in this plan. I call it the program. It's not one project and then we go to the next now it's connected to also with the intention of selecting a limited number of companies and working in this program for a couple of years.

- EI3: My relation with programs are not always that visible in the things that I do for Witteveen+Bos, but it is in my PhD research that I do at university, mostly in studying the cases that are all program; programmatic initiatives in the infrastructure sector. So yeah, that's how I am involved mostly in programs.
- EI4: I have worked as a project manager in a project in Zeeland that is part of the HWBP.

Q2: How do you define a program?

- EI1: I would say that there is this higher level it's a group of projects with some similarities in a way of type of projects. Probably some continuation on organizational level on the client side. And you should learn during those projects when they are sequential or when they're parallel there should be some interaction about to learn and improve, become more efficient, effective invasive construction time safety costs, quality and all that kind of stuff.
- EI2: A program consists of activities that can be performed solitarily, but are connected to each other, through a program. And it means that the total scope is more than one solitary project. It's it comprises of multiple projects, but I think also they are connected in some way, at least that's my opinion, that's the advantage of a project that it can be performed by one company or more than one company in the program that has the obligation, but also on the other hand, of course, the right to execute these projects for a quite a number of years. So, it's a long-term relationship, and if it's a good program, then the contract also has something about cooperation, about performance, about increasing performance or performing better. So, there should be incentives in this program. And I also think these projects and the execution can be conditional in terms of you don't have the right to execute all the projects at the start, you should perform as being contracted in a good way and then you get the right to perform in another project. So that can be a program, but also it can be projects in the terms of, okay, we're going to build something new or can also be in terms of asset management or maintenance. The type of work can be different in a program.
- EI3: I would define a program a bundle of projects. A bundle of projects that you cluster to accomplish goals that you cannot accomplish in one single project. So, it's about goals that are too great to accomplish in one single project. You need more projects that have some part of common element in it so that you can better contribute to the overarching goals.
- EI4: I think there's two different types of definition for programs. One is a big bulk of projects together and so it's actually a cluster of projects. And the second one is which is more policy making is when you have an idea of where you want to get, or a goal that you want to achieve, but you don't know exactly how you get there, and you are doing all kinds of activities to get closer to your goal, but without a really clear plan or steps to get there, because it's just unforeseen what will happen. The last the last definition is what I recently used more as definition of program but the first one is the old definition of very frequently used one.

Q3: How do you define a programmatic delivery approach?

- EI1: In that case, there is some link or incentive, I would say for a contract or for the markets or so, it can also be an engineering firm or in the early stages incentive or an incentive to work properly in one project to continue in the next one. But how it's organized that can differ, I think.
- EI2: Delivering a program step by step. There's not one result, but there are more results, along the way, along the program. And as I said before that the results can be connected to each other in terms of better performance during the program.
- EI3: Yeah, that's a good question. I don't think that there is a real definition already. But I would say that it is a delivery approach where you select one or several contractors for the delivery of multiple projects.
- EI4: This is a terminology that I don't really know. But maybe according what you say, to put more projects together in one tender in one assignment.

Q4: What are the benefits of implementing a programmatic delivery approach in the Dutch infrastructure sector?

- EI1: Some of the issues that we are facing now in the infrastructure sector are so big and we are with little people, so we should try to innovate and become more efficient and effective. And those issues that we are facing now have some issues, they are too big to handle it as one project, so you want some standardization and to have the same approach for the same problems.

- EI2: There is one major advantage in comparison to doing projects separately, or one by one, especially for public clients It's very important to realize that they have the obligation to tender. There are national and European tendering obligations, and that means that there is no incentive in terms of performing a project in a good way, because it doesn't give you any advantage as a company, a private company, as a private contractor, it doesn't give you any advantage for the next project. So, in terms of incentive in performing, there is an enormous advantage for the client to let the company know, let the contractor know, that if he performs in a project in a good way, that it will give him an advantage in the next one. And then, that's what I like in working for different type of contract, different type of clients, public clients they do a sort of hurdle race; you step over one hurdle and the next one is just as high as the first one. If you look at private companies, they can act in a different way. They can say, I want to have a reasonable price from you from the private, from the contractor. If it's not reasonable, then we do one project and then you are out, you don't have anything new. If you if you arrange a program because public clients can also arrange a program, then you have this advantage of this very strong incentive in cooperation, in having a right price.

- EI3: One of the main benefits is that you enter into a long-term relationship. So, you really get a chance to get to know each other to really and enhance the collaboration between the two parties, because in one single project you just do the project and then you say goodbye to each other. And then all the things that you have learned, they disappear. They disappear because they are not stored into the organizations, but they're stored in people and the people are going to do something else. So, when you have stable project team or a stable program team in this sense, I think it's very helpful because you do repetitive projects, but the same team, that's the ideal situation. In practice you do not always see that also not in a programmatic collaboration but that is one of the main benefits I would say.

  Also, I think it's helpful when you want to innovate because you can spread out the cost for that innovation over multiple projects. So, you do not, as a contractor, at least you do not have to earn it back in that one single project, but you can use several projects forward and you can also develop the innovation by applying it more often. So, in the first project you were sort of a try-out, and then the things that work you can take it with you along the way. So that's helpful. and you also see that in practice that it really helps for example in standardization modular building. But most of all, one of the benefits is related to the soft part. I would say, like the people getting to know each other and understanding each other's interests, but also working for the common goal. So, it makes working more fun, I think, with less fights and less conflicts. There is more need to invest in your collaboration because you were stuck with them for a longer period of time, so you will not let it escalate soon but you will really try to make the best out of it.

- EI4: The idea has one big overview, and you build on what you've learned from other parts of the program. So, if you have like five different projects in the program the first, you don't start all at the same time. At least normally it's not very common to start all at the same time. So, you learn from each other. It can also help, I think, in the communication that people understand the stakeholders around the project to understand that there is a bigger overarching program and that different parts of that are executed. But I think the learning is the most important. And if financial management that is done correctly, it can also help not to go over budgets five times, but you will have to have flexibility in each project. You have a little overflow in other projects, but of course not too much. It may help in financial management. It doesn't work always like that, that's my experience.

Q5: Why do you think the programmatic delivery approach is not implemented commonly in the Dutch infrastructure sector?

- EI1: Not only in the Dutch infrastructure sector, but also in whole Europe because of the procurement law. You would say if one party or a contractor is doing a good job, I can give him the second one and the third one. But you have some limitation due to this law. You want to also achieve some competition between contractors and that limits the possibilities, I think for programs. So, you have some limitations. And I would say on a project level you have a project team on a client side and contractor side, and if it's becoming a program, it's becoming too big for those teams. So, you should have another level and then you get all kind of organizational

issues, for information flows and making choices and making decisions becomes difficult. You should organize programs properly. But the more people working on a program or on the projects or different projects the more opinions, becoming more complex.

- EI2: Because every project has its own characteristics. So, it's very difficult. The way we finance projects it's not in program terms. It's budget for each project separately.

- EI3: I think that it is upcoming. So, you see it more often. In my experience, when I talk to people that are not using it yet, but they are also so enthusiastic, they are like this is the solution for the problems that we have. But it is very scary of course. It has a lot of consequences for the way you are organized, as a client for your structure, the governance, the contract types that you use. So, it is quite a transition for teams from a project organization to a program. So, they want to figure out how to do it first and then start with it and it takes time.

- EI4: I think that at least now in the Netherlands, we have come to a point that there is a lot of challenges in the public sector. Also, when you look at the HWBP, it has to do with the climate challenges that we have at the moment. But there's also the soil that is contaminated. There's a lot of maintenance that has to be done on bridges and construction like that, and that is all coming at the same time. And these are bigger challenges that have benefits when you put them all in one. And I think a long time ago, we had the Delta program, which was also one of the programs and these were more separate projects, but there was also one central point where this was all controlled and overlooked. I think it has to do with the challenges in this time, it's not something that we chose to do now. And before there was an opportunity, we didn't choose to, I think there's, it has to do also with the challenges that are big at the moment. And there are not only big, but they're also interlocking. So, there is a lot of interaction between the challenges that we have, like the climate change that we have, the drought that we have a challenge with nitrogen. So, all these issues mean for more interaction in the approach. And I think that's also why there is a lot of more, a lot more programs at the moment. Yeah. Cause the challenges are getting bigger at the moment.

Q6: To what extent do you think the collaboration between the public client and the contractor is essential for a programmatic approach?

- EI1: At first, I would say it should not be more important than in a project. But the collaboration is also on another level, because in a project the boundaries are set normally, and the objectives are clear. But, when you're in a program, another level should be added because you want to learn and to share knowledge and be in some degree or extent flexible, to change, and for some levels in a project or on the contractor side, I think that's new. In a program the position and role of everyone is different than in only a project. And therefore, I think collaboration changes.

- EI2: In theory, you can choose any type of contract. You can also choose a classical contract and I think it could be appropriate if you have a very simple and no-nonsense type of project, I don't see why you need a strong relationship between client and contractor because then the objective is clear. Risks are low. Pricing is simple. I think that collaboration is important if you have complex projects, there's a lot of complexity in terms on where do I perform? Is it in inside Amsterdam or is it outside somewhere? But I can also imagine if you have a simple project and, in the end, it's being performed within planning within budget, he scores and he's getting extra points in terms of an extra chance in getting the next project, but it doesn't need to have so much cooperation. It doesn't need an intensive relation between client and contractor, but if you have a complex contract yes. I think then it's important. You also have to score and to assess the cooperation between client and contractor, I think.

- EI3: I think it's complicated. It depends on the goals that you have for the project. Is it just to speed up and the projects are all quite simple? The contractor does it all the time? It's not that hard? And the overarching goals are not like "we want to build circular", not as ambitious. Then the collaboration part is less important I think because everybody knows what to do and how to do it. And it's more like a transaction-based collaboration still. But once you have certain program goals that are more ambitious, that are more difficult to reach, and you cannot do that by yourself. You need other parties to also think about the solutions to fix a problem and to contribute to the goals. So, then you do need to collaborate, and it becomes more important. It really depends on the goal of the program, I think.

- EI4: I think that contractors have a lot of knowledge and that the public clients, they don't have it. Also, it's a bit of a political thing because in Holland, we the public authorities have at some point chosen not to keep that knowledge in house and to buy everything from the market to buy the knowledge from the market. That has dipped to a point where they don't have any knowledge and they have to use the knowledge from the market. And there has been a situation where the market took advantage of that. So, there's a lot of mistrust and I think it's needed that private parties are trusted more to share their knowledge with the public parties, is really needed because otherwise we cannot solve it, but it is a big problem that we have in Holland, but also not just in this country.

Q7: What do you think are the enablers for the public client and the contractor to collaborate in a programmatic delivery approach?

- EI1: Based on my experience that I worked on project level in the dike reinforcement project, there was a contractor involved and a client and the HWBP was supervising and reviewing some documents, especially cost related, that it should not be too expensive and should be in line with the broad objectives. I was not part of the collaboration between the contractor and the client in the program level, but I am aware that some of the people in the project team of the contractor were involved in the so called "project transcending exploration". For that program, there was some research done about failure mechanisms and about using local soil to give inputs to those projects and how to deal with those issues, and therefore, how it could be done more efficient and less expensive. So, some of the colleagues on the contractor side, were involve in those initiatives (PoVs) because probably when you have knowledge at first hand, you can make better use of it and gain advantage when you are going to do a next project.

  Also, I'm not working at a waterboard to know to what degree and to what extent they are sharing knowledge, sometimes I'm surprised that I work with contract managers, mainly. I think the HWBP was aware of to become a successful program we should invest in those topics to get better results and more to reduce costs in the end for all the projects, but probably the first project will be more expensive because of the PoVs were used in a project to investigate how we can improve, and it should be suitable pilots. But that's, I think the bottom line, one of the goals of a program is to become more efficient. And for that reason, collaboration is important, always, also quite a soft topic. Of course, but I think that the clients in those dike reinforcement projects are aware that we must improve our knowledge on this these topics, so we cannot get the lowest price for that. So, the contractor must set an extra step and we should be probably paid for that. You have also the markets vision of the union of waterboards it's better, like RWS also set up market vision, and it says that we should strive for more integration over the project phases.

  So not only the early design, the detailed design, and looking up for a contractor to execute it. But we try to get the contractor involved more early because of his knowledge and then we can get a better project. It's also one of the elements in the HWBP, I would say. But it's difficult to say what the clear differences of the collaboration in a project compared to a program, besides those elements that I said, about sharing knowledge and try to improve be more efficient.

- EI2: I already mentioned, the advantages for the public client, because I think it's a very good incentive in having, in reaching eventually, a very good quality cost ratio, so that's the advantage for the client. I think for the contractor, the advantage is certainty about the work workload. So, you can plan, and you can adapt your capacity on the projects to come because in advance, we are part of this program for Amsterdam, for the bridges and the quay wall, and so we know that for the next 10 years we will have quite a lot of work on this. So, we can plan people, we can educate people on this. Then it also has the advantage of being able to develop knowledge, perhaps innovation. It has all sorts of advantages, but in, in the core it's more it's especially knowing the needed capacity in advance.

- EI3: That's a really good question because I also wanted to know this. It's hard to say that at this point, because we only have few examples. So, what are the enablers, what I see in some programs is that they experience some difficulties in the collaboration because the promised scope in the project is not realized. So, the public clients set up a program and several contractors are contracted for the program and they were promised to do like 10 projects a year, for example, but the budgets are cut and then the public clients only was able to give like three projects in a

year. But the contractor here did they also make the cost estimation for their own organization. So, they wanted, to do the ten projects, but they only get one. Like they want to do the 10, but they only get one. That gives a lot of tension. So, I think predictability is very important. You need to know, and you need to know what kind of projects you have in your program and being able to give them to the contractor. What you also see is that when they really invest in the collaboration, by using a coach or so, like an external coach, that can help in doing workshops or when there are several conflicts just to help, that is really supportive.

- EI4: Because they need the knowledge, they just need the knowledge what I don't think is that it will make things cheaper because that's something that is very often mentioned that when you commit with a contractor early in the project there's room for innovation, and that will be cheaper, but innovation is not cheap. I'm convinced innovation is not cheaper than doing the thing that you always been doing, but we need innovations it's just needed. Otherwise, we will not manage to organize our environment anymore. And so that's what I think is needed. And so, it is not going to make things cheaper, but it's going to make, I hope, that it's going to lead to solutions for programs that we have that are more including all kinds of challenges and not just the one challenge that is seen at the beginning. So, the challenge is to combine all these all these needs in a solution that works, that's integrated. I think for public sector, it's really needed to involve as many people as they can and so also contractors.

Q8: What do you think are the barriers for the public client and the contractor to collaborate in a programmatic delivery approach?

- EI1: I think there are some barriers. You should be aware that the programs can be organized very differently. So, for example you have the quay walls program in Amsterdam, that there's only one client but working in many different types of contracts and framework agreements compared to the HWBP where you have like 20 clients, all the waterboards and with a supervising body or program team above the HWBP, that is quite different organized because there's different levels.

  But thinking about barriers when I'm a contractor, I can share some knowledge developed with the clients, but I will not always, to some degree, I can share my knowledge, but I want to remain my advantage compared to the competitors so to be successful in the future as well. So yeah, that is of course, like more economical barrier and then the procurement law I told you, Is difficult. I would also say it's difficult the lifespan of projects in the program and changes in the project teams or the program teams when people go away and are changed by others. You can set up some things on paper on how we should work, but it's also to some degree of a quiet extent, depends on who is on the other side of the table. So, a project can be successful because of set boundaries, if program's taken a long time, then there can be some shifts about how successful it will be because of the human factor.

- EI2: I already mentioned one, which is that you're stuck to them, saying "you are the contractor for the next 10 years", then the rest of the market will stay quiet for the next 10 years because they can't get in. So, the public client is becoming dependent and unless he is performing, there's no problem, but if he is underperforming, you have a problem, you know how to get rid of them or in the end, perhaps, or how to steer or how to get him to perform again. So that might be your problem. So, you're dependent. That's I think one of the main downsides, that can be in terms of money, they can be in terms of cooperation but also capacity if he doesn't have capacity of what to do. I've seen some contracts on programs which also say, ok you're in as a contractor or as a consultant, you're in the program, but you don't have the right to execute all these elements. So, we can go outside, that's often one of the contents of a contract.

  Also, you have to realize they are still companies, you know? They have also different owners. Different interest or at least not always mutual interest. They have their own goals as a company. It's not going to change; they will work together but there is a limit on this.

- EI3: You really see that in some organizations people come and go and they are part of the program, but they are not in the sense that they do one or two projects and then they do some other projects. So, they are not really involved. That doesn't really help with the speeding up. And the program goals. Also, I think like some organizations are so complicated by their own structure, like decision processes are really slow and lots of people have to find something about several decisions. The mandate that the project manager has, and now you also have the program

manager, of course. So, you added a new layer. So, the roles are changing of the people that are involved in the projects. And I think it's sometimes its people don't even know by themselves anymore that they are part of a program so that they are just doing the project, like they always do projects. Even though that it's not part of a program because it's also complicated and they are just doing their job and not thinking about "maybe we also have to think about the projects that are coming because things that we are doing now might be relevant also for later projects", but that is done totally because it's so complex. So that, I think that's a barrier. So, you really have to think about how as a public client, when you want to do a programmatic approach, how are you going to make your own organization ready for that? Also, the role division, I think it's very important to have that care at the beginning in the program, so that everybody knows what to do and what's what is expected from them. And he assigned the responsibilities to several people because when no one is responsible, no one is doing.

- EI4: The trust is a big thing in the project I have an anecdote, I'm not sure if you can quote me. We had a project kick-off project start-up meeting with the contractor and the client and us, so it was the engineering company contractor and the client. And one of the first questions the client asked to the contractor was how we make sure that we don't get ripe of this, which is not a nice welcome. And there's also a reason that they were not trusted because the contractor has just a different interest, everybody has their own interest and it's very logical, but this doesn't help things forward.

I'm also thinking about another thing that is what is sometimes complicated, especially in these bigger projects you have, you just need a lot of time to prepare the design and to have all your permits in place. This is just a very lengthy process and contractors have a different, very different way of working and, I have seen that when a contractor is involved in that process, they get very irritated because it takes too long, and also contractors have a different model of making money than we do, we get paid for the hour and our challenge is to make sure that the permits are in place and that everything is properly worked out. For a contractor, every hour that he cannot use his machines and that their machines and the construction people are sitting, he's losing money. So, the interest of the contractor is very different than the interest for a company like ours. And that I've seen that has led to conflict, no, not really conflict, but misunderstandings or irritation. Also, if you have a program where you have different projects to do in the program , it happens very often that the people change or that you have one team for one project and then another team for the other project and the same goes for the public client, so the information is lost.

Q9: How does the collaboration between the contractor and the public client in a programmatic approach differ from a project-based approach?

- EI1: That's a difficult one. I don't know on a collaboration level, but normally the business case for a contractor on a project level is to deliver the project and to have some profit. But in a program, perhaps you will take a little bit less profit in the first project to learn and to become more efficient in the second one or in the third one. But that's more of a business case approach, I would say. You see it also here, if there is a new type of project, like the renovation issues of infrastructures, like the bridges and quay walls that we are facing now, when there's the first project, we don't want to achieve that. Then the learning effects, learning on the first project, is more important than getting a big profit, but that's more business case.

- EI2: If you're in a project, especially when it comes to maintenance, we are normally in the construction industry are used to working in projects. That means we're going from a to B and the next project is being done in another team. In terms of a learning curve, this is horrible. Cause we see every project as a new start so we don't learn, you only learn on an individual basis of what you experience in a project, you might do it different in the next project. There's no systematic approach on learning. That's the advantage of a project of a program because in a program, yes, we can together with all the companies involved, we can try to learn and to develop a system or develop a systematic approach into learning or whatever, you can develop a structure in which you say, we learn this and this in the project and together we agree it's going to be different in the next one, because we're going to do it with the same people on, based on the same contract or whatever. And that's the disadvantage of the way we do projects in the construction sector. Read the papers, and you see the same mistakes every time. I've been in the construction industry for

more than 25 years; I see things happening the same way as they happened 20 years ago. The same mistakes and same faults. And I think that can be the hardship program. Learn from each other and improve your performance both on the client side and on the contract side.

- EI3: I think there are, because in a project, that it just there's one project so the people that you are working with, even though they might be quite nice, you I have no guarantee that you will meet them again, in the next project. But also, I think people feel less responsibility when it's only one project compared to when they it's a whole program. So that this one thing, yeah, there are a lot of differences. I think also in the way the contract is set up and the long-term collaboration.

- EI4: The difference is the governance structure, mostly for me. I notice that when you have a project you communicate directly with a person that decides, and probably mostly it's a politically assigned person. The project communicates directly with this person. When you have a program, there is a layer in between. What is interesting is this HWBP that was different, it is they are not the persons that decide. RWS has initiated this program together with the waterboards, but they have a budget and they decide which project has to be done, but then, they give the assignment to the public client and they are after that responsible for organizing the program or the project. And if they say, we have five different projects, we want to make a program out of it, they are free to do that. So, the governance in HWBP is a bit different than when you have a program within one organization that is executed in different projects where split into different projects.

  Also, I think when you are in a program, the duration is usually longer so there is more incentive to learn from each other and it goes both ways, I think. And there is at least in the first project that you do within the program, there is for the contractor more incentive to really do something that the contractor likes, or at least that works, or to keep the relationship good, but they don't, they won't do it at all cost but the incentive is there to perform really good so that they get the other assignments as well. I think that makes a difference maybe and for the rest. Yeah. I don't really see that there is a big difference honestly.

Q10: In projects, collaboration factors such as -Commitment – shared understating -collaborative planning -Trust -shared knowledge – communication -mutual goals are present. Do you think these collaboration factors in a project-based approach differ from a programmatic delivery approach? If yes, how?

- EI1: I don't know what other types of collaboration about sharing knowledge, trust and having a contract that is balanced. I don't know what kind of aspects should be important.

  To improve the building trust between the contractor and the client the tender phase could be longer, which is also quite costly. But when you are looking at an early contractor involvement, and if you do, you have a longer phase on working together before he sets the final price for the realization of the project, normally in an integrated contract they just make a price in one phase when there is some lack of knowledge or lack of information available, but he should set this price, but that's always difficult. So many there's much written about it to how to solve this problem. But because of those incentives to get a project, I should have a low price and interpretate requirements in my favour. They're not in favour of the clients, so that's not a setting, a good base for trust for collaboration.

- EI2: Yes, I think it's important. And if you just have a project, you can work together on a strictly business type of way- we are connected to each other through the contract. You do your thing and I do mine and then we shake hands and it's ready. But if you're in a program, at least we have to work together much longer. So, it's a longer basis and at least I think automatically we will get to know each other also on a different level. And after sometimes I think it's possible not only to speak about what we have to do, but also about how we do things. Why do I experience your type of behaviour in a different way? You experience it yourself for instance, but in order to do that, there should be a basis of trust. There should be a basis of "I get to know you a little bit, we talk about, okay, are you married? Or how are your children? How was your holiday?", so you get a bit more connected and then you're able, you have a sort of foundation of trust, and then you can also start talking about, okay, I see some things, how you behave in your projects or how you communicate with me, and I want to talk about this because we can do this better, and that's that is advantage. That's dangerous for the corporation but also for the success of the different projects in a program.

Also sharing of knowledge in a program is not an easy issue because there's always something about knowledge is also money. Knowledge is power. I think you have a lot of homework to do as a client in order to create a sound environment in which all your partners will be open and contribute. We'll also see the advantages of collaborative development of knowledge, of innovation, et cetera. I don't think there's one standard approach for this. But you should arrange beforehand something about the intellectual property. So how are we going to do this? Suppose we develop something. A new a new method or something who's owning this method, who will profit from it. If you don't do this beforehand, people will not be very interested or will not invest in developing these kinds of innovations. And that's, I think, the first responsibility of the client to think about this. And then as I said, create circumstances to give everybody the right feeling, the right attitude of "I also want to develop as well, I want to contribute because it's also in my interest to participate and to develop and" yet also being able to profit from it. But I don't have the golden formula for this.

- EI3: I think indeed that those are very important. Also, for programs they are proven, of course, in projects they enable and improve the collaboration and I think it's the same for programs. For example, working at the shared location or so, or doing a project start-up and regular project follow up meetings, but a whole team not only to discuss the technical parts of the project or program but to know each other as well, I think this is really important.

- EI4: What I have seen that works is to use a coach like a team coach that is paid for by all the parties that are involved or sometimes only the client, but that also makes that they are dependent on the client. So, I think it would help if the team coach were paid by all three parties. And then that is an independent coach that helps at least to put the right discussions on the table. That I've seen that works. But that's more in the relation. And to be honest about what drives you and what is your interest? Because we all understand that interests are different and why you want. By contract, we want to start working as soon as possible, but it doesn't really make sense to be secretive about it. You need to, I think it, it helps to keep it, to put it on the table and to discuss how we can help each.

Q11: Can you think of other factors that might be only present in a programmatic approach?

- EI1: I can imagine that the softer aspects of collaboration are getting more important because of the long-term relation that you try to achieve compared to the harder aspects. But collaboration cannot be successful if those hard conditions like getting paid according to the contracts. But also, clients normally, well in our fields, we have our deadlines and those are hard to achieve, and if the clients, if you don't manage to achieve those deadlines, then the client says, "I don't pay you". But the client is always "I'm so busy", "I cannot meet those deadlines, I cannot manage those to deliver it on time" and that those aspects are softer for them. To collaborate on a good level and focusing on the soft aspects is only useful if the hard conditions, like money and delivery on time, are done properly. That's also on a project level and in a program level as well. I think that people who are working in a program should be more aware of the bigger picture than in a project.

- EI2: One of them is work together also in one location. So that's a physical factor. Getting to know each other and talk about also other things that might not be directly related to the project, you need to be physical in, on one location. You're not going to do this on Microsoft teams. So, this is important. I think it's important to have the right mindset, especially with the management. They have to give the example you should have trust on all levels, not only on the operational level, but also on the higher levels, that should be in the same intensity or the same way of cooperating and being able to say something to you that might be a bit a bit offensive, but okay. It's for the best, for the relationship. Physical managerial. Perhaps also in the beginning at least to help in terms of a coach, or at least attention not only for the business and the strictly technical issues but also about corporation issues, they should be on the agenda. So, I don't know if it managerial or, you can do it as a manager.

- EI3: What I do think is that now that you are entering into such a long term collaboration, it's very weird in construction, like in a metaphor, first we marry and then we start dating, that's strange. You want to explore first, whether you are or not a good fit. If you are, then you start to do the stuff together for all the years that are following. So what I think that is very important is that

before you sign a contract that you really think about what is important for me in collaborating , for such a long time, but also for the contractor, of course, so maybe doing workshops in advance or so, or maybe, you see a little bit more now when they are developing the delivery strategy, the procurement strategy, that there is a little bit more emphasis on soft aspects. Like what is your vision on collaboration or so, and have criteria sometimes, but still, it's very subjective. It's like they write it down on paper and maybe you do one interview.

Also, you have to coordinate so many different organizations and interests, so you have to align very different interests often which you have to put some effort in there because it's not just for one project, it's for a whole program, there is room to do things besides just the maintenance on the bridge. For example, you can also do other things besides it, because now you have the time and the knowledge for a long period of time. So, I think that is something that you really need to think about, like aligning and coordinating between all the different parties involve. On the other hand, I think the key point in sharing knowledge is whether they work with a stable team or not. So, I think sharing knowledge is it's it happens automatically. Within one project, of course, because you have to deliver the project together, so you have to share knowledge, but the, I think the key is. For the next project, you have to work with the same people. So, then you can really learn and the knowledge that you obtained in the first project you can take to the second one and the third one and the fourth one.

- EI4: I don't think that there's a big difference between programs and projects in that sense. Especially when projects or programs more, quite often they are of a longer duration then it's even more important to have a good working relation.

C

Data retrieving

C.1. Programme documents used in this study

Table C.1: Programme documents used in the study

Programme	Name of document	Date
HWBP	Planning guide HWBP	Oct 2014
HWBP	Programme plan	Apr 2019
HWBP	Evaluation POV's	Dec 2019
HWBP	Knowledge and innovation agenda	Nov 2019
HWBP	Programmatic approach support sustainability and spatial quality assurance HWBP	2020
HWBP	Monitorin plan	Sept 2020
HWBP	Final report monitoring evaluation	2021
HWBP	Annual report	2022
HWBP	Project Book	2022
MJPG	Report market dialogue MJPG	2018
MJPG	Sustainability advice realisation	Feb 2019
MJPG	Market consultation RWS	2020
MJPG	Market consultation MJPG	2021
MJPG	Report Market consultation MJPG	2021

C.2. One pager for permission

Student Name: Tatiana Gomez Chica
MSc Thesis Topic: Programmatic delivery approach

Dear Sir/Madam

I am a master's student in Construction Management and Engineering at the Delft University of Technology. Currently, I am doing my graduation thesis project within Witteveen+Bos on the programmatic delivery approach.

For my research, I will use a case study methodology, and thus I am looking for case studies that can be suitable. Furthermore, I believe that the "[name of the programme]" can bring valuable insights to my research. Therefore, I am seeking permission from your part if it would be possible to have access to documents that are not available to the public and be able to interview people that work in the programme. The following is more information about my thesis topic and my research objective.

- **Title:** Exploring ways to organize the inter-organisational collaboration between public clients and contractors to facilitate the implementation of programmes in the Dutch infrastructure sector
- **Research objective:** The main objective of this research is to identify the level of collaboration and the governance mechanisms that are essential for the public client and the contractor when using programmes in the Dutch infrastructure sector and understand how the collaboration can be organised in the early phases in order to contribute to the programmes goals.
- **Why case studies:** The use of case studies is to learn how in practice is currently done to develop a model that can support public clients on how to organize the collaboration between the public client and the contractor when using programme. In each case study, the idea is to collect information that can provide knowledge to the research, for example, (a) Learn how the programmes are governed (b) understand the barriers and enablers in the inter-organisational collaboration at the programme level (c) identify essential governance mechanisms for the achievement of the programme's goal.
- **Data needed for the research:** Collecting documents (public and private) are essential for formulating the question that I will ask during the interviews. I am planning to interview two people from the public client perspective and two programme leaders/managers from the contractor side/engineering firm. The people that I will interview need to have knowledge on the programme and know how is the collaboration between the public client and the contractor.

We can discuss further if you need more information regarding my research topic
Kind regards,
Tatiana Gomez Chica

C.3. Email for contacting interviewee

Dear [name of the interviewee],

My name is Tatiana Gomez Chica, I'm a master's student in construction management and engineering from the TU Delft. Currently, I'm doing my research graduation project within Witteveen+Bos under the supervision of Jesper Pots (company supervisor) and committee member Dr.Ir. A (Ad) Straub (chairman), Dr.ir. M (Maedeh) Molaei (first supervisor), and Dr. E. J. (Erik-Jan) Houwing (second supervisor). I'm contacting you because I have selected the "[name of the programme]" as a case study for my research study. I believe you have the expertise and knowledge in this programme and could contribute to my research study.

The purpose of the research study is to gain knowledge about how the collaboration between the contractor and the public client in the early stages of a programmatic approach can contribute to achieving a programme's goals and will take approximately 60 minutes to complete. The data will be used to make recommendations on which strategies or governance mechanisms should be used in the early phases of a programmatic approach in the Dutch infrastructure sector regarding the collaboration between public clients and contractors in order to contribute to the programme's goals. I will ask you to provide answers according to your perception of the thesis topic. The interviews will be audio-recorded and transcribed into text.

If you are willing to participate in this research, I would like to arrange an interview with you, according to your availability. Also, if you want to know more about this research, please fill free to contact me and ask me any questions.

Looking forward to hearing from you.

Kind regards,
Tatiana.

C.4. Interview protocol

The interviews will be divided into five main sections. First, the introduction of the research is provided. Second, general questions regarding the programme and their roles are asked. Third, questions will be asked regarding the theoretical framework built for the case studies. Lastly, some questions will be provided in case Part III is not sufficient to answer them.

PART I: INTRODUCTION TO THE RESEARCH AND THE PURPOSE OF THE INTERVIEWS

- Introducing myself

    - I'm a master's student in construction management and engineering from the TU Delft. Currently, I'm doing my research graduation project within Witteveen+Bos under the supervision of Jesper Pots (company supervisor) and committee member Dr.Ir. A (Ad) Straub (chairman), Dr.ir. M (Maedeh) Molaei (first supervisor), and Dr. E. J. (Erik-Jan) Houwing (second supervisor).
    - Currently im working on my master thesis on how to organize the collaboration between the client and the contractor in the early stages of a programmatic approach.

- What is the purpose of the interview?

    - The purpose of this research study is to gain knowledge about how the collaboration between the contractor and the public client in the early stages of a programmatic approach can contribute to the implementation and achieve the goals of a programme. The data will be used to make recommendations on which strategies could be taken in the early phases of a programmatic approach in the Dutch infrastructure sector regarding the collaboration between public clients and contractors that can contribute to the programme's goals.
    - A list of collaboration drivers and enablers have been drawn up based on theory and the exploratory interviews, as well as the governance mechanism, which will be used as a basis for the case studies.
    - The aim of this interview is to identify the lessons learnt and understand how was organized the collaboration between the client and the contractor in the programme.
    - Key topics to be discussed in the interview:
        * Collaboration in the programme .
        * Collaboration practices implemented in the programme.

- Confidentiality and use of the data

    - The interviews will be audio-recorded and transcribed in text.
    - Personal data will be safely stored during the research study and the data will be destroyed after the completeness of it. Names and other personal information will not be made public, and anonymisation will be used throughout the research.

PART II: GENERAL QUESTIONS REGARDING THEIR ROLES

- What are your roles and responsibilities within the programme?
- With whom do you collaborate in the programme?
- What would you say is different from working in a traditional project from a programme?

PART III: THEORETICAL FRAMEWORK COLLABORATION IN PROGRAMMES

1. Goal setting

    - What are the objectives of the programme and how were these objectives defined? Who was involved?
    - How does collaboration play a role in achieving the programmes goals?

- What aspects define the level of collaboration needed with the contractors?

2. Capability Building

   - How was the evaluation and selection of the contractor? Are there well-defined selection criteria for the contractor?
   - What are the benefits and challenges of these selection criteria for the programme?
   - How was the programme organized in order to facilitate the sharing of knowledge? What practices for sharing knowledge and learning are applied?
   - What practices were implemented in the early stages of the programme to build a collaborative relationship and how effective were they? What practices were implemented during planning and development to build a collaborative and long-term relationship with the market/contractor?

3. Rewarding

   - What rewards mechanisms will be implemented to the contractors? Do these reward mechanisms play a role in the collaboration of the programme? Will they incentive the contractor to work for the programme goals?
   - How are the risks allocated between the parties? Why are they allocated in this way?

4. Roles and decision-making

   - How are the roles and responsibilities defined and to what extend do they supported the programme goal?
   - How is the decision-making in the programme?

5. Coordination

   - How is the culture, values and norms established in the programme?
   - How will conflicts be managed between the public client and the contractor?
   - What practices, tools or processes will be implemented in the programme to facilitate the collaboration?

6. Monitoring

   - How will be the collaboration between the public client and the contractor manage and monitor?

PART IV: OTHER QUESTIONS

- What are the lessons learnt when organizing the collaboration in the early phases of the programme?
- What are the biggest challenges to collaborate in the programme?

PART V: CLOSING INTERVIEW

- Provide the consensus form and contact information.
- Asked if they would like the transcript from the interview.

C.5. Themes and coding

Table C.2: Themes and coding for analysing data for case studies

Theme	Code	Keywords
1. Goal Setting	Joint performance goals	Objectives, goals, ambitions, early contractor involvement, performance, startup sessions, alignment
	Clarity of the goals	Clarity, ambitions, visions, aim, goals, aware
	Flexibility of the goals	goals, flexibility, tender, procurement, development theme, ambitions, requirements
	Predictability of the works	Future works, predictability, certainty, works, future projects
	Longer tender phase	tender, long, early phase, alignment, goals, ambitions, objectives
2. Capability Building	Selection of capable partners	Soft aspects, hard aspects, tender, selection, criterion, dialogue, sessions, project delivery method, contract, discount
	Training and continuous learning	Knowledge, learning, training, lessons
3. Rewarding	Rewards tied to performance	Rewards, performance, gain mechanisms, pain mechanisms, incentives, tender
	Risk sharing mechanisms	risks, risk allocation, risk sharing
	Reputation	Reputation, future works, experience, recognition
4. Roles & decision-making	Clarity of roles and responsibilities	Roles, responsibilities
	Management structure	organizational structure, hierarchy
	Decision-making authority	decision-making, decision, power, governance
5. Coordination	Common management practices	programme management, project management, practices, tools, processes, coordination
	Shared culture	relational norms, culture, norms, blame, trust, openness, best for programme, best for project
	Effective communication	vertical, horizontal, channels, communication, effective, information, platforms, tools
	Change management	change, flexibility
	Conflict resolution	conflict, resolution, meetings, discussions, problem, solution, understanding
	Stable team	teams, stability, stable, fluctuation, personnel
6. Monitoring	Formal control and monitoring	formal, control, monitor, key performance, indicator, overlook
	Informal control and monitoring	informal, control, monitor, key performance, indicator, meetings, overlook
	Monitoring and auditing via third party	control, monitor, key performance, indicator, meetings, overlook, coach, audit, thirdy party

C.6. Summary of the interviews

Multi-Annual Noise Remediation
Contract Manager (Client)
CODE: MJPG1
DATE: 12-09-2022

Table C.3: Interview MJPG1

Governance dimension	Summary of the interview
1. Goal Setting	This programme consists of two phases. Phase one is called remediation plans and it is to understand what measures are to be taken to reduce the noise levels along the highways. Phase two is making a contract model that will be used for the whole Netherlands in which five regions of six regions will use this model contract. The contract provides uniformity so that all regions' tenders in a standardized way. However, standardization is not maximal, meaning that the contract model is not finalized at the fullest as every location has specific requirements. The market for the programme is limited, since there are only 10 to 12 parties who build noise barriers, and for instance ProRail also needs these builders at the same time as us.

For developing the model contract for the programme, we did market consultations to ask the market how they can address the tasks. This is very important because the programme must be ready for December 2027. |
| 2. Capability Building | There are standard procedures in the Netherlands to follow to select a market party that is called the RAW. We use this document and there we choose the procedure we wish to follow. In the MJPG we don't only look at the price but as well as the quality. |
| 3. Rewarding | During the tender the contractor makes promises; we monitor these promises, and the contractor must report what they have executed or not. If they don't fulfill their promises, they might get a fine.

For risk sharing we used the UAV-GC 2005 in which there are already some rules established on how risks are shared, and some responsibilities. But in general, there are some risks that are standard for the contractor and there are standard risks for us, and there might be risks that are in a grey area in which we have to discuss how we are going to manage them. |
| 4. Roles & Decision-making | Roles and responsibilities are clearly defined contractually in the D&C

The contract model will be delivered to the regional teams, and we stay on board as team, and the five regions can consult us. We have the money, so they must ask us for the money to realize the projects. They also need to tell us if there are changes, and why they changed them, and we can provide them with extra money if needed. |

Governance dimension	Summary of the interview
5. Coordination	The model contract provides uniformity in all projects of the MJPG, so that the contract will look similar in all regions of the Netherlands. The contract model is then given to the five regions that will tender the projects and will select the builders. We realized that aligning with them is crucial and communicating at a proper time is also needed for them so they can prepare their teams.

We have had these five regions on board since 2015. But our teams are switching. People come and go, and this is very difficult. Since the programme started few people have remained of those group who started the programme. So, for the future we should think about how can take care of the information and the agreements we make with people and how to deal with it when people leave |
| 6. Monitoring | We stay on board and we do meetings with the regional teams to answer the doubts that the regional teams might have for the document. If something is changed of the contract model they need to contact us and explain the reason behind it.

According to the requirements and the promises made by the market during the tender we will monitor and check if these are realized. |

Multi-Annual Noise Remediation
Project Manager (Linked to client)
CODE: MJPG2
DATE: 14-09-2022

Table C.4: Interview MJPG2

Governance dimension	Summary of the interview
1. Goal Setting	The MJPG is a large programme from the infrastructure department, in which one part is done by ProRail, but this is not done in our project. Our project only constitutes RWS. Our goal is that with the new guidelines regarding noise acceptance on housing and the environment, there has to be measured to reduce the noise level on these properties. There are different ways of reducing noise levels, in which one of them is building noise barriers. Under the MJPG we plan to build these noise barriers in 160 locations in the whole Netherlands, in which have created a standard contract that is not completely finalized. In which the finalization of the contract model is done by the regional teams responsible for the tender of these noise barriers.
	I think collaboration is important difference in the programme goals because it's done centrally the contract preparation where the different, sub areas, the south or the north or the west and east. Must fulfill or complete the contract share and then tender it to the market to make a construction. So, it's very important that the collaboration between Witteveen+bos and RWS must be good to make a quality document that can be set through to the responsible areas. Secondly, RWS need to create awareness in the areas and that it's clear what they expect to receive from us and where they can go further with, and by maintaining constant updates of what's we are doing and what's the stage of the contract preparation, we keep the areas informed.
	Before we started the contract model, RWS did a market consultation on how we should approach this programme, so that the market is not over-flooded with the question we have and that it can be done and that we have the right parties.
2. Capability Building	It is difficult to answer how will be the selection and evaluation of the market parties because we are not involved in the selection of the contractor. What we have done is that we have laid a foundation of the minimal criteria and we have set empty criteria so that the market parties can add value to these items. With these market consultations we created a proper foundation of what are the minimum criteria and what are the items to select the market. Most of the criteria we have drawn down in the contract are hard aspects, such as technical requirements. To select the contractor it will be used a competitive dialogue and the contractor is selected based on the MEAT criteria. In which made specific choices for circularity requirements.
	Sharing knowledge in the programme is crucial because it is a layered approach. First you make a standard contract that the region will tender and had to develop a complete contract. So, the regional teams must know what we have done and how we have done it and why we have done it in this way, and what are the choices and why we made those choices. So, there should be good contact with the programme and the areas who will work further with the contract model. Additionally, we planned a pilot project in a location with few noise barriers to learn what and how the market reacts and how it is done and what we can do better or what can be changed in the contract model.
3. Rewarding	There are not really rewards in the contract or incentive for finishing earlier or if they performed well. However, the regional teams can include these aspects when tendering the projects.
	But we have some rules according to the UAV-GC.

Governance dimension	Summary of the interview
4. Roles & Decision-making	The planning stage was in parallel to the contract preparation. So, the client had to manage both at the same time as well as managing the regions that will use the model contract.
5. Coordination	A programme there is the need to be more flexible for change management. Things can change or the goal will change, or the priorities can change. You have to be more flexible and adaptive so that you can change your execution organization and that is not too fixed. Not being flexible enough cost more time and more money. Conflicts are solved according to the UAV-GC when there will be a real conflict.
6. Monitoring	Monitoring the contractor will be responsibility of the regional teams. We have made the contract model, and there is a bag of money for realizing the projects. The regions get these bag of money and the contract model and its their responsibility to realize the noise barriers.

Multi-Annual Noise Remediation
Systems engineer (Linked to client)
CODE: MJPG3
DATE: 15-09-2022

Table C.5: Interview MJPG3

Governance dimension	Summary of the interview
1. Goal Setting	There are new requirements regarding sound reduction. So, in the whole Netherlands, there were sound measures to understand the current conditions and check if it is needed to build a noise barrier along the national highways. They have the mission to be sober and effective at a fair cost. The goal was clearly defined because is to comply with the new regulations. As a programme, we tried to identify standard noise barriers for the different locations, and we developed a model contract that is going to be transferred for the regional teams and we share the vision and explain what is missing. We have already made most of the decisions, however the regions have some aspects they can adjust.
2. Capability Building	We are looking for a partner that can come with what we call a sustainable chain, and they need to describe how they envision being a partner with us. During the competitive dialogue light they need to describe in a play why and how they are going to be that partner for us. However, the regions will make it more specific the list of requirements.
	For sharing of knowledge, we have the idea to start the tenders with a pilot location in which from the results of it, a review will be done, and lessons learned will be gathered to see what needs to be change at a programme level, so we can implement these lessons learned for the upcoming projects. However, we also need to understand how the market will react to this contract model because we have a limited number of parties that build noise barriers so if there is not a lot of competition, they can increase the price a lot, which is a risk for us.
3. Rewarding	There are no specific incentives for the contractor that rewards them for their performance. Performance only comes into the question in the MEAT criteria, in which they get a fictional discount on their bid.
	The allocation of risks will be done accordingly to the UAV-GC. There you will see that a lot of risks are still placed on the contractor. So, you see what is normally done for projects.
4. Roles & Decision-making	Most of the decisions are already made by the programme team, in which the regional teams will use the contract model when tendering the projects. We gave them some freedom so they could include specific aspects from the location.
	In a programme you create extra layers of management. In which each layer must report back to the programme management. You create islands, and all the islands need to have a connection. It is important you ensure that there is a connection between these islands, and you need to build trust to make sure your governance fits with the programme

Governance dimension	Summary of the interview
5. Coordination	Working with a programme its useful to create a uniform way of noise barriers, in which it will look similar across the Netherlands. Also, it gives you the opportunity to take advantage of the lessons learn as you execute projects. So, you can change aspects according to the feedback you get from project to project. Additionally, you can see that in a programme there can be a continuous loop of learning together, where you can see that certain teams involved will remain for future projects, improving and making the best plan. We at the programme level really thought about what things we want to be uniformly, so it is not changed. However, there are some aspects that really depend on the location you are going to execute it. So, the local context, the environment can affect the requirements. Therefore, the contract model provides some freedom so they can include aspects necessary for the specific location.
6. Monitoring	We put some requirement into the system and put a verification and validation aspect to each, which comes out from the tender documents. We are asking the contractor for his calculation for circularity and their plan for sustainable chain cooperation. We are asking them how they are going to make sure that the calculation will be the case so that they don't just use a number but to ensure that they achieve this number during project execution, and we will measure them according to this number.

Multi-Annual Noise Remediation
Procurement advisor (Client)
CODE: MJPG4
DATE: 21-09-2022

Table C.6: Interview MJPG4

Governance dimension	Summary of the interview
1. Goal Setting	The goals were established before I was involved. But the objective is to be sober and effective, while also being circular. The goals of the programme come from higher up in the organization and we have to understand how we are going to achieve these objectives. Via market consultation we consulted the market parties about how we could organize this programme. Also, we also involved the regions which are also part of RWS, but they are a different group within the organization that needs to be involved in the programme as they will tender the projects. So, we have a central team that organizes the programme and does the model contract, and there are other teams that are going to contract the contractors finalizing the model contract. We arranged meetings with them to facilitate the delivery of the documents by answering the questions they have regarding the model contract.
2. Capability Building	We as a programme team have already established some requirements, but it will also depend on the teams who will tender the project. So, we as a programme team include circularity and the use of the environmental cost indicator as a requirement. Then, the regional teams will include other criteria they want to use for selecting the contractor. We wanted to do a pilot project to learn from it and to learn with the market.
3. Rewarding	At the moment there is nothing established about if there would be rewards tied to performance. However, we give fictional discount on price during the tender phase according to the MEAT criteria, according to their plan for the sustainable chain cooperation, circularity, and the environmental cost indicator.
4. Roles & Decision-making	We have drafted a document in which is stated who is responsible for what. It explains our responsibilities and the responsibilities of the regional teams. It is a document with a lot of instructions. However, we have experienced that it is not so clear the responsibilities of each party therefore, we will hold more meetings, to explain the rules and establish explicit rules in order that everyone understands their responsibilities.
5. Coordination	We planned the project to be sequential because we saw that the market does not have the capacity to do the projects in parallel. Also, as there is limited parties that are able to build the noise barriers, they have more influence on the price, their wishes and their needs
6. Monitoring	We have regular meetings with the regional teams to explain what we have developed.

Flood protection programme
Project Control (Contractor)
CODE: HWBP1
DATE: 20-09-2022

Table C.7: Interview HWBP1

Governance dimension	Summary of the interview
1. Goal Setting	The programme goal is very clear. In the year 2050, we must make the Netherlands resistant to high water levels and also the budget for those projects is already reserved. It's about 1800 kilometres to reinforce. It's a clear program. We have designed rules which need to be followed. We started with the projects which have the most impact on safety, and we will end with the smaller projects. The definition of the objective was the government which made the new regulations for safety in the period 2010-2014.
	Personally, I think we can only achieve this goal by collaboration. Because otherwise, we don't have enough capacity to make it. So, we must collaborate on the aspects of open knowledge, innovation, and ways to collaborate. And we also do it a lot as a market; although we are competitors, we share knowledge about innovations and how we collaborate in the project to help each other, to get to a higher level. And that way, we want to achieve the goal of 2050.
2. Capability Building	we had selection criteria in two phases. In the first phase we went from six competitors to three and that was on the criteria of collaboration, risk management, knowledge about execution and design process, which was also tested in an example case. In the second phase, the criteria were an interview with three people from our management team. And we made a plan for risk management, in which we informed the top six risks of the project and how to eliminate them. And we made a plan for chances on the project objectives. So, to achieve more quality in terms of the project objectives.
	I did that's on a personal basis. Of course, you get knowledge and take lessons with you. But we also put a lot of energy into implementing lessons from other projects in our own company and with the companies we work with. Although I was only involved in two projects until now during the execution phase. I know about 5 to 10 projects' how things went. There are a lot documented for sharing of knowledge.
	It's complicated to share knowledge between contractors, but I mostly see this, it's called the phenomenon of copetition. It's cooperation and competition at the same time. But only a few companies are able to maintain in this sector this coopetition. It's our mutual goal to reduce risks and to lower cost levels. So that will help too.
3. Rewarding	There are no real performance mechanisms like that. But It's clear that when we collaborate well, it's good for all. So, it's also good for our business model to collaborate because we can work faster with fewer disputes. In the end it's better and it's more efficient for us, and that's good for our business case too. So, there are no direct performance mechanisms like you mentioned, but by collaboration we work more efficiently. That's our main goal.
	The risk allocation was in two phases. The first phase, which was the design phase, we had one risk register together. So, the risks were not divided but shared. That worked well because we worked jointly on risk management, openly and with mutual goals. And now in the second phase, we have clearly allocated the risks described in the contract. But at the same time, we manage to keep the same level of mutual responsibility for all the risks. So, we help the client and the client help us

Governance dimension	Summary of the interview
	What's important for us is that there's a lot of work to do. So when we have a good position in the program, we have work for our company until 2050, you can say that. And as well, what's important for us is collaboration leads to lower risk profiles and that's also important for us. So we it's a financial aspect.
4. Roles & Decision-making	Each waterboard has their own vision on how they want to do things. Each waterboard chooses how they want to address the project and they chose if they which project delivery method they want to use.
5. Coordination	Program management in the program and in the project. In the program, they facilitate those meetings and they do it on a professional matter. So, for me as an individual, it's interesting to go there to help me in my daily work and to meet the clients and meet other competitors. In projects, there are standards, defined by the program on how to manage your project, but I see that most clients are improvising in every project, to find out a way to do it. So, as a contractor too, we make the same mistakes over and over again because we learn on an individual basis. We learn and we do a lot about learning from project to project, but it's hard to maintain a certain level, a base level, to grow in performance, that's hard to achieve.

In theory, we have this model of escalation for conflicts. But we found out in this project that when you have a good relationship on the management level, you can talk about all kinds of problems and really understand the interests of the other party. Then you can together find a solution. So, you don't have to escalate to higher levels.

One thing that's important is to keep the teams together. Because now we have a change of some key people at the client side and we are able to manage it and keep the collaboration good. But that's a risk in long projects for collaboration, like I mentioned we have been working for four and a half years now together. |
| 6. Monitoring | So, regularly, once every three months, we have all-day independent coaches to work on our collaboration that will help you and guide you to have the right talk between the public client and the contractor |

Flood Protection Programme
Contract manager (Client)
CODE: HWBP2
DATE: 23-09-2022

Table C.8: Interview HWBP2

Governance dimension	Summary of the interview
1. Goal Setting	The goal setting of the program, as I said, is effective and sober and the sustainability. And to work with the client and the contractor, the client and the contractor are equivalent in collaboration because you, as a client, can use the contractor's experience in the early stage of the project. And that's important because you can reduce the risks and the issues and discuss these aspects before you set a price. The contractor has a lot of experience with risks in these types of projects, and you, as a client, can use their experience in the early stage; you can see all the risks and all the potential costs, and then you can look at the building of the project totally insightful. And then you can ask the HWBP, I need a hundred million euros, and then I can build this dyke.
	We have said to the market 'you can come with us, we will pay every hour, and there are no risks for the market'. In a normal project, we tell the market, come with us, there is a limited budget of this amount, and as soon as it is over the collaboration stops. That's very important, to give freedom to them to share their experience. Not having money in your head as a public client, makes the contractor to share more their experience at the early stage, which is better for the project for the next stage.
2. Capability Building	The selection of the contractor was a two-stage approach. First, from many contractors to a selection of 3-4 contractors. And then from 3-4 contractors to 1. During the first stage, we look into more hard aspects, and then during the competitive dialogue, we can get to know each other, by interviewing them and speaking to them. The more compatible for us the more points for the contractor
	The delta technology is a collaboration of contractors, that they advice clients in the early stage of the project to provide their experience and technical innovations. Additionally, sometimes we do visits to other projects from other water authorities and they do visits to our project. We listen, and we learn. We talk about the project and the innovation, and people listen, but they do their own thing in the end. I think we can learn much more from other water authorities
3. Rewarding	The perspective on the money is very important, if I perform good, then I will receive the money. The risks should be balance. The one that has influence in reducing the risk it's the owner of the risks. That is the rule. Sometimes we have to share risks.
4. Roles & Decision-making	In each stage of the project, you define new goals, and they should be in line with the programme goals, and it goes in the contract. And it's your responsibility, we have to describe it SMART. But sometimes we think that the program goals are grey. For example, they established that the collaboration with the market has to be optimal. But, what is optimal? But then you go to the SMART, and you understand clearly what the goal is or what do they mean by optimal. So it is very important that the goals are clearly enough so we can go into our projects and do the things right

Governance dimension	Summary of the interview
5. Coordination	I think at the project level, we have a culture to be sincere. But in the programme, I think there is distrust. The people of the programme are the ones who provide the money for the projects, and most of the conversations between the HWBP and the water authorities are more related to money, for example, 'have you done that', 'why do you do it this way. There are so many questions related to money...In the future, we have to collaborate better between the programme and project levels in an open culture... So, I think to improve the collaboration between the programme and the project level, then people from the programme level should go to the location where people from the project level are working. Something that I haven't mentioned before is continuity. People that worked in the early stages should continue working in the execution phase. That's very important. When you change the people, then the history and the culture are all lost. And you must do it all together. So that's very important the continuous of people For conflict management is to always bring the problems to the table, so we can talk about it. You speak and I listen.
6. Monitoring	Every three months, I think, we speak with the program: 'how are you doing' and there are visits from people of the program on our project, we talk about it but there are not many issues. There are many meetings about collaboration. We have meetings without points, and we just speak freely, to understand how's everyone feeling. To understand your concerns. And you speak of all the risks about your collaboration. And when conflicts arise, we can talk about what's the problem is and look for a solution together

Flood Protection programme
Tender strategy (Linked to client)
CODE: HWBP3
DATE: 28-09-2022

Table C.9: Interview HWBP3

Governance dimension	Summary of the interview
1. Goal Setting	I don't know how the objectives of the program were defined, but I think we as the Netherlands realized that we have some problems and sea level is rising, where rivers should expect discharge and also the calculation methods on safety and dikes were updated frequently or at least sometimes. So, they came to the conclusion that the dikes are not safe enough. I know from the water law all dikes or not only the dikes but should be assessed every 12 years, and based on that conclusion, that the dike is not safe enough and it should be in reinforced. So that's the basis of how the program is started. One of those objectives was we should make use of the contractor's knowledge due to the complexity of this case and then you also have the market vision of how to work with the supply chain. Not only with the contractor but also the engineering firms and other parties you should also work with in line with those objectives. The bouwteam lasted for two years, in which there are design loops in which you evaluate each loop to readjust the price of the project. The main element of the project within the programme was that we needed to get funds for the realization phase, and in that case, we have to communicate with the program level with our cost estimation and our plans. Difficult items were discussed in favor of early acceptance by the program. So, in that case you can say there was interaction between the project with the program level, to get acceptance for going to the next stage getting the funds. The programme funds 90% and the water authority for 10%, so of course, HWBP can demand that projects are delivered, but it is up to the water authority how they will do it. But they have to make a plan upfront and show how they will do it to the program level, so the HWBP can give inputs or don't give the funds if it's not done properly. On a high level, the programme level asks some requirements to the client, and those requirements from the programme to the water authorities are also transferred to the contractor, but they can be changed to some extent.
2. Capability Building	In the evaluation of the contractor, for the MEAT criteria we focus more on soft aspects because were going to build a Bouwteam, so its about collaboration. Therefore, we wanted to know how the contractor was going to collaborate. It is challenging to evaluate the contractors on soft aspects, because we interview key personnel, key functions in the project. However, we had to discuss with lawyers if it was a suitable method because people might change their work and replace. But we still did the interviews because how you collaborate is really dependent on the person that on the other side of the table. The POVs is something that the program uses, which is about sharing knowledge. And I think there are also some documents available on the HWBP websites and you have the guidelines on how to work but that's quite I would say that's not enough for a good program.
3. Rewarding	The main incentive for the contractors is that after the bouw team the contractor gets to execute the project. The risks allocation is a standard distribution of risks for integrated contracts, UAV-GC. All the risks were allocated and all the control measures.

Governance dimension	Summary of the interview
4. Roles & Decision-making	For the bouwteam phase the roles and responsibilities were determined by the waterboard and the contract manager. If we made the contractor responsible for the design, then he will make the best choice to reduce costs. Normally, when using bouwteams the design is done with help of an engineering firm and the contractor is only an advisor. But in this case, to position the contractor in the right way, we decided to make him responsible for the design. From phase to phase the responsibilities changes and it its difficult because the nest stages the contractor was not collaborating in the same way with the waterboard.
5. Coordination	The programme level provides a detailed guideline on how to get funds by the HWBP, in which they state what elements should contain and to what level of detail your cost estimation should be. So, at some extent the waterboards determine their own strategy, but it should be accepted by the programme level. The project in the programme had a formal escalation process for conflicts.
6. Monitoring	We the key performance indicators, after each design loop there was an external firm. We had some projects follow ups. There were projects startup, which is to get together and to get to know each other but also how should we work together, and what should we do. and there we also had after each design loop a project follow up and there were addressing about what went well, what things were difficult, what's are the challenges for the next stage. How should we work together. so, what do we like about each other. but how do we work. What can we do better. So that's what's quite a good thing also to feel like one team because we were working on a project location that's of course also in elements on collaborating when you were working on a project. But it was the best to be there. It wasn't always possible. And for me for example I was not working that much on the project, I was working from the start until the end while others said we're more focusing on one stage but that was good for collaboration to be on one location

Flood Protection Programme
Project Manager (Contractor)
CODE: HWBP4
DATE: 04-10-2022

Table C.10: Interview HWBP4

Governance dimension	Summary of the interview
1. Goal Setting	The objectives of the program, were defined in the phase that we as a contractor were not on board. They set goals and the objectives. Together with the HWBP program we set the cost planning and the risks. In that way, they set the goals for the project, and set those goals through the contractors in the tender.
	In the tender we had the objectives as a scoring mechanism for our plan. So, in our plans, which we had to describe, we had to set, we had to focus in what way we would achieve the objective for the Waterborad. So that was really a program thing and in the lower areas of the project, we set goals as a project, but those goals are on a lower level than a higher detail level of the program.
	In the phase we where are now, the execution phase, we don't have much involvement with the program. But in the tender phase and then the making of the plans, the making of the planning, the making of the price, the involvement with the program was very big. And in that phase, we set the goals and we set the dates for the project. So, then the collaboration was then very important for us, and that was something we had to do together. You can't do that alone as a contractor. And in the phase, we are now this pure project, The collaboration with the waterboard is very important. The waterboard is our client, and is also the owner of the dyke, phase to the environment and that sort of case.
2. Capability Building	When we had to make our plans in the tender, we were not scored or judged on our price, but we were only scored on our plan, the quality of the plan, and how it helped to achieve the objectives. Also, we were scored and judged by the people working on the project. So, the capabilities of the people were very important for the water authority, and judgment for the contractor was involved with that. So that was a pretty big thing. If you look at the normal projects, that's not how it's done.
	The Waterboards, HWBP, contractors, we are involved in a construction team and the team that started beyond in front of the tender, the waterboard, invited all the contractors who were interested, and we talked about how we as a contractor, the water board and RWS, should plan the project and in this case, I think that helps. And they really listened to those conversations. That's helping with the risk distribution in the later phase of the project
	Personally, I think sharing knowledge in the programme is done too little. It could be done more. There are some events in the Netherlands where the market and the clients share knowledge, but it's once a year. The water board also organizes intervision between projects. Wolfern-Sprok connects with two other projects. Where the waterboard is also implementing a program team and that program team is not responsible for the work of HWBP but is responsible for all the projects for the waterboard. And at that level they are responsible for connecting the projects with each other. But that is a very hard task, and all the projects are climbing the wrong way or following their own way, so they can do more. I think.
3. Rewarding	Rewards in the sense of money don't play a very big role. We must open ourselves. So, in the construction team phase, we discuss the price and we set the price with the contractor, waterboard and HWBP.

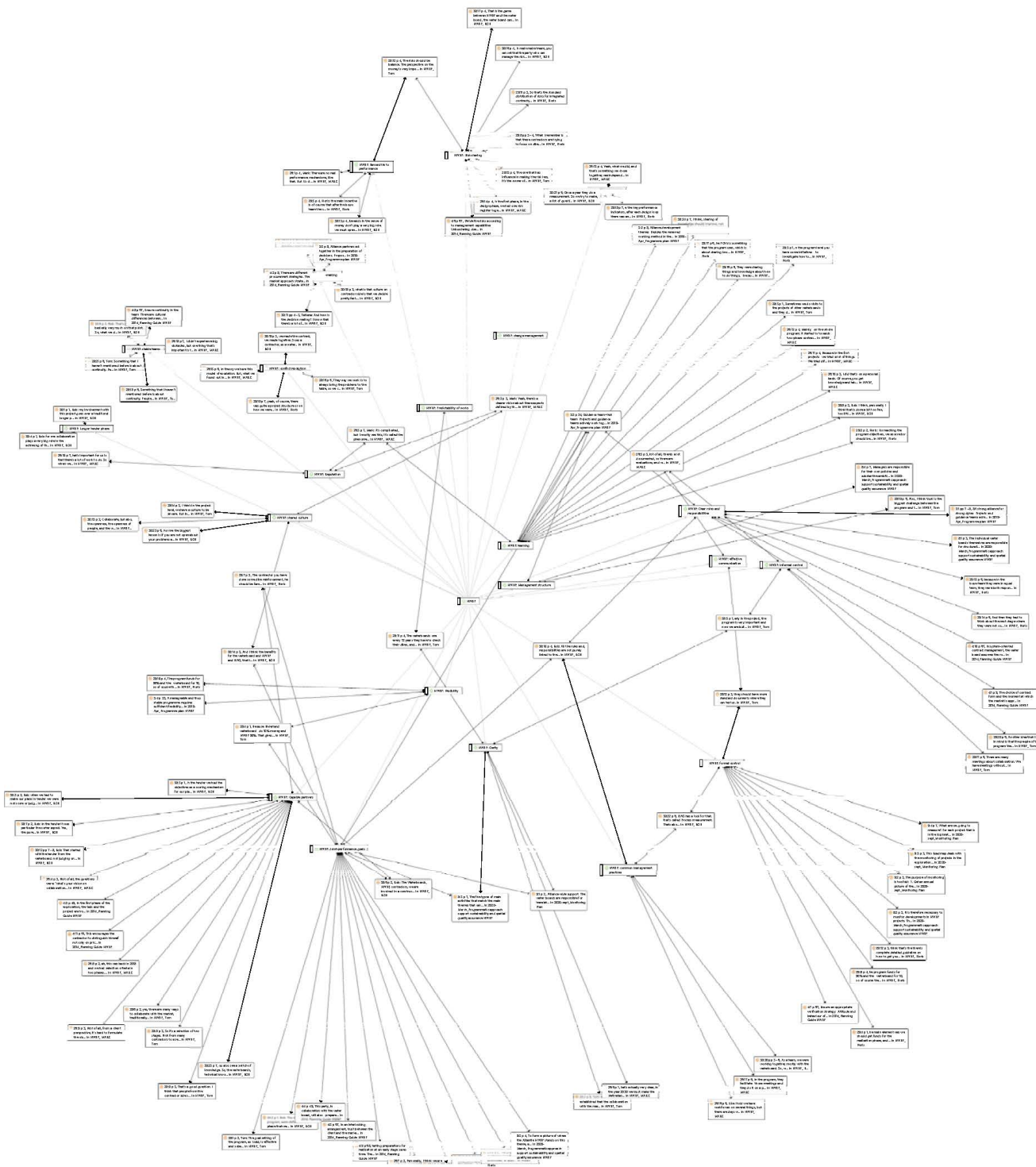| Governance dimension	Summary of the interview
	I think the benefit of the selection criteria for the contractors is that openness is being achieved. Normally, if openness is not taken into the criteria, you must go on price or planning or that sort of case. So, openness and honesty are rewarded. And I think the water authority, HWBP, and RWS benefit because the contractor is also responsible. Not in a hard aspect, but in a soft way, in which the contractor feels responsible for the result of the project, feeling also responsible for the risks like the water authority and the HWBP. And I think that is a huge benefit
	In the mainstream, you allocate the risk to the party who can best manage the risk. So, there are particular risks we as a contractor can manage best, and those are risks set to the client. And in the HWBP, when there is a risk that no one can manage (client or contractor), we call it exogenous risk, is allocated to the HWBP. So, each risk is allocated. The main idea is that the party who can manage the risk, the risk is allocated to that party
4. Roles & Decision-making	The contract and price setting are purely for the contractors. At the programme level, where the water authority relies on HWBP, HWBP makes the most important decisions. But when the contract is established, and prices are set, the decisions are passed from HWBP to the water authority.
	So as long as the project fits in with the program-project goals, the waterboards is the in lead. The risks which are allocated to us as a contractor, for that risk we as a contractor are in the lead for making the decisions. Cause we are the best in many the risks. So we also have the decision making role.
5. Coordination	So we don't have a management or steering group or a ministry or something like that who has to be involved in the decision, the water board and, particularly HWBP and RWS decision making goes a bit more difficult to culture. Therefore, the people who are involved at project are, pretty much preparing the decisions but not making the decisions. So that prepared decisions for the lower of the upper, the upper low, and the decisions are made and that part of the project, so that, that is a difference. Which is feedback in culture.
	We made the contract, we made together. So as a contractor, as a waterboard, we are both, responsible for the contract if there are conflicts. The first step is to look at the contract, what we have discussed about that particular conflict. You could come into a situation where, the conflict is not described in the contract, and then you, then you are looking as parties for which party is responsible. In practice, we all always come to a solution, where it is very important that both parties are checking the consequence of a conflict. It is best for both parties that you make sure that the consequences of the conflict are as low as possible. So, if there is a conflict, we don't concentrate on who is responsible for the conflict, but we focus on how do we make sure that the consequences are as small as possible. and I believe, and the waterboard believes if you do that, the discussion about who is responsible goes a lot easier. And in normal contracts, that, that is a bit more difficult, is a real big focus on who is responsible, and nobody is looking at how do we make consequences as small as possible. That's the game we are playing with each other.
6. Monitoring	As a team, we were working together, mostly with the waterboard. So, we have project startups, and project follow-ups once a year. We also have meetings every two weeks, or every four weeks where the subject of the meeting is collaboration. So, we discuss with each other: 'How are we standing?', 'Are there any conflicts?', 'Do we see any conflicts coming?', 'How are people behaving?', 'is everybody having fun in their work?'. That was some of the mechanisms we used to manage the project
	For the project startups and follow-ups, we have a coach, which they are helping us with the form of the teams and, also, the scoring and the performing of the teams, so we can help each other

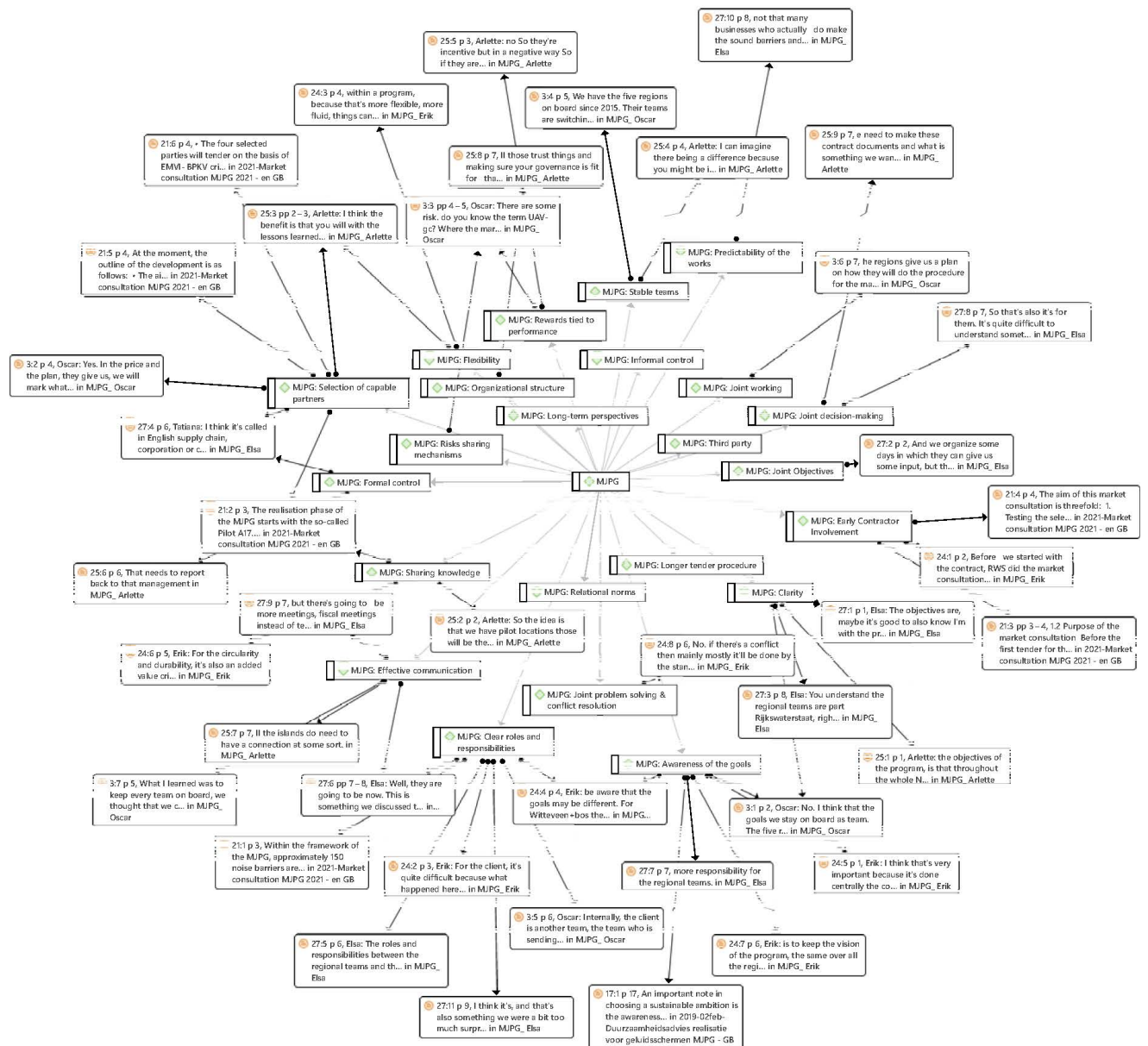# C.7. Coding Atlas.ti

Figure C.1: Atlas.ti coding for HWBP

Figure C.2: Atlas.ti coding for MJPG

D

Preliminary model

COMPLIANCE INFRASTRUCTURE PROGRAMMES
The primary goal of the programme is to comply with the law

Preliminary conditions
- Characteristics of the programme & projects within the programme
- Preconditions (policy, environment, market)
- Points of attention during construction & operation (opportunities & risks)

EARLY PHASE OF THE PROGRAMME

PROGRAMME LEVEL

Purpose:
Establishing strategic decisions by providing direction on how the programme is organized, managed and the synergies they want to achieve.

1 Goal-Setting:
- Secondary goals are drawn-up jointly with key stakeholders
- Level of flexibility established & design rules
- Joint responsibility to increase awareness
- Advice from key parties
- # of works within the programme

2 Capability Building:
- Establishing minimum criteria for selecting capable partners
- Providing sufficient spaces for knowledge-sharing and incentive a continuous learning

3 Rewarding:
- Risk sharing for joint-responsibility

4 Roles & Decision-making:
- Clear roles and responsibilities for all parties in the programme
- Clear management structure
- Decentralized preparation of decision with centralized decision-making
- Centralized decision-making for granting subsidies

5 Coordination:
- Programme management practices
- Open and trust culture
- Providing sufficient communication channels
- Flexible approach that can be change according to lessons learned
- Formal & informal conflict resolution
- Building stable teams in key teams

6 Monitoring:
- Formal control by establishing measurable indicators
- Informal control for building trust
- Steering decision-making

CONTRACTING AUTHORITIES (sub-pogramme level)

Purpose:
Linking the programme level and the project level, by translating the strategic decisions from the programme level to operationalize them in the projects, and tendering the projects

1 Goal-Setting:
- Development of tender and selection of market approach
- Translating primary and secondary objectives to projects
- Joint development of goals

2 Capability Building:
- Selection of suitable project delivery method that aligns with programme goals
- Establishing selection criteria (hard & soft requirements)
- Ensuring knowledge-sharing and continuous learning during project life cycle

3 Rewarding:
- Contractual risk allocation
- Gain or/and pain mechanisms
- Reputation crucial for steering behavior

4 Roles & Decision-making:
- Roles according to contract
- Preparing decisions to be approved

5 Coordination:
- Programme & Project management practices
- Open and trust culture
- Providing sufficient communication channels
- Formal & informal conflict resolution
- Building stable teams in key teams

6 Monitoring:
- Formal control by establishing measurable indicators
- Informal control for building trust
- Hiring third parties for controlling and steering behaviour

Flow: Primary Goal → Preliminary conditions → 1 → 2 → 3 → 4 → 5 → 6 → Delivering the conditions to contracting authorities → Finalizing boundary conditions → 1 → 2 → 3 → 4 → 5 → 6 → Selecting contractor → Starting execution of project

PROJECT LEVEL

Purpose:
Executing projects according to what is established by the two levels above and learn while executing them

Execution of the projects

Project 1   Project 2   Project N ... Project N

LESSONS LEARNED

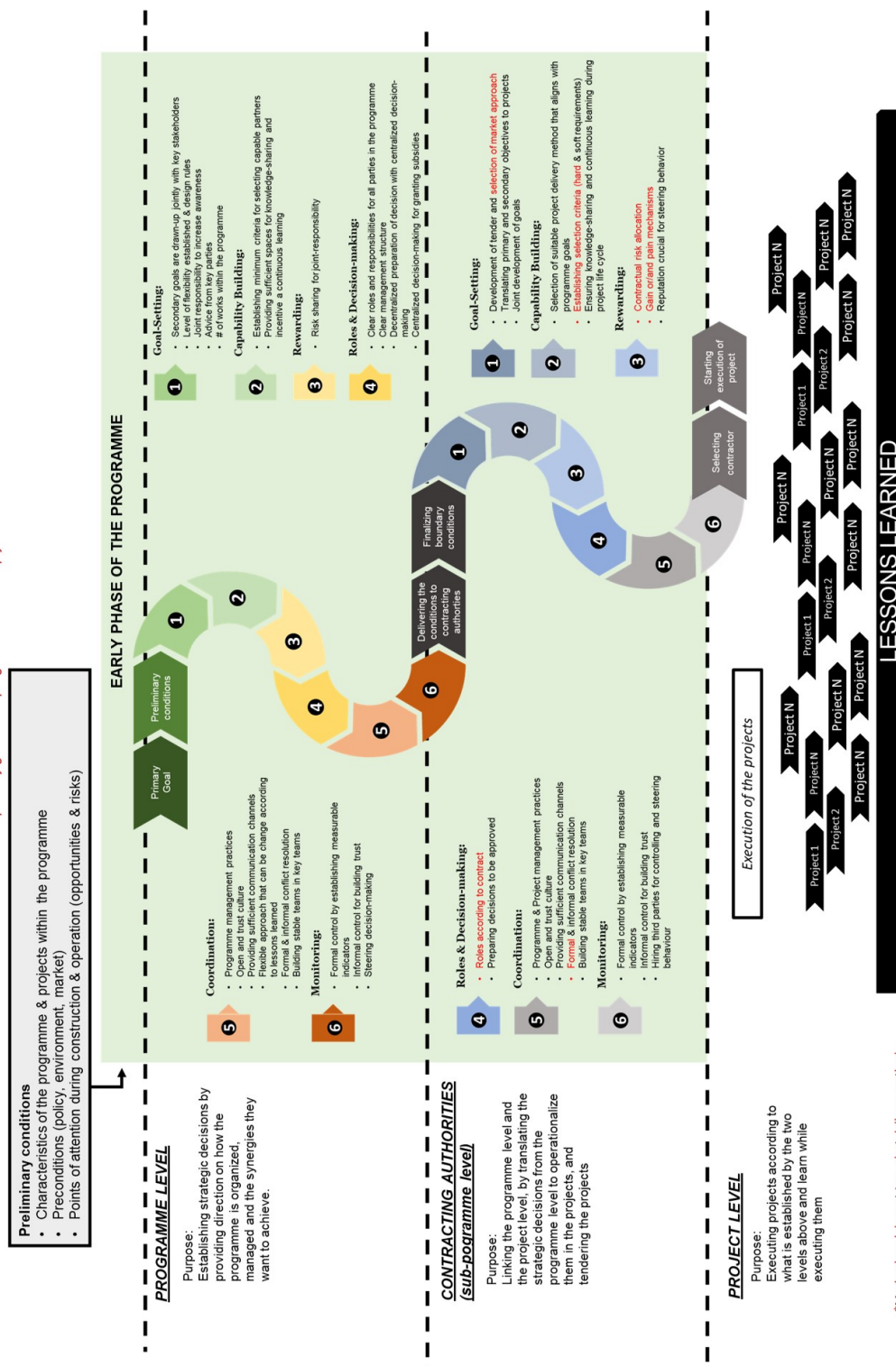*Mechanisms inherent to project delivery method

Figure D.1: Programme governance organizational model (PGO Model) for compliance infrastructure programmes