

Programmatic procurement as a driver for social ambitions: An explorative multiple-case study in the Dutch construction industry

An exploration of programmatic procurement strategies and their influence on collaboration and performance

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Submission date: November 5, 2022

Word count: 12.359

Abstract

Programmatic procurement is considered a procurement approach in which framework conditions can be created to address major social ambitions. few studies have explored programmatic procurement yet. This study explores how the procurement strategy may affect the collaboration aspect and the potential for value creation within the program. This study contributes to the scientific debate on the applicability and potential of programmatic procurement. In addition, it enables public clients, program managers, and procurement experts to make more thoughtful decisions and thus improve the practice of programmatic procurement. Case studies of four Dutch construction infrastructure programs based on programmatic procurement are conducted. Procurement documents are studied, and public client procurement officials and program managers are interviewed. This study defines the prominent procurement strategy decisions, and identifies how these affect collaboration, performance directly, and performance through collaboration. Contractual flexibility enables to deal with the uncertainties of the long duration and the diversity that the projects imply. This flexibility is exploited by aligning and consulting to suit both the contractor and public clients. As interests are better aligned, exploiting this flexibility becomes more convenient. Furthermore, since parties have a mutual understanding, solutions better suit the interests of both parties. The findings confirm that programmatic procurement can contribute to achieving social ambitions.

Keywords: Construction industry, Programmatic procurement, procurement strategy, collaboration, performance.

1. Introduction

The Dutch construction sector faces major external challenges, such as increasing prosperity and mobility, climate change, and obsolete existing infrastructure (Ministry of Infrastructure and Water Management, 2019; EIB, 2016). However, opportunities regarding these social ambitions are not fully implemented by the construction sector due to internal challenges such as (1) a limited long-term perspective, (2) steering on individual project results, (3) limited application of innovations, (5) limited cross-project learning capacity, and (6) high failure costs (RWS, 2019). Furthermore, the increasing complexity of construction projects (Viana et al., 2020), the conservative culture of the sector (EIB, 2017), a tight construction labor market (EIB, 2021A), and fragmentation in the sector (Adriaanse, 2014) create circumstances in which it is difficult to meet external challenges.

Procurements provide a large part of the conditions under which projects operate and therefore are significant for the construction industry's performance (Viana et al., 2020). Traditionally, clients generally procure project-based in the Dutch construction industry (Adriaanse, 2014). However, current procurement practices do not provide the appropriate conditions to contribute

sufficiently to social ambitions (Ministry of Infrastructure and Water Management, 2019).

The limitations of mature project management cause the development of program management in the construction industry, economic, and dynamic nature of the public clients requirements (Shehu & Akintoye, 2009A). Programs should be able to deal better with the social ambitions as projects since programs (1) create benefits through overarching management of multiple projects, (2) evolve in uncertain environments by untangling the vague and changing, and the fixed and tangible, and (3) take a wider perspective to optimize the overall business benefits, not just the project client or sponsor only (Pellegrinelli, 1997). In response to the failure to meet the major social ambitions, programmatic procurement is considered a method in which framework conditions can be created to deal with these challenges (Lutt et al., 2021; EIB, 2021B; Vosman et al., 2019; EIB, 2017). Programmatic procurement applies long-term, integrated, and collaborative cross-project tenders to satisfy social ambitions. However, few Dutch public clients have adopted programmatic procurement despite recently raised interest. A lack of clarity on the context and definition of program management can contribute to a lack of understanding of benefits, thereby discouraging

program management use (Pellegrinelli et al., 2007). Furthermore, Vosman et al. (2019) have found many barriers at the system, organizational, and relational levels to applying programmatic procurement in public client organizations in the Dutch construction industry.

There is hardly any literature on programmatic procurement in the construction industry. Lutt et al. (2021) have clearly defined the definition and characteristics of programmatic procurement, including a hands-on guideline that clients can use in decision-making, initiating, and procuring a programmatic procurement. Vosman et al. (2019) have researched barriers and subsequent drivers in the change process from project-based to programmatic procurement. However, both base their research on expert interviews and surveys, not empirical data. Although public clients have sporadically applied programmatic procurement, there is no empirical literature on programmatic procurement in the construction industry. As a result, questions arise about how programmatic procurements are applied and how procurement strategy decisions affect performance. This paper builds on four recent case studies in which public clients apply programmatic procurement in the Dutch construction industry. The study attempts to bridge the literature gap by exploring procurement strategies, collaboration conditions, and performance of programmatic procurements and their subsequent relationships. The research question is as follows: which decisions belong to a programmatic procurement strategy, and how do key procurement decisions influence the potential of performance in programmatic procurements? This knowledge contributes to the scientific debate on the potential of programmatic procurement and provides insight into what may be interesting for future research. Additionally, this research provides exploratory information for practitioners to make more thoughtful decisions to improve performance in programmatic procurements.

The layout is as follows: Chapter 2 presents the theoretical background of programmatic procurement. Then, Chapter 3 elaborates on the research methodology, after which Chapter 4 presents the results of four recent programmatic procurement case studies in the Dutch construction industry. Finally, the paper concludes with a discussion and conclusion in Chapters 5 and 6.

2. Theoretical framework

2.1 Programs and projects

Although Table 1 presents the characteristics of programs and projects, the distinction remains vague (Pollack, 2021). There is much ambiguity about the definition of programs. The verb program is used synonymously for multi-projects, portfolio of projects, new business approach, and mega-projects (Shehu & Akintoye, 2009A).

Table 1; Programs and projects (Pellegrinelli, 1997)

Programs	Projects
Is an organizing framework	A process for delivering a specific outcome
It may have an indefinite time horizon	It has a fixed duration
Evolves in line with business needs	Has set objectives
May involve the management of multiple, related deliveries	Involves the management of a single delivery

Focused on meeting strategic or extra-project objectives	Focused on the delivery of an asset or change
The program manager facilitates the interaction of numerous managers	The project manager has single point responsibility for the project's success

Projects and programs differ in managing uncertainty, change, and complexity (PMI, 2017). Pellegrinelli (1997) states that programs' primary purpose is to create value by improving the management of isolated projects. Programs are often seen as an overarching framework that provides the necessary infrastructure to implement strategies and link projects to this strategy (Pellegrinelli, 2011). Programs are managed in a way that accepts the uncertainty arising from the complex and lengthy change process (Pollack, 2021).

The BMP (2011) identifies several different reasons for starting a program: (1) vision-led; triggered by a strategic vision sponsored by the top of the organization, (2) emergent; triggered by the recognition that coordination of the projects is needed to achieve desired objectives, and (3) compliance; triggered by a 'must do' otherwise the organization or its assets are not compliant anymore.

Programs also have different types and essentially describe the certainty of the program (Blismas et al., 2004). Target programs have clearly defined goals. Rolling programs have an ongoing and open nature to adapt to the context of an organization. Bounded programs have a more limited time frame with a clearly defined scope. Bounded programs have the open nature of a rolling program, yet more explicit goals and direction are delineated. Programs can have characteristics of different program types at the same time (Miterev, Engwal & Jerbrant, 2016). It seems more of a continuum of intermediate states between typologies (Pellegrinelli et al., 2007). Therefore, there is no standard approach to program management (Miterev et al., 2016).

2.2 Program management

Program management should be tailored to the type and, thus, the certainty of the program. Certainty about the composition of programs, production rates, and workloads has important implications for process efficiency, so recognition of the program type can influence an organization's management approach (Blismas et al., 2004). Pellegrinelli et al. (2007) state that "Programmes shape and coordinate projects and related activities in pursuit of organizational goals and benefits in the context of a dynamic organizational environment." (p.52). The context of a program consists of the dynamic cultural, political, and business environment in which it operates (Pellegrinelli et al., 2007). "The importance of context cannot be over-emphasized to create a room for implementation and practice" (Shehu & Akintoye, 2009A), p.714). Therefore, effective program management is dynamic and flexible and adapts to changing contexts (Lycett et al., 2004).

The PMI (2017), the BMP (2011), and Lycett et al. (2004) identify several processes that are important within a program, similar primarily to project management. The project-overarching processes are program management processes carried out throughout the entire duration of the program (PMI, 2017; BMP, 2011; Pellegrinelli 1997). Achieving the overarching objectives is seen as the main activity or principle of program management. It is through these overarching processes that programs distinguish themselves from projects. After all, programs can achieve benefits through program management that are not achievable by implementing the same projects separately.

The BMP (2011) and PMI (2017) identify similar program management processes such as (1) vision development, (2)

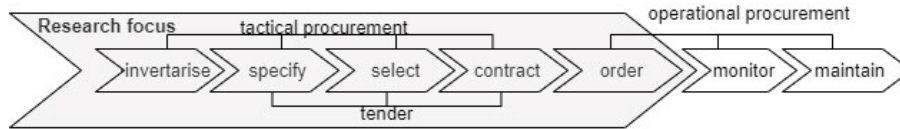


Figure 1; Procurement process and research focus (adjusted from Weele et al, (2021) & NEVI (n.d) & Eriksson (2006))

development of a target state and a roadmap to it, (3) the business case of the program, (4) leadership and stakeholder management, (5) standard practices for recording risks, problems, benefit measurements, and lessons learned, (6) management practices for managing the following programs and a program organization structure. Furthermore, PMI (2017) adds a process to adapt to its organizational context to the above enumeration.

Shehu & Akintoye (2009B) have defined five critical success factors for programs based on research in the UK construction industry: (1) program coordination, (2) priority focus, (3) program vision, (4) program strategy, & (5) program planning. In addition, case selection (Pellegrinelli, 1997) and adjustment of projects also contribute to achieving program objectives (Pellegrinelli, 1997). Rijke et al. (2014) also describe the importance of the program's adaptation to its context.

2.3 Procurement

Procurement is defined as "a strategy to satisfy client's developments and/or operational needs with respect to the provisions of constructed facilities for a discrete life cycle" (Ayintoye & Main, 2012, p.252). Procurement is a process of contracting in a measured way a suitable contract partner with the most appropriate product (e.g., a service or project) at the most favorable price. The price/quality ratio is usually the essential award factor (Pianoo A, sd). Tendering refers to the tactical part of the procurement process and is a regulated and not freely interpretable process (Pianoo B, sd). Since public clients operate with taxpayers' money, tenders must comply with the 2012 Procurement Act (Pianoo C, sd.) This regulation is an elaboration of 4 principles: (1) nondiscrimination, (2) equal treatment, (3) transparency, and (4) proportionality (Pianoo B, sd.). A procurement process involves the phases shown in Figure 1.

Procurement strategies must be aligned with the context and desired results. (Jansen, 2009). Several literature define procurement strategy elements. Procurement begins with the recognition of a problem. (Eriksson, 2006). After this, procurement decisions in current (project-based) procurements can be divided into seven stages: (1) specification, (2) bid invitation, (3) bid evaluation, (4) contract formalization, (5) compensation, (6) collaborative tools, and (7) performance evaluation (Eriksson, 2008). The decision stages are not chronologically, but rather iterative. Eriksson, Leiringer & Szentes (2017) defined four key procurement strategy elements: (1) the project delivery system, the reward system, the contractor selection and the collaboration model.

2.4 Programmatic procurement

The definition used for programmatic procurement (Dutch: Programmatisch inkopen) is derived from the literature on program management (BMP, 2011; PMI, 2017), the procurement process (Weele et al., 2021), programmatic procurements (Vosman et al., 2019), and the programmatic delivery method (Lutt et al., 2021):

A procurement process that encompasses the organizational structure, operational system, and

contractual relationships of a **group of related projects** that are **cleverly composed** and delivered in a coordinated way to achieve **strategic objectives** and control that are not achievable by managing them individually. The procurement process involves a **long-term project-overarching collaboration** between the public client and the market parties.

Ideally, parties are involved early and collaborate integrated (Vosman et al., 2019, Lutt et al., 2021). Due to its characteristics, programmatic is expected to be appropriate for dealing with challenges where repetition, innovation, or urgency are needed (Lutt et al., 2021). Vosman et al. (2019) found multiple barriers and based on these barriers identified five key drivers, both provided in Table 2.

Table 2; Barriers and drivers of programmatic procurement

Barriers		
System level	Organizational level	Relational level
Tension between requirements and innovation	Governance geared to project-based operations	Low level of trust between client and contractor
Continuous competition	Lack of clear ambitions and strategy	No motive to share knowledge
Lack of continuity for innovation	Implementation process is underestimated	Different interests of client and contractor
Insufficient portfolio volume	Negative perception of regulations	
Challenging capacity allocation	Insufficiently trained employees	
Drivers		
Clear ambitions and strategy		
Project-transcending governance		
Market consultations		
Framework agreements		
Appoint a responsible change manager		

2.4.1 Programmatic procurement strategy

Although there is little empirical literature, Lutt et al. (2021) and Vosman et al. (2019) have defined some programmatic procurement decisions to be made.

The public client should identify whether the project's characteristics (multiple projects in the near future that show similarities and can be executed over a flexible time horizon) and client characteristics (experience, willingness, capacity, and programmatic mindset) suit programmatic procurement (Lutt et al., 2021). Insight into the project and client characteristics leads to the decision to apply or not apply programmatic procurement.

Along with the scope and the projects, a program management approach consists of processes defined in Section 2.2. This management approach involves program and project levels (Lutt et al., 2021). After this, the overarching program objectives are outlined, possibly in consultation with the market parties (Lutt et al., 2021). One or multiple market parties can be contracted to execute program activities and subsequent projects (Lutt et al.,

2021) in one or multiple tenders (Vosman et al., 2019). In programmatic procurement, a program-wide approach to ensure competition must be considered (Vosman et al., 2019).

Pre-selection can be done based on: communicative competencies, collaborative competencies, and innovative capabilities. In addition, award criteria, such as degree of adaptability and experience with projects in the program, can be used. A dialogue about program objectives, intermediate objectives, and the proposal's feasibility can be used to align parties' visions (Lutt et al., 2021).

2.4.2 Collaboration

Suprpto (2016) has defined collaboration from the client-contractor perspective as a process in which a client and contractor jointly create norms, rules, and structures governing their teams, their working relationships, and ways to act or decide on the issues emerging during the course of a project, in order to bring about mutual satisfactory project outcomes. Collaboration is affected by the procurement strategy (Eriksson, 2015).

Lutt et al. (2021) define multiple collaboration forms possible in programmatic procurement, divided over two axes: Intertwined/separated collaboration and competence-focused/objective-focused; the form of collaboration should be adjusted to the program type and the level of ambition in the goals.

Involving parties early in the construction process provides sufficient time to build trust, comfort, commitment, and familiarity among participants (Lutt et al., 2021). Additionally, opportunities and risks emerge early due to early coordination between the client and contractors, allowing opportunities and risks to be better allocated to the parties best able to exploit or mitigate them. Furthermore, by applying long-term goals, shared responsibilities, and profits, programmatic procurement is suitable to align individual and collective interests (EIB, 2017). A long-term project-overarching collaboration with the contractor(s) and other parties with a core team of different participants has many advantages. This creates opportunities for cross-project learning and allows the team to decide what is best for the common interest, not for the project or its own interests (Lutt et al., 2021). Furthermore, Vosman et al. (2019) found that contractors and public clients have different interests, but have not proposed an appropriate solution.

After the contracts are awarded, the market parties and the public client define the preconditions of collaboration. Suitable examples for programmatic procurement are open book accounting across all parties, open communication, and pain/gain and risk/reward sharing (Lutt et al., 2021). Although low trust between contractors and clients can be a barrier to applying programmatic procurement (Vosman et al., 2019), transparency in costs and risks through open-book accounting can improve trust. Early contractor involvement (ECI) can also achieve more trust (Lutt et al., 2021).

Contractors are reluctant to share knowledge in collaboration since other parties might profit from it, affecting their competitive advantage (Vosman et al., 2019). Therefore, multiple solutions are proposed to increase the motivation to share knowledge: (1) by guaranteeing project continuity, for example, one tender for the whole program. (2) By rewarding knowledge sharing financially or with follow-up projects.

2.4.3 Performance

Programs focus on achieving an overarching objective by achieving benefits that are not achievable by executing individual projects. Benefits are measurable improvements specific stakeholders can perceive as an advantage (PBM, 2011). These

benefits contribute to the achievement of the objectives. The iron triangle traditionally defines performance, three success criteria for costs, time, and quality (Shao, Muller & Turner, 2012). However, programs are concerned with long-term objectives. Therefore, Shao et al. (2012) added performance success criteria from a programmatic perspective. Program performance is also based on the satisfaction of clients, contractors, sponsors, and other stakeholders. In addition to this, efficiency and innovation are success factors.

Performance is created through the project-overarching processes in the program. Programmatic procurement allows risks to be managed across projects and distributed among more stakeholders (EIB, 2017). Contractors, suppliers, and others can be offered more continuity over the long contract duration (EIB, 2021B; EIB, 2017), creating prospects for a multi-year market volume and recouping investments (EIB, 2021B; RWS, 2019). In addition, innovative solutions can be developed and implemented in multiple projects (EIB, 2021A). By bundling similar projects, projects can learn from each other, creating more scaling possibilities (EIB, 2017, Lutt et al., 2021). Cross-project learning can be optimized if projects are executed (partly) consecutively (Lutt et al., 2021). Since overarching goals are central to a program, goals and how to achieve them are more clearly defined (Lutt et al., 2021). Programmatic procurement also allows financial and personal resources to be used more flexibly in projects where they will have the greatest impact (EIB, 2021A).

3. Research methodology

3.1 Case selection

This paper draws on multiple case studies of four infrastructure programs that implement programmatic procurement in the Netherlands. Since the research field is exploratory, case studies are appropriate (Eisenhardt, 1989). Multiple case studies are suitable since they provide a detailed empirical description of the particular setting (Stake, 1995). Furthermore, multiple case studies enable the researcher to create a more generic, accurate, and robust theory, since this allows the researcher to base the theory more deeply on the evidence of various empirical cases (Eisenhardt, 2007).

Four cases are the lower limit of the optimal range recommended by Eisenhardt (1989). The empirical grounding of the research is likely to be unconvincing for fewer than four cases.

The cases are selected since the cases are spread (1) across different types of public clients, (2) across program sizes, and (3) across program types. Furthermore, the public client has already tendered the program and thus has gone through the procurement process, as shown in Figure 1. This enables the researcher to gain complete insight into the phases prior to awarding. Three cases have already executed several projects. Although this is excluded from the scope, valuable information is retrieved from this phase. The case characteristics are provided in Table 3.

3.2 Data collection and analysis

Empirical data is obtained from a document study, interviews, and an expert panel. The data from the document study are obtained from investigating six to ten documents per case, such as procurement strategies, category management plans, government vision documents, risk analysis, organograms, and contract and tender documents. Document study is particularly applicable in

Table 3; Case characteristics.

	Case A	Case B	Case C	Case D
Program scope	Pavement maintenance works	Pavement maintenance works	Maintenance works on civil objects	Electricity grid reinforcement
Contract sum (Eur millions)	>200 in multiple procurements	>10 and 50<	<10	>200
Program type	Rolling	Rolling	Target	Target
Reasons for starting the program	Vision-led	Vision-led	compliance	compliance
Procurement date	2019	2020	2019	2022
Contract	Different per procurement, 4 to 6 years	two years with a two-times one-year extension option	Estimate of three years, but longer if needed	Estimate of four years, four times a one-year extension option
Parcels	>5 parcels over the multiple procurements	>2 and <5 parcels	one parcel	>2 and <5 parcels

this research since it provides a detailed description of the procurement process (Bowen, 2014). In addition, three interviews are conducted per case, with respondents representing the public client in managerial positions such as procurement director, procurement manager, procurement consultant, categorial manager, program manager, and contract manager. Interviewees are selected based on their experience, role, and participation in the case procurement process. Each interview took 1-1,5 hours and was transcribed intelligent verbatim. Interviews are considered one of the most crucial collection methods.

case studies and are a highly efficient way to collect rich empirical data (Yin, 2014). In addition, an expert panel of five experts is consulted to triangulate, clarify, and extend ambiguous results. While the individual conception is important in the interviews, the group conception created by discussions between experts and researcher in the expert panel is used (Linstone et al., 1975). First, general results are presented, after which the expert panel could question these. Then twelve in-depth statements were discussed. The expert panel prevents clear misinterpretations of the data, helps to interpret results, and thus increases the validity of the research.

The results were analyzed based on the analytical framework in Figure 2. The analytic framework is derived from (Erikson et al., 2019).

Literature mentioned in Section 2 has mentioned the relationships in Figure 2 based on project-based procurement. However, this research focuses on programmatic procurements. The analytical framework assumes that, similar to project-based procurements, the programmatic procurement strategy relates directly to performance and indirectly to performance through collaboration. Also, the programmatic procurement strategy should be aligned with its context.

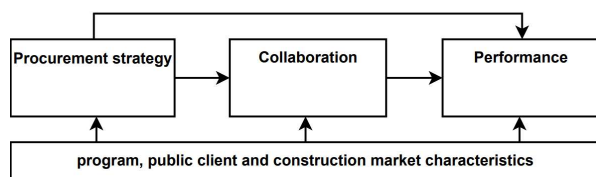


Figure 2; analytic framework

An inductive research method is applied due to the explorative research field (Eisenhardt, 2007). Therefore, the analytic framework consists of no sub-elements. The document study provided insight into the case until the tender moment, and the

data is coded open and axial. By open coding, the terms used in the concepts are explored (Boeije, 2019). By axial coding, the terms and concepts are demarcated, the relevance of the terms is established, and the terms and concepts are abstracted (Boeije, 2019). In this process, the existing literature is not included. The open and axial coding process provides input for the interviews. All dimensions are introduced in all cases by cross-comparison of the document study individual case results and consulting these with two procurement experts. The input is based on the decisions in the procurement strategy concept. The analysis of the documents provided a great but incomplete understanding of the cases.

The interviews supplemented the document study by providing a complementary understanding of the procurement process. Additionally, an understanding of the process after the tender is gained in the interviews. The interviews were utilized to triangulate document study data about the procurement strategy, the value-creating process, and context characteristics findings, including their relationships. However, the document study did not provide insight into the collaboration concept and its relations. Therefore, no triangulation was possible. Due to the complementary and interest-oriented focus of the interviews, the interviews were conducted in a semi-structured manner, which is suitable to understand the case as best as possible (Yin, 2014). The interview coding is initially done similarly to the document studies coding, after which a re-categorization is done for both the interviews and document study.

The expert panel prevents clear misinterpretations of the data, helps to interpret results, and thus increases the research's validity (Linstone et al., 1975). Both the expert panel and interview data are open and axial encoded. Finally, the entire data set is selectively coded to determine important terms and concepts and integrate the data to answer the research question (Boeije, 2019). The procurement strategy is central to the selective coding process; therefore, the results are structured similarly.

4. Results

The results begin with the definition of the programmatic procurement strategy decisions found in the cases. Second, the implications of programmatic procurement strategies on collaboration are elaborated. Finally, the last Subsection elaborates on the implications of procurement strategy and collaboration on the potential of performance in programmatic procurements.

4.1 Programmatic procurement strategy

For all cases, procurement strategy decisions are found to be relatively similar. The programmatic procurement strategy decisions observed are listed in Table 4 to improve readability. Additionally, programmatic procurement decisions have been divided by phase to provide guidance.

Table 4; Identified programmatic procurement decisions.

Procurement strategy decisions
Inventarize
The strategic need
Overarching objectives
Approach outline
The decisive decision to procure programmatically
Specify
Program scope
Parcel division
Contract duration
Program organization structure
Select & contract
Procurement procedure
Project delivery method
Contractor selection
Payment system
Order
Project definition*
Prioritization
Alignment of collaboration vision

*Project definition motivates the strategic need in both compliance cases. Therefore, it can also be placed in the inventarization phase.

In practice, decision-making in programmatic procurement is repetitive, since all decisions need to be appropriately aligned. In addition, all cases consider roughly the same contextual characteristics, as provided in Table 5.

Table 5; program's content, public client, and market characteristics considered in the procurement strategy

Program's content	Public client organization	Construction market
Nature and size of projects	Competencies	Competencies
Opportunities and risks	Resources	Resources
Duration of projects	Policy	The organizational structure of market players
Project similarities	Interfaces with internal organization	Impact on market balances
	Motivation for the program	Access to market parties
		Needs of market parties

4.1.1 Inventarize

The strategic need drives the decision to abandon traditional procurement and choose programmatic procurement. In all cases, the strategic need has arisen to a greater or lesser extent from the major societal challenges mentioned in Section 1; Current

procurement methods are considered inappropriate to address these challenges. The compliance cases have gained insight into the current status of the client's acreage and concluded that they must act to remain compliant. By surveying the acreage status, the public client recognizes that their upcoming challenges exceed their organization's capacity to a great extent. The other two cases express the desire to dissociate themselves from 'fighting contracts' caused by current procurement methods.

The overarching objectives arise in all cases from the strategic need, consisting of primary and secondary objectives. Without the primary objective, the secondary objectives would not exist either. The primary objective is the objective towards which the program is working. For example, the primary objectives of C & D that face a compliance challenge have a clearly defined target comprising projects to be carried out by a specified date. However, cases A & B have a more vision-led primary objective of improving the current situation for a designated period, and thus have a rolling program type. Secondary objectives are more related to public client policies. These are focused on societal challenges but can also focus on more local challenges that the organization or its territory faces.

The approach outline delineates a suitable approach to achieve these overarching objectives. In other words, it outlines how program performance establishes the achievement of the overarching objectives. It provides a framework to relate to in subsequent phases.

The decisive decision marks a moment or process in which the above motivates to procure programmatically. In cases C & D, there was a thorough understanding of the compliance problem situation. The acute nature of the problem and the observation that the current capacity was insufficient to address the upcoming challenge were decisive. In the other two cases, a manager with an adequate mandate played a decisive role, and thus, are vision-led.

4.1.2 Specify

The scope of the program delineates which construction activities are included in the program. The scope consists of projects with similar characteristics, work disciplines, processes, and environments. Scope demarcations are made based on several aspects. First, the two compliance cases demarcate the estimated contract volume and the expected projects. The work disciplines, geographical area, project size, and nature of work are derivative from the status survey of their assets. Finally, the two rolling cases use project size, work disciplines, nature of work, geographic area, time, and estimated total contract volume to demarcate which projects are and are not included in the program.

The parcel division subdivides the scope into parcels. Case A, B & D subdivide the scope into geographical parcels. Case C considered subdividing but decided not to. In all cases, a division of the work process (design and implementation) or work disciplines is considered, but these were not applied, since it does not contribute to achieving the overarching objectives. The number of parcels balances on a continuum between multiple opposite aspects; on the one hand, there should be sufficient contract volume to gain benefits, not identical for all cases, such as (1) continuity in the workflow to recoup investments, (2) sufficient portfolio volume to enhance combination opportunities, and (3) to exploit the potential of learning capability and knowledge retention. On the other hand, the portfolio must remain manageable. The interests of small and medium-sized enterprises (SMEs) are considered for the number of parcels since three public clients have the policy to involve SMEs, and SMEs can suit the contract scope more than larger companies. Based on the above considerations, case D, which opted for a single parcel, assessed that the contract volume is such that it contributes to the

objectives and does not introduce too many risks. In addition, two cases consider the contract's impact on the existing market relationships; will there be enough work leftover, or will some parties not become too powerful?

The contract duration is determined along with the scope and parcels. The maximum duration is at least four years for all cases, but the public client can end the contract with individual contractors earlier in case of bad performance in cases A, B & D. In cases A & D, large investments justify exceeding the maximum contractual term prescribed by the 2012 Procurement Act. The compliance cases have included deadlines in their primary objective, but when the underlying projects do not reach this deadline or the total contract volume is not reached, the program can continue even after this date.

The program organization structure delineates the program and defines the (mutual) relationships between the following parties: (1) the client's organization, that is, the internal client, (2) the client's program team, (3) the client's project teams; (4) the contractor's project teams. Demarcation of the program organization determines which people are accountable on the achievement of overarching objectives. The two rolling cases replace existing maintenance procurements and, thus, are more engaged with their parent organization. The compliance cases are in addition to the current organization and therefore operate more or less independently. All cases extract essential information from the parent organization, not identical for all cases, for example, discipline knowledge, customer contact, and asset management.

The two more extensive cases have one or more layers of program managers. Cases B, C & D focus on retaining parcel team composition for both client and contractor. Case B has one core team for both parcels, case C has one team for their only parcel, and case D has a core team for each parcel. In case B, a single client's core team on both parcels facilitates cross-parcel learning in terms of collaboration. In addition, case D stimulates cross-parcel learning by setting up a consultation structure at the discipline level and through the program manager. In contrast, the public client in case A uses different project teams for each project, but the contractor teams remain the same. Program managers have different tasks, but these are not identical for each program: (1) facilitate learning across the parcels, (2) divide work into the parcel, (3) report progress to the parent organization, (4) execute performance measurements, (5) monitor uniformity, and (6) keep the mindset of program workforce focused on the overarching program objectives, not the project objectives. The two smaller programs are handled by only one project team from the public client; thus, this team also acts as a program team.

4.1.3 Select & contract

All **procurement procedures** are based on framework agreements with a single contractor per parcel. The right to submit a one-to-one offer is awarded and the client has the right to accept these offers one-to-one. After the tender, three cases established ECI agreements based on DNR 2011 or an ECI contract model. Following joint preparations, all cases conclude execution agreements. These are based on UAC 2012, but there is also room to implement UAC-IC. In cases C & D, exceptions to the UAC 2012 have been applied in the execution agreements because of the joint preparation. The contract also offers scope for these exceptions.

The project delivery model defines how collaboration is formed to a large extent. In all cases, an ECI has been used. Table 6 compares the phases of the construction process and the ECI setup of the cases. Cases A & B involve the contractor directly, as they still retain a responsibility or control, and therefore there is no additional risk of undesired solutions. In contrast, design responsibilities shift from the client to the contractor in cases C &

D, while cases A & B have assigned complete design responsibilities to the client or the contractor. Public clients of cases A, C & D feel that the construction process phases client requirements and the preliminary design work does not need the contractor's expertise; Client knowledge is sufficient to carry out this process correctly.

Table 6; *the involvement of the public client and contractor in the construction phases. (C&D have the same approach)*

	Case A	Case B	Case C	Case D
Initiation and definition (client) requirements	Client is responsible, contractor provides advise	Client responsible	Client responsible	
Preliminary design		Contractor is responsible, client participates		
Definite design		Contractor is responsible, client participates	Contractor is responsible, client participates	
Execution design				
work preparation	Contractor responsible	Contractor responsible	Contractor responsible	
Work execution	Contractor responsible	Contractor responsible	Contractor responsible	

The contractor selection involves the procedure of awarding the parcels to the contractors. Contractors can earn one parcel for each procurement procedure. Through reference work, technical execution competence is assessed. Cases B, C & D integrate design and execution responsibilities; these organizational competencies are also assessed with reference work. The lack of these references results in a knockout. Cases B & C award combined execution experience and organizational competencies in one reference.

The award method is most economic advantageous tender (MEAT) based on the best price/quality ratio. For example, cases B & D have a 70% quality and 30% price ratio, and cases A & C award entirely on quality. Interviewees from case A indicate that construction activities are still very uncertain at the tendering, leading to a vast and unmanageable or unsuitable contract when the price is included. This would again introduce strategic behavior and take the focus off achieving the overarching objectives. The interviewees of case C state that it is impossible to set the price at the tender moment. Cases B & D recognize that their price is based on the activities covering 80% of the work, and prices may be revised on a project-by-project basis due to project circumstances.

The qualitative criteria for the award are focussed on two main aspects. At first, a collaboration plan is the most critical aspect of each award model. In this plan, the contractor indicates how he envisages cooperation. In collaboration, a clear focus is on learning ability and retention of knowledge. The requirements of the collaboration plan are kept very broad and do not translate the client's wishes to encourage the contractors to be creative.

The price is based on fictitious quantities with the most common construction activities, providing a binding reference for project price negotiations. Case B uses a minimum subscription amount in the program tender to avoid low prices. Cases A & C exclude the price in the tender since both intended to apply the principle of "fair money for fair work". Although case D does not try to influence low prices in procurement, two interviewees speak of a price level with healthy margins. These cases use the above-mentioned aspects to contract market-compliant prices instead of competitive prices without healthy margins. According to the interviewees in these cases, competitive prices will lead to an

excessive focus on the price that does not align with achieving the overarching objective.

The payment system defines how the contractor is paid for his activities. A clear distinction is made between the ECI and the execution agreements. First, the ECI payments are discussed. Case A includes a fixed percentage of consultancy in the implementation agreements to cover the costs of advising in the design phase. Cases B & D choose to reimburse the expenses incurred with hourly rates set for tendering, and within case C, a fixed amount per project is agreed upon for the preparation. This negotiation is similar to the implementation agreements described in the following.

After the design phase, the parties agreed on a fixed price per project for the implementation agreements. At this time, a specification, a risk portfolio, planning, and other project requirements are established. As the design is almost complete, the party responsible for the final design develops a work description at the post-level. Based on this, the contractor creates an open-book budget transparent on people, equipment, and materials at the item level. The budget is negotiated in a structured manner until the parties agree to avoid lengthy discussions and impasses. Cases B & C partly base this negotiation on price rates fixed in the tender. All cases can introduce cost experts and have included an escape to introduce another contractor in negotiations.

4.1.4 Order

The project definition defines which specific projects will be executed in the program. The two compliance cases clearly define which projects the program includes before the tender, but are not further demarcated yet. At this stage, the two rolling cases have only defined the scope within which projects will be allocated to the program and will define the projects continuously during the program.

Cases A, B & D have no obligation to put projects on the market, and projects may not be continued in Go/NoGo moments. The two rolling programs define their projects periodically or continuously.

By **prioritization**, the achievement of the primary objective is superior to the secondary objectives when these conflict. Additionally, overarching objectives can interfere with project objectives. Also, on these, prioritization is made.

Collaboration alignment is a process in which the collaboration plans of the parties are aligned. Before tendering, clients have a rough sketch of how they envision collaboration. Due to partner selection, in which contractors have much room to develop a collaboration plan, these collaboration visions of both parties should be aligned. After the tender, three cases choose to align the collaboration plans and make concrete collaboration agreements with the contractor(s). This involves the cooperative and process-related aspects of the process.

4.2 Collaboration

Multiple interviewees and the documents from all four case studies stated 'collaboration' when asked how the performance potential of programmatic procurement can be fulfilled. In collaboration, the program is executed, and the performance potential can be exploited. This Subsection discusses how programmatic procurement strategies have influenced collaboration.

The results show that multiple aspects **align the interests of both the contractor and the public client in performance**.

At first, all cases apply low competition in the contracts by awarding less or not on price and the one-to-one right of contractors per parcel. In addition to this, all public clients have

chosen to negotiate the price of individual projects after the tender. All cases experience that these aspects shift the excessive focus on price from both public client and contractor towards a focus on quality. The contractor's focus is not on minimum quality and additional work to compensate for rock-bottom prices. Therefore, the contractor tenders and behaves less strategically. Consequently, the client's focus shifts to equal collaboration instead of control to prevent the contractor from exhibiting strategic behavior. This shifts the focus on acting and preventing strategic behavior toward performance.

Second, contractors have ensured a long-term contract with multiple projects. Along with less competition, an arguably granted revenue with decent profits is created, vastly increasing the contractor's interest. Contractors can be expelled from the contract in case of poor performance. Therefore, contractors are expected to have more interest in good performance according to interviewees of cases A, B & D; thus, public clients and contractors are more aligned.

Third, interviewees in all cases state that ECI causes the contractor to be involved in both the design and implementation; they benefit from high performance in the preparation and design phase. This is amplified by the feedback loop from the execution of a project to the design of the next project, arising from the long contract duration with multiple projects.

Multiple aspects improve **mutual understanding as** individuals get to know each other.

At first, cases B, C & D focus on keeping the parcel teams together so that individuals get to know each other by collaborating for a long period. According to interviewees of cases B, C & D, knowing each other has multiple advantages since one knows what to expect, knows whom to get, knows what is essential to the other, and gets used to each other. In case A, the client teams differ for each project; therefore, no advantages are described.

Second, this change in project teams combined with limited preparation time caused client teams of case A to fall into old behavior by not working in an ECI manner and focusing on project objectives. The public client in case A has intervened to increase preparation time and has observed that this has initiated more room for new behavior and collaboration in preparation. The effects of this are described in Subsection 4.3.6.

Third, all cases gain mutual understanding by discussing and making joint decisions about project innovations, measures, and conditions in the preparation phase. The public client and the contractor gain insight into each other's requirements, processes, interests, and preferences; therefore, mutual understanding is increased. The interviewees state several preparation processes that create mutual understanding. For example, case A mentions joint early cost and risk analysis as processes that contribute significantly to mutual understanding. ECI enables collaboration in the preparation phase so that these processes can be executed jointly. An interviewee from Case C mentions that negotiating the price down to the substantiation level on an item-by-item basis contributes to this mutual understanding. By discussing this, the public clients gain insight into the construction methods' rationale. In addition, the client gains insight into what is offered and what is not. Vice versa, the contractor can gain insight into what the client expects.

The results show some examples of areas of concern regarding collaboration.

First, all cases state that both the contractor(s) and the public client sometimes lapse into old behavior, think project-based rather than programmatic, and act out of distrust rather than trust. This remains a risk, especially in the transition from project-based to program-based procurement. Therefore, when adversarial

behavior occurs, it is essential to rectify one another. This old behavior can reduce trust and negatively influence collaboration.

Second, multiple interviewees state risks for collaboration at the end of the contract since their interest in performing well, offering market-compliant prices, and keeping the team together becomes less critical to the contractor.

In case C, the introduction of an additional project from another internal client negatively influenced the collaboration for a while. The additional project emerged new risks that the contractor did not adequately mitigate. In response, the contractor wanted to change the contract regarding risk allocation. Therefore, the conflict in one project caused a compromised collaboration in other projects for a while. In addition, there were fears that the higher management of the contractor could force the project members to act differently, negatively influencing collaboration. It did not happen in the end,

Next to this, broad requirements for the collaboration plans cause each collaboration with each contractor is different and not clearly defined yet. Case B did not properly align the collaboration plans with a contractor due to time limits for a project deadline. This first project was described as having an uneasy collaboration.

4.3 Program performance

In this research, multiple aspects are found through which programs achieve their program performance. These aspects are **bold and cursive**. The aspects are divided into six subsections below: (1) combination opportunities and scale advantage, (2) learning capability and knowledge retention, (3) creating prospects for recouping investments, (4) applying program-level framing, (5) flexibility to deal with uncertainty and diversity, and (6) early contractor involvement. This subdivision is based on the interrelationships and similarities of the aspects and is provided to increase readability. In these sections, the influence of procurement strategy and collaboration on these aspects are elaborated. The first three subsections are relatively independent of each other. However, the last three subsections have implications for multiple subsections. In these sections, the influence of procurement strategy and collaboration on these aspects are elaborated.

4.3.1 Combination opportunities and scale advantage

Combinations and larger-scale possibilities emerge when multiple projects are combined in one contract. Some examples of how procurement strategy and collaboration influence the achievement of **combination opportunities and scale advantage**.

The first example is that by combining multiple projects in one contract, fewer tenders, contracts, transfers, and interfaces reduce the management efforts and costs for both the client and the market.

The second example is found in cases A, B & C, in which combination opportunities are exploited, such as “make work with work” and using waste products from one project in another project. Logically, these opportunities improve efficiency.

The third example is found in cases A & D, in which geographic parcels increase the scaling advantages of investments in the area. It enables contractors to focus on an area by setting up a hub with storage and devoted teams. Therefore, the efficiency can be increased.

The fourth example is in cases A, B & C, in which two nearby projects are bundled in execution to improve efficiency.

The fifth example is found in case C, which defined its projects before the tender and called a meeting just after the tender to explore possible opportunities and risks. Therefore, there was

timely insight and understanding of possible advantages, and more combination opportunities were exploited.

The fourth example is found in case A and contrasts with the second. The projects were defined very late; therefore, the combination opportunities were not exploited, as there was no timely oversight to achieve benefits. Additionally, difficulties were experienced since the client project teams were different each time, and no one coordinated the opportunities. After applying a maintenance management system, the projects could be defined earlier and opportunities regarding the above were better exploited.

4.3.2 Learning capability and knowledge retention

As programs provide a steady flow of similar projects over a long period of time, knowledge can be retained and learning can take place. Some examples of how the procurement strategy and collaboration influence **learning capability and knowledge retention**.

The first example is found in cases B & D, which have constant parcel teams. Therefore, the design knowledge flows to the execution phase, after which the execution knowledge of project X flows to the design phase of project Y. Combining multiple projects over a long duration and the integration of design and execution allows all cases to learn from previous projects. Products, contacts, and processes can be retained and used for future projects. This effect has increased with geographic parcels, and the contractor is involved in both the design and execution phases. Multiple interviewees indicate that the contractor has gained area-specific knowledge in the execution phase that is of value for the design phase.

The second example is found in case A and contrasts with the first example, which has a different team for every project due to organizational reasons. Therefore, there was no interest in passing on this information from the execution knowledge of project X to the preparation of subsequent project Y, and learning capability and knowledge retention were reduced. The other three cases have fixed teams and benefit from these aspects. Case A describes that there are still great opportunities if the same teams remain within the program, and the potential is not exploited when project teams switch.

The third example is found in cases B & D, in which both the client and the contractor express the desire to learn across parcels. With multiple parcels, the program may be able to exchange ideas in collaboration, processes, and products between parcels. However, although this desire is expressed, no clear evidence is found that cross-parcel learning occurred on processes and products. Instead, results indicate apparent hesitation through memories of construction fraud and the loss of competitive advantage of contractors. Therefore, clients do not know if sharing learning in terms of processes and products is appropriate. In addition, the client can compare the prices of different parcels. Low competition strengthens the contribution of this cross-parcel cost comparison.

4.3.3 Creating a prospect for recouping investments

According to the interviewees in all cases, long-term overarching investments are needed to satisfy social ambitions that do not land in projects but must be arranged across projects. All public clients try to provide long-term stable turnover with the prospect of recouping investments by providing a long-term contract with the one-to-one right for multiple similar projects. Various examples of how procurement strategy and collaboration influence **the prospect of recouping investments** are found.

The first example is experienced cases A & B, and cases C & D describe this example. Cases A & B have invested in zero-emission

machines since the public clients ensure the contractor that their machines will be deployed on the projects in the program, and project costs may be increased to compensate for higher purchase prices. This guarantees that investment costs for these more expensive machines are partially divided across multiple projects in the program. Public clients state that paying these additional project costs is justifiable since it contributes to the overarching objectives. In addition, cases A, B & C have insight into the substantiation of unit prices since open-book project cost calculations. Therefore, it becomes transparent and verifiable for the client to include these project-overarching investments in project costs. All cases state that this can stimulate the contractor to make certain investments that benefit multiple projects or the overarching program objectives, since the extra costs can be (partly) paid by the public client. As a result, these cases show that investments have increased. However, an interview of case D states that contractors struggle to apply the programmatic perspective and desire to push the contractors to apply this. He mentions that contractually nothing prevents project-overarching investments, but there is also nothing that encourages it.

The second example is that no cases have a granted turnover. Cases A & B mention project uncertainty as the main reason for not giving a turnover guarantee. Only case D compensates investments made if turnover falls short of estimates to ensure the prospect of recouping their investments. Interviewees from cases A & C state that the acuteness of challenges guarantees turnover for the contractors. Cases A, B & D have established a way to suspend the contractor(s) from the contract by periodically reviewing the performance. In the event of a poor evaluation, the public client can exclude the contractor from the contract. Public clients employ these options as motivations for good collaboration between the contractor and the client. Although this does not emerge from the results, experts state that the absence of a contractual turnover guarantee and possible early termination of the contract may resist contractors from investing.

4.3.4 Applying program-level framing

Programmatic procurement focuses on achieving the overarching objectives that are not achievable with individual projects. Projects contribute to achieving the overarching objectives. As mentioned in the Subsection above, actions can be placed in a programmatic perspective; therefore, measures can be framed on a program level. Some examples are given below. Multiple examples of how the procurement strategy and collaboration influence the ability to frame on a program level are found in the cases.

The first example is found in case A, in which the combination and exchange opportunities, the flexibility in planning, phasing, and the work methods are compromised since multiple internal clients adhered to their own project objectives. These internal clients still think in terms of project objectives and not program objectives, thus reducing the achievement of overarching objectives. As project members or other stakeholders continue to focus on project objectives, the overarching objectives may be compromised. Multiple interviewees from cases A & D recognize that some stakeholders are accountable to the project objectives and do not always contribute to the program objectives. An interview in case D states: "The role of the program manager is to keep all the frogs on the wheelbarrow and the wheelbarrow in the right direction."

Second, these internal clients of Case A were reluctant to participate in the program. They and also other interviewees in case B raised the concern that the project costs would increase. The regulations of case A obliged the internal clients to let the

program execute their projects, but it did create hassle and noise within the client's organization. Several interviewees said that the price level per project differs from the lowest price tenders, since prices have healthy margins instead of marginal margins. On the other hand, three clients suggest that this does not have to be more expensive. Multiple interviewees state that a public contracting authority should strive for the best price-quality ratio. In addition, multiple interviewees argue that the cost-benefit analysis framework is very decisive for both costs and benefits; therefore, these calculations have little added value. In addition, project specificity creates diversity in cost/benefit analysis on project and project-overarching investments. Both costs and benefits are different for each project. Therefore, cases A, B & C have additional budgets for the overarching objectives set according to comfort limits and approve such investments on gut feeling.

The third example is found in case C, in which the asset manager accepted only innovations with a certain TRL level. An innovation with a lower TRL was applied in a location where the adverse effects of the lack of quality are low. This innovation was in the interest of the program objective, but it harmed the project goal. Since the asset manager is focused on the overarching objectives, it is possible to consult to apply such innovations in conditions where adverse effects are low; innovation is therefore improved.

The fourth example is found in case A, in which situations have arisen in which the contractor has offered something in a plan to achieve the programmatic goals and scored added value. Still, the client later decides that it is not feasible, for example, financially or technically. All public clients have not had measures priced in the tender. Not including such measures in price during tender deprives the client of contractually enforcing these measures without directly paying for them themselves. In doing so, public clients of cases A, B & D state that they experience discomfort as it feels like it conflicts with the values of the 2012 Procurement Act.

The fifth example is cases A, B & C, which indicate that achieving overarching objectives was compromised. All cases have expressed some examples where project objectives or overarching objectives conflict. For example, opportunities are seen regarding the overarching objectives, but there is not enough time to implement them.

A sixth example is found in case D, which shows that not only can investments be framed at the program level; an interviewee mentions that he wants to approach stakeholders for licensing and permits. Local governments can benefit from the program's overarching objective; As a result, their interests are expected to be more aligned with the public client. In geographically divided parcels, this is improved since more projects are included for each stakeholder. Therefore, a relationship can be built with stakeholders within the parcel.

4.3.5 Flexibility to deal with uncertainty and diversity

Long-term, in combination with multiple projects, implies uncertainty and diversity. Projects are not defined or fully demarcated at the tender moment. Projects are one-offs and therefore are, to some extent, diverse. All cases deal with this by creating flexibility within the contractual framework in which projects can be carried out. The results show how the procurement strategy and collaboration influence **flexibility within a clearly defined framework**.

The first example is found in all cases, which deliberately retain some flexibility by not delineating the scope too tightly to deal with uncertainty and diversity. Found examples of broadly defined scope are: in case A, it is still undescribed "how" the work can be executed, but the "where" and "when" are. Cases B & C have options to include technically or geographically adjacent work or

even separate projects, and cases B & D include an extensive range for the monetary volume of the contract to keep room for additional projects. Based on progressive insight, projects can be added to the scope. By this broadly defined scope, all cases describe a degree of flexibility in their scope demarcation required to deal with this uncertainty. Therefore, work can be spread more evenly, planned, and phased more efficiently, priorities can be shifted to where needed, and adjustments can be made to suit the program goal, characteristics of projects, or preferences of the contractor. In addition, the contract flexibility allows for stabilizing the fluctuating turnover to some extent. Flexibility can be exploited to satisfy both the contractor and the client more; therefore, the program's performance is expected to increase. According to multiple interviewees, flexibility improves exploiting this combination & scaling opportunities improve the individual project performance and achieving the overarching objectives. It enables to adjust things for the sake of these opportunities. ECI allows, in all cases, the client and contractor to align and consult and exploit opportunities regarding this flexibility, as elaborated further in subsection 4.3.5. However, according to interviewees in case A, this flexibility effect is reduced if projects are defined too late.

The second example is found in case A, which has small parcels with divided work types so that SMEs can subscribe to the contract. This is done because SMEs can provide a particular work type, and larger contractors are best able to provide other work types. Furthermore, if construction activities are not too diverse, contractors can bid for a parcel that suits them well.

The third example is found in all cases, which all acknowledge that setting prices in the tender is not easy. A consequence of uncertainty and diversity is that price is (partly) excluded, and project prices must be negotiated. By (partly) excluding price from the tender and the one-to-one parcels, it can be expected that the efficiency incentive is partly lost, negatively affecting the price level. On the other hand, as mentioned before in the collaboration, the excessive focus on price is also lost. Since no or only part of the price is fixed in the tender, the client is vulnerable in terms of price in the project negotiations. Therefore, he has to have enough price knowledge in the negotiation phase; otherwise, the interviewees expect that the vulnerability and price level will increase. Some interviewees in cases A & B raise concerns about increased project costs, as elaborated earlier in the second example in Subsection 4.3.4. Even if cases have set some prices in the tender, diversity in project circumstances means that prices only can be used as guidelines; prices are too dependent on situation-dependent factors.

The fourth example in cases A & C relates to diversity. Case A has multiple internal clients, and case C has added a project from another internal client to the scope. Both describe that multiple internal clients are not always desirable, as they may have different processes, interests, and wishes, affecting uniformity and standardization in the program and resulting in less efficiency.

4.3.6 Early contractor involvement

The application of the ECI enables two aspects. Both aspects arise because there is no discrete boundary between design and execution; the tender is gone, both parties can be involved in the design phase, and information can flow back and forth between the phases. In other project delivery models, many preconditions are set during the tendering process.

ECI enables ***the use of each other's complementary knowledge, expertise, and skills;***

First, the interviewees in all cases state that the contractor can bring his expertise to the preparation phase. Then, cases A & B

describe that both parties can execute activities that suit their capabilities, improving the performance; constructability is expected to be increased.

A second example is found in case A, in which the interviewees state that the risk analysis is earlier and more adequate and that the consequences of emerging risks remain low since the collaboration is good. The parties are in conversation with each other. Risks and issues, if they occur, can be solved collaboratively and effectively. Therefore, the consequences of the occurrence of risks are less severe. One interviewee of case A mentions this as an essential performance aspect: "the collaboration caused the deadlines of projects to be achieved because we solve things in a healthy, cooperative way. This avoids shifting other projects within our area, increasing our predictability and ensuring that we meet our objectives." The results indicate that mutual understanding efficiently identifies and allocates risks to the parties who can mitigate these the most.

A third example is found in case A, which had very late project definitions. Therefore, the clients lapsed into old behavior and did not work in an ECI manner. The use of contractor knowledge was not exploited, missing opportunities to improve constructability and tailor the project to the contractor's preferences.

A fourth example is found in Cases A, C & D. Geographically divided parcels improve the value of the knowledge from a contractor. Interviewees describe that if a contractor encounters something in a project, this knowledge is more valuable if there are projects in a similar environment.

ECI also enables the contractor and the public client to **align and consult** about solutions in the preparation phase. All cases mention that the broad contractual scope definition provides flexibility and a broad framework for alignment and consultation; there is flexibility and room to exploit opportunities. It is a logical consequence that if people mutually understand each other, alignment and consultation can occur more efficiently.

First, the interviewees of all cases state that requirements, processes, interests, and preferences can be discussed collaboratively and appropriate project innovations, investments, measures, and conditions can be found. Then, multiple interviewees mention the importance of understanding each other's interests, risks, problems, and underlying reasons for requirements in such discussions. By doing this, it is more likely that more appropriate solutions will be found for both parties, as they can participate in the decision-making process.

Second, the interviewees in all cases state that the preparation can be tailored to the execution methods and preferences of the contractor. Therefore, the efficiency of execution is expected to increase.

The third example is found in case C, where a consultation on an innovation took place between the parcel team and an asset manager of the client. As a result, a suggested innovation was not applied because it does not meet the desired wishes of the asset manager. In this case, including the asset manager in such consultations hindered innovation. However, when innovations do come through, they are to the client's satisfaction.

5. Discussion

An essential aspect of programmatic procurement is collaboration. Through collaboration, the program can exploit the performance potential. Improved collaboration conditions within programmatic procurement provide benefits at the program and project levels. This contradicts existing literature (BMP, 2011; PMI, 2017; Lycett et al., 2004; Pellegrinelli, 1997) since only program management level benefits are described. Nevertheless, this is a logical effect since the collaboration between public customers and

contractors is generally suboptimal in the construction industry (Deep et al., 2021). In other words, the level of competition the interviewees refer to is simply low. Therefore, this improved relationship has benefits throughout the process and both at the program and the project level. This possibly also applies to performance.

This research describes multiple improved collaboration conditions and performance aspects. It is challenging whether these originate from a programmatic approach or ECI. ECI obtains advantages described by Eadie & Graham (2014) that correspond to the aspects which improve performance identified in this research: (1) knowledge retainment, (2) use of complementary knowledge, (3) alignment and consultation, and (4) flexibility within clearly defined frameworks. Furthermore, Eadie & Graham (2014) described ECI advantages similar to improved collaboration results of this research, such as improved risk management and focus on quality instead of price.

Programs with less intensive collaboration are less likely to be successful (Lutt et al., 2021):

“a virtual intertwined collaboration combination with a core team consisting of employees of the different participants of the collaboration has a lot of advantages, since decisions are taken together with all parties, consulting the interests of all parties. However, ... the programme objective can well be achieved without having a highly intensive collaboration.” (p.15)

This research does not establish that programmatic procurement must involve ECI, but the preconditions and mindset of ECI and programmatic procurement align well. The results do not provide information on the use of other project delivery methods in programmatic procurements. Some of their aspects conflict with the characteristics of programmatic procurement, so benefits are expected to be compromised.

The study provides a clear split in the approach to the four cases, divided into goal-oriented programs with an emergent reason and rolling programs with vision-led change. As a result, a different programmatic strategy is applied. Different rationales for and benefits expected from programs lead to different strategies (Pellegrinelli, 1997). However, it does confirm that practitioners understand the importance of adapting the program to the context, as described by (Shehu & Akintoye (2009A) and Lycett et al. (2004). However, if different rationales for and types of programs achieve different benefits remain unclear.

Case studies confirm the importance of a programmatic mindset and thinking about program goals instead of their interests or project goals. This importance is substantiated by Pellegrinelli, (1997), Lycett et al. (2004), Shehu & Akintoye, (2009C), and to both project managers and directors over and above the program. This research confirmed that project managers and internal principals must also be included in the program to adopt the programmatic mindset; otherwise, they will continue to pursue their own goals that do not align with the program's goals.

Public clients in this research minimally highlight the suitability of a programmatic procurement approach. At first, contracts are long-term; parties not awarded a parcel are excluded for more extended periods. In addition, SMEs are taken into account, but advice from public clients for contractors not to depend too much on one contract contradicts the fact that the contracts are accessible by SMEs. Second, although public clients state that contracts include sufficient competition, one can question that. In contrast, it is also questionable whether high levels of competition actually decrease benefits. According to Lutt et al. (2021), mini-tenders could be used to increase competition, but the author

argues that this may counter much of the value-creating. On the contrary, with too little competition, it is also questionable whether high levels of competition are desirable.

A common argument against programmatic procurement is higher costs. However, a client should not only relate to the contractual price but also relate to the value and price/quality of the entire supply chain and society. When the context does not have enough potential for value creation, the added value of programmatic procurement can be questioned, as there are possible disadvantages, as described above.

Shehu & Akintoye (2009C) define priority focus as a success factor for programs. However, in contrast, the cases do not obtain any priority focus in advance. Due to the uncertainty of the projects, it seems appropriate to prioritize on a project-by-project basis and not program-wide, as the projects are too different for that, and program-wide measures are tough to calculate and measure.

Programmatic is a new procurement method. Public clients seem to struggle with applying programmatic procurement. The results include inappropriate strategies, and within the flexibility of the framework of programmatic procurement or in successive programs, adjustments have been or will be made to the method.

This research does not provide enough insight into the legal aspects of these contracts. Multiple cases are struggling with the legal aspect of contracts. Vosman et al. (2019) appoint the use of framework contracts as a potential for programmatic procurements. The cases in this research use framework contracts with one contractor per parcel, but some exceed the legal maximum of 4 years for framework contracts. Vosman et al. (2019) describe that a negative perception of regulations is a barrier for programmatic procurements. However, the cases researched have taken the plunge and have passed the tender phase. However, passing the tender does not mean that the contracts are legally fair; As long as no one complains and goes to court, the tender goes through. This chance is slim given the contractors' interest in this type of contract with good prices. The interviewees doubt whether the contracts are legally and ethically valid.

Public clients determine several contractual conditions to manage risks: contract duration, project costs offering process, and contract volume. These contractual conditions might hinder the contractor from fully committing to the contract. The prospect of multi-year market volume may become uncertain, which EIB (2021B) suggests is essential for investments and innovation. Although one case provides reasonable and fair compensation for unrecovered costs when using any of these contractual conditions, the impact on contractors has not been investigated and remains of interest.

The barriers found by Vosman et al. (2019) are very similar to the issues found in this study. However, public clients seem to have found a (partial) solution: Continuous competition, lack of continuity for innovation, insufficient portfolio volume, challenging capacity allocation, low level of trust between client and contractor, different interests of client and contractor, and lack of clear ambitions and strategy. Nevertheless, the barriers mentioned above remain areas of concern for public clients. Furthermore, the following barriers still apply in this research: a tension between requirements and innovation, the implementation process is underestimated, negative perception of regulations, insufficiently trained employees, and no motivation to share knowledge.

6. Conclusion

This research explores which procurement decisions are made and how these decisions affect collaboration and performance in programmatic procurement. The concepts mentioned above and subsequent relationships are explored by conducting four case studies in the Dutch construction industry. This study provides evidence that programmatic procurement, as described by Lutt et al. (2021), Vosman et al. (2019), EIB (2017), and EIB (2021B), contribute to achieving social ambitions. This research identified procurement strategy decisions in programmatic procurements. Furthermore, the study confirms that the procurement strategy largely determines the conditions for collaboration. Collaboration is improved because the interests of both the contractor and the public client are better aligned on achieving performance. In addition, the parties have gained more mutual understanding.

Furthermore, the results confirm that the procurement strategy directly influences performance. The long-term, project-overarching and programmatic focus on strategic objectives enable to achieve combination opportunities, scale advantage, learning capability, knowledge retention. In addition, it enables program-level framing and the use of each other's complementary knowledge. Flexibility in the procurement strategy increases the possibilities in the direct relationship between the procurement strategy and performance.

Finally, the results confirm that procurement strategy indirectly influences performance through collaboration. Contractual flexibility with a clearly defined framework enables the cases to deal with the uncertainties of the long duration and the diversity that the projects imply. This flexibility is exploited by aligning and consulting on project and program levels to suit the contractor and the public clients' interests. As interests are better aligned, exploiting this flexibility becomes more convenient. Furthermore, since parties have a mutual understanding, solutions better suit the interests of both parties.

6.1 Research limitations

The study has several limitations. At first, the cases were still ongoing at the time of writing. Therefore, not all effects can already be detected by public clients. However, in this stage of research, these results provide the best available data.

Only the perspective of public clients at a higher management level is included. The research excludes the lower management level of the public client and the contractor's perspective. By including these, a more holistic perspective could be gained.

Triangulation has proven to be difficult between the document study and the interviews, and between multiple interviewees. The document study and the interviews do not focus entirely on the same; thus, the triangulation between the document study and the interviews is complicated. The document study is more focused on established procurement information. In comparison, interviews are more focused on the personal view on this established and the subsequent collaboration phase. The limited interviewees covered a broad process and multiple managerial roles; Still, by doing this, more ground could be covered, which suits the exploratory nature of the research.

In addition, relationships are obtained from a limited amount of cases. Also, the cases applied a relatively similar approach through the use of ECI, which influences collaboration intensively. Therefore, the indirect relationship of procurement strategy to performance through collaboration is not generalizable to programmatic procurements with project delivery models. Direct relationships seem to be relatively unrelated to the collaboration

in the contract and, therefore, are more generalizable to all programmatic procurements.

6.2 Theoretical and managerial implications

The findings of this study provide an empirical exploratory insight into programmatic procurements. This provides guidance in the scientific context for follow-up studies. A holistic understanding of how procurement strategies to influence collaboration and value creation is reached by providing a systemic perspective. This enables public clients, program managers, and procurement officials to make more thoughtful decisions, since they understand how procurement strategy decisions might affect collaboration and performance. In addition, one can infer whether programmatic procurement adds value in certain situations and better apply programmatic procurement in high-potential contexts. As a result, its use can be improved.

6.3 Further research

Since the research is very exploratory, a broad range of further research can be identified. At first, similar research from the contractor's perspective provides more in-depth insight into the empiric and can extend the knowledge base. Second, insight into the legal and financial aspects of omission of price from the tender can create a basis for procurements with less competition and more focus on other aspects. Third, it could be interesting to study the applicability of other project delivery models in programmatic procurement and the subsequent effect on value creation. Fourth, given that this research focuses on cases on contracts involving a single contractor per parcel, it may be interesting to study differences in value creation in contracts between single or multiple contractors per parcel. Furthermore, the price/quality ratio throughout the supply chain could be compared in programmatic and project-based procurement.

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