Toward Harmony: Enriching research into a future equilibrium between trust and control in the pricing process of a two-phase approach.

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Abstract

In the contemporary construction industry, determining the most effective approach for pricing in projects is an ongoing challenge. The emerging trend of deferred pricing is explored where feasible pricing is encouraged in the two-phase approach. This research focuses on this challenge by examining the balance between social and formal control in the pricing process of a two-phase approach. Based on academic background and incorporating insights from nine relevant two-phase projects, a comprehensive list of pricing mechanisms was compiled and categorised into social control, process control, and output control based on their respective social or formal approach. This set of mechanisms is validated and scaled through a focus group, followed by case study interviews to investigate the impact of contractual pricing mechanisms on projects and the dynamics between the involved parties.
The research findings reveal that several crucial conditions influence the potential balance between social and formal control in addition to the established pricing mechanisms. These conditions include the willingness to collaborate, transparency among the involved parties, the individuals within the project and their respective organizations, and the complexity or novelty of project components. Notably, the selected pricing mechanisms significantly influence the dynamics within a project, with most case studies demonstrating a shift from process control to more social control. Additionally, these case studies found that the initial approach of social or formal control in the project affects the final dynamics between the parties.

Index Terms – Deferred pricing, Two-phase contracts, Price determination process, Control vs Trust

Introduction

In recent years, using construction teams has gained significant traction and emerged as a popular approach within the construction industry. Since 2016, the adoption of the construction team model has experienced rapid growth, driven by its potential to enhance collaboration, improve project outcomes, and increase overall efficiency (UNETO-VNI, 2018). However, a critical challenge within the industry is determining the most effective approach for the pricing phase of construction projects. Market stakeholders are currently seeking a well-defined and efficient pricing process that aligns with the collaborative nature of construction teams. This directly addresses the research problem at hand. While traditional contracts offer clear definitions for pricing, deferred pricing lacks a standardized methodology, leading all parties to continually attempt to reinvent the wheel, resulting in various forms of pricing emerging. There is a pressing need to develop a solid approach applicable across diverse projects concerning pricing. To delineate this approach, the following research question has been formulated: "What does a process of deferred pricing look like, whereby there is a balance between social control (trust) and formal control (control) to achieve (project) objectives?"

Rijkswaterstaat suggests that a two-phase approach with deferred pricing can help address the pricing challenge within construction teams. Furthermore, they argue that this approach can foster a financially healthy, innovative, and competitive civil engineering and construction sector (Rijkswaterstaat, 2019). In an industry marked by intense competition among contractors, the two-phase approach contributes to the pursuit of integrated collaboration, striking a balance between competition-based and collaboration-based strategies. Research by Lahdenperä (2010) supports this notion, indicating that traditional approaches often result in adversarial relationships, particularly in contracts with competitive pricing. Within the context of the two-phase approach, deferred pricing emerges as a valuable tool for controlling costs. By deferring price determination until more comprehensive information and risks are known, greater control over incurred costs can be achieved. Additionally, this approach offers the advantage of increased certainty through early discussions of risks and the formulation of mitigation measures within the collaborative environment (Duijverman, 2022).

Figure 1 presents a schematic representation of a two-phase approach, as outlined in the paper "Fair Work for Fair Money" (Huith, 2021). The blue-outlined piece refers to the part of the two-phase approach primarily examined in this research. It illustrates the two award criteria alongside the reduction in participants throughout the process.

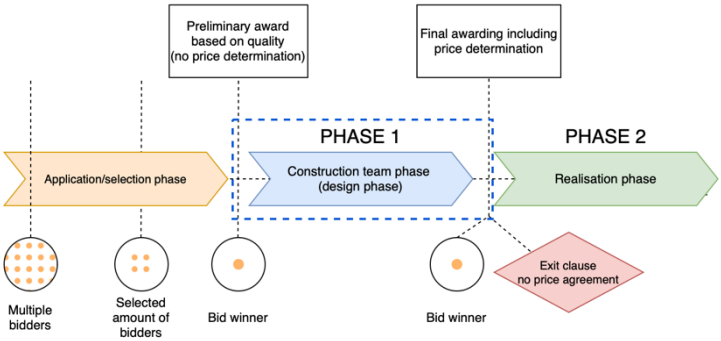

Figure 1.; Schematic representation of a two-phase approach

To provide a more comprehensive understanding of the research focus, which is the price formation in a two-phase approach, a different methodology is employed compared to traditional contracts that establish a fixed price at the project's outset. In the two-phase approach, price mechanisms are applied. A price mechanism, or in other words, a price-related criterion, is defined by the researcher as follows: In the context of procurement, a price mechanism refers to a methodology applied to determine the price of a project or service. This often involves specific rules and criteria used to evaluate bids and determine the final price awarded to the winning bidder. This research explores the various price mechanisms that can be implemented during the price formation of a two-phase approach, contributing to the feasibility of a deferred price determination. To understand how these mechanisms can influence price formation, this research focuses on the balance between control and trust among the parties involved in the price formation process as an exploration and in-depth analysis. This means that the research explores how a social aspect (trust) can be approached to foster greater collaboration between the client and contractor and what needs to be established in advance (control) to ensure that the client maintains control over the (price formation) process.

This paper begins by discussing the chosen methodology for the research. A justification of the background for this research, including related definitions, will follow. The first part of the background will focus on control versus trust, examining definitions and providing additional information. It will also delve deeper into the concepts of cooperation, competition, and coopetition in the two-phase approach. Furthermore, this section will establish the foundational definitions and explanations of social control (leaning towards trust), output control (leaning towards control), and process control (a combination of both). The theoretical framework, which serves as the basis for this research, will also be explained in the background. The background section will conclude with a discussion on the "legal framework," assessing the validity of the two-phase approach in conjunction with the price mechanisms and identifying crucial prerequisites for compliance with legal regulations.

The remainder of this research article will focus on the research design, interpretation, and implications of the results, touching on any relevant points, including potential limitations and areas for future research. Finally, the last chapter will present the key findings, interpretations, and potential limitations. The chapter will conclude with recommendations, followed by acknowledgements, appendices, and a summary of available data.

Methodology

This chapter provides a comprehensive explanation of the research design. Initially, the research design is outlined, followed by an overview of the overall research strategy. Subsequently, the data collection methods are discussed, including an in-depth strategy from the literature review and case studies. Finally, the technique employed to analyse the collected data is explained.

I. Research Design

The literature review revealed a scarcity of studies focusing on the deferred pricing process in two-phase contracts. Consequently, this research can be classified as exploratory research aimed at gaining deeper insights into this pertinent and current topic. An inductive research approach was adopted to explore specific elements, namely pricing mechanisms. This approach leads to the generation of more general findings that can eventually be applied to projects beyond the scope of this research. The primary data for this research will mainly be derived from project stakeholders, including clients, contractors, and engineering firms. By gathering input from these entities, the research is qualitative, emphasising understanding perspectives rather than focusing on variables or numerical data. The data obtained from the case studies is categorised as qualitative, employing a multiple embedded case approach, which will be further clarified in the research strategy. The overall research strategy will provide additional context and clarification regarding these considerations.

II. General research strategy

The research strategy adopted is based on the elements outlined in the research design. The research consists of three main blocks schematically depicted in Figure 2.

Block 1A focuses on the theoretical framework, which encompasses an overview of existing price mechanisms applicable to the price formation process. Additionally, it presents the academic categorisation related to trust and control, providing insights into the mutual dynamics of social and formal control. The framework interweaves social and formal control categorisation with known price mechanisms. This framework serves as the foundation and guiding structure for the subsequent stages of the research.

Block 1B expands the theoretical framework by examining nine relevant ongoing two-phase projects to identify the contractually implemented price mechanisms. A wide range of projects was investigated, including three infrastructure-related, four water-related, and two utility-related projects. Based on this diverse input, the research mapped out the price mechanisms that had not been considered for this research and added them to the existing list of price mechanisms when they were applicable.

Block 2 involves a focus group session where the identified price mechanisms are validated and scaled based on the categorization established in the theoretical framework in block 1A. To ensure a common understanding, the researcher maps and communicates the definitions of the price mechanisms to the participants during this session.

Block 3 comprises the case studies, employing a multiple-embedded approach that aligns well with exploratory and qualitative research focusing on phenomenological descriptions (Scholz & Tietje, 2012). The research aims to compare different types of case studies. In multiple-case research, similarities between the cases are necessary for meaningful comparisons (Stake, 2013). The analysis occurs within each case and across the different case studies, as Yin (2003) described.

Quantitative data is utilized to support the acquisition and validation of qualitative data. The design of multiple case studies allows for a comprehensive rationale of the findings, with validation obtained through interviews with multiple parties involved in each project (Yin, 2003). To illustrate the multiple case study approach, Figure 2 provides a schematic overview based on the three phases described by (Yin, 2003).

Following the completion of the third block, the analysis and conclusion process will involve comparing the outcomes of the individual case studies. These outcomes, combined with the earlier blocks, will form the basis for concluding, identifying limitations, and providing recommendations for the research.

III. Data Collection Methods and Depth Strategy

Various data collection methods were employed throughout the research to gather the necessary data to achieve the main objective and provide informed recommendations. The mapping of the theoretical framework involved desk research and a semi-systematic literature review. The semi-systematic review aimed to provide a comprehensive overview of the research area, particularly suitable for multidisciplinary topics investigated by different researchers. The methodology followed Snyder's (2019) approach, involving designing, conducting, analysing, and writing the review chronologically. During the mapping of price mechanisms, additional practical mechanisms emerged from the nine relevant two-phase projects initially not identified in the literature. These additional mechanisms were incorporated, through block 1B, into the outcomes of the theoretical framework and presented during the focus group meeting. In this focus group meeting, the established pricing mechanisms were validated and scaled based on the categorisation from the theoretical framework.

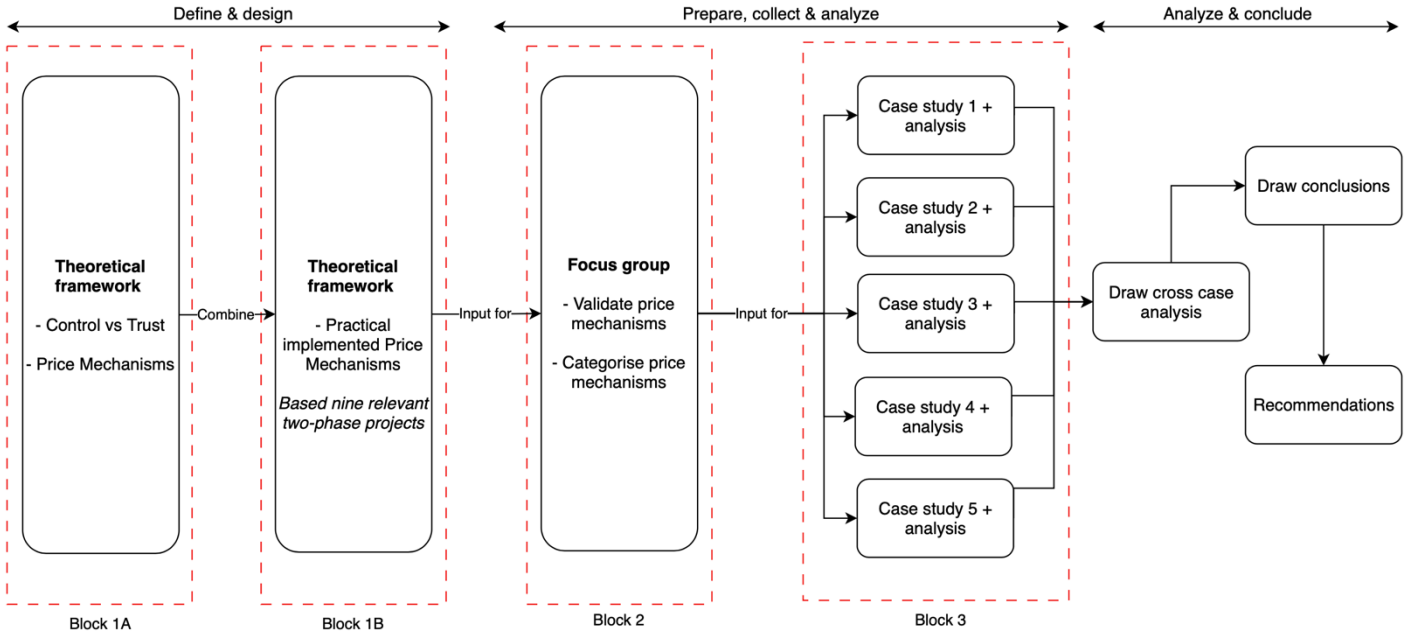

Figure 2.; Methodology scheme

The next step involves conducting interviews and utilizing case studies for field research on the balance between trust and control in the pricing process. Furthermore, the interviews aim to compare the outcomes of the price mechanisms. Through the interviews, the influence of a price mechanism on mutual dynamics is mapped out, determining whether it leans more towards social control (trust) or formal control (control). Based on these findings and comparisons, whether the output of the literature or the focus group aligns with how the influence of price mechanisms emerges in practice will be analysed. The results of the case study interviews can thus serve as validation of the findings obtained from the literature and focus group.

The interviews will help gather input from project stakeholders and address any contradictory findings or confirm consistent results, as Yin (2003) outlined. The final step of this research, and thus the main objective, is to formulate a recommendation regarding pricing mechanisms on the degree of trust versus control needed to make deferred pricing feasible and operational.

IV. Case-studies

It is essential to determine the case study that the projects meet several conditions to qualify as a case study. Below are the preconditions against which the projects were assessed.

- The project must have a construction team phase or work with deferred pricing.
- The project must be fundamentally designated as a two-phase approach.
- It must be projects where the initial procurement was not done privately but open through a ("public tender") process.
- The project should be tendered, preferably with an advanced construction team phase or after the final price has been determined.

Based on these preconditions, the number of projects has been reduced from nine relevant projects that were previously cited to five projects that meet the established criteria for case studies. The excluded projects and how this process was carried out are shown in Annex I. The projects that met the preconditions are:

- Large-scale Dike Reinforcement project
- Polder Pumping Station project
- Provincial Support Point project
- Urban Dike Reinforcement project
- Large Infrastructure project

This research examined these projects in more detail, examining the pricing process and the relationship between the client and contractor. Annex II presents the most relevant information regarding these case studies. The analysis techniques applied for this research are explained in section V.

V. Data analysis techniques

The research relies on data collection through documents, surveys, and interviews. It is essential to identify the data analysis techniques employed in this research.

A summary will outline the step-by-step construction of the document analysis. The process began with identifying relevant sources, focusing on academic papers, handbooks, and field-related information sources. Reports, presentations, memos, guidance documents, manuals, (price) containment plans, and email correspondence were utilized. A selection of documents was made, including those from case studies that seemed relevant to continue the research and scientifically relevant documents.

The research focuses on the two-phase approach and the pricing process. Regarding the two-phase approach, specific attention is given to relevant aspects such as price formation and the interaction between trust and control. Due to limited data availability regarding the price formation process, the concept of (deferred) pricing in other sectors was examined. The data was critically assessed, and pieces lacking relevance were excluded. In cases where outdated sources were utilized, recent sources were sought to confirm or challenge the information. From this broad overview, a deeper examination was conducted to define the critical aspects of the research. The document analysis takes a convergent approach, moving from the broader perspective to collecting specific data on the identified aspects. The collected data is then reviewed and focused on a specific topic through a process called coding. Following the coding, the findings are synthesized and presented in this research.

The analysis of the interview data employs thematic analysis, a predominant qualitative analysis method (Alsaawi, 2014). Thematic analysis is a systematic approach that aims to identify, analyse, and report patterns (themes) within the obtained data, providing a comprehensive organization and description of the dataset (Braun & Clarke, 2006). This analytical method seeks to explore and comprehend the recurring themes present in the data. The thematic analysis framework employs a deductive semantic approach, aligning with predetermined themes derived from the literature review.

Background

A sub-question of this paper concerns an understanding of the current academic literature regarding the main topic, finding a balance in deferred pricing of two-phase contracts. To identify the theoretical framework, a focus is put on first a comprehensive background has been developed concerning the classification of trust and control in the context of the price formation process. These findings form the foundation for categorising the second component, pricing mechanisms. The results obtained from this theoretical framework provide the basis for addressing the primary research question of this research:

"What does a process of deferred pricing look like, whereby there is a balance between social control (trust) and formal control (control) to achieve (project) objectives?"

Trust vs control:

Various modes of interaction exist between the contractor and client within project engagements. The focus of this research, the two-phase approach, represents coopetition. This is evidenced by the initial competition based on quality, followed by the selected party working jointly with the client to develop the project documents. Coopetition is characterized by trust and cooperation while acknowledging the importance of control in the process.

Trust and cooperation are crucial together if a solution is to be reached by the client and contractor. This also concerns a sensitive bond within the pricing process of inter-organisational relationships. It is essential to zoom in on the specific concepts to gain knowledge of both concepts and thus understand what they mean.

First, trust does not concern a single concept but is composed of multifaceted dynamics influenced by the relationships between people or organisations. In his book, Smolders (2019) points out that trust is composed of several layers that reflect the level of trust.

There are a wide variety of definitions regarding trust. For this research, the following definition is adopted: "Trust is the willingness of a party to be vulnerable to the actions of another party based on positive expectations regarding another's conduct" (Smolders, 2019).

In this research, control (formal control) refers to the principal's supervision, assessment, and direction over the contractor's activities, decisions, and performance. Specifically, the context of the price formation process pertains to the contractor's activities related to cost estimations, price setting, and cost control. At this point, an assumption is made that control arises from distrust within an organisation or involved people. Smolders (2019) states that distrust is based on self-assured negative expectations about another's behaviour. An in-depth exploration of the concepts of trust (social control) and control (formal control) are provided in the categorisation.

Lewicki et al. (1998) reflected the same in their paper, stating that trust comes more from hope between parties and distrust from anxiety that may occur during a project process.

Research has shown that in inter-organisational relationships, such as those commonly found in the construction industry, the level of trust of primary contractors is often more sensitive to the client's divergent actions or behaviours (Wong & Cheung, 2004). These barriers in the trust relationship create an imbalance that complicates collaboration in a two-phase contract.

The question posed is how to get rid of formal control in the projects from the point of view where there is, to some extent, distrust between the client and contractor. According to Vosman et al. (2020), transparency answers this question. Transparency can be applied over many different components. However, considering this research is about transparency regarding the costs and risks, it is seen as a proper solution to strive for an equal and transparent collaboration between client and contractor (Vosman et al., 2020).

The remaining issue relevant to trust and control in this research is the containment of possible strategic behaviour. This can emerge at various project stages and significantly impact the final level of trust. Strategic collaboration is known in the market as a possible area where partners' strategic behaviour can occur, so there needs to be sufficient trust in the collaboration from other partners (Das, 1998). Strategic behaviour can emerge when, for example, the contractor focuses on obtaining additional work later in a project, where extra money can be earned. This does not benefit the relationship of trust and cooperation.

Categorisation of trust vs. control

The literature review revealed that trust and control within construction projects should be complementary concepts. In many cases, stakeholders in a project strive for collaboration, but the level of control exercised often depends on the strength of the relationships between the involved parties. For this research, a classification system has been developed to balance steering control and trust within the pricing process. This system serves as a reference point for analysing the studied price mechanisms and for the ultimate findings of the research. In the quest for a balance between a certain level of trust and control, it is essential to understand that certain key factors encourage social control while others promote formal control.

Research by Stevens et al. (2015) suggests that optimal performance in a project is achieved when trust (social control) and distrust (formal control) are balanced, which is highly dependent on the context of a project. This theory has led to a generic model for the pricing process, with extremes of maximum trust and control (Smolders, 2019). When there are two extremes, there will be a grey area in the middle where there is no clear understanding of whether there is social control or formal control. In this context, maximum trust refers to a client-contractor relationship based solely on trust without exerting formal control. In this case, trust promotes a solid relationship and places more value on collaboration. Conversely, when everything is contractualised, it tends to result in a controlling relationship between client and contractor. The findings in this chapter demonstrate how both extremes emerge and are used in the pricing process.

Further elaboration of this classification, aimed at mapping trust or control, aligns with the framework proposed by Eriksson & Laan (2007), which emphasizes three aspects of control in a project: social control, process control, and output control.

Social Control

The most suitable form of control in collaborative relationships is social control, which promotes trust and engagement (Das, 1998). Social control can be defined as building a common organizational culture that encourages self-regulation (Aulakh & Gencturk, 2000). When neither output nor process control is suitable, a lower level of control is obtained. This occurs when the technical specifications and product characteristics are developed in collaboration between the client and contractor. This typically entails social control, but to some extent, also process control, allowing for a high emphasis on trust, a moderate emphasis on authority, and a low emphasis on price (Eriksson & Verlag, 2006). The focus is on soft parameters based on trust and cooperation, placing this categorisation in Figure 3 in the left quadrant and focusing on maximum/(high)average trust and (low)average/low control.

Process Control

In situations where the emphasis is on authoritative control while still promoting trust through the absence of fixed prices, the focus is on process control-based soft parameters. The compensation of the supplier's costs based on worked time and the costs of materials used (reimbursement compensation) entails process control (Eriksson & Laan, 2007). Process control refers to how the client controls and influences the contractor's behaviour or the methods used to achieve specific goals within a collaborative relationship (Aulakh & Gencturk, 2000). Essentially, process

control involves regulating and guiding the activities and behaviour of the involved parties to achieve the intended goals of the collaboration. This means that during the process, the client and the contractor steer for average control and trust within the project through regular contact and interim insight into progress. Here, there is more steering on establishing a mutual bond than in output control but more controlling than social control. As a result, Figure 3 shows that process control is in the middle of the figure.

Output Control

Output control emphasizes price, especially when detailed specifications require a high level of price control. This form of control is efficient when measuring goal achievement, emphasizing the focus on tender prices. A compensation system that rewards the supplier for its output, such as a fixed price for a delivered product, indicates output control (Eriksson & Laan, 2007). Clients facilitate competition and emphasize price, and short-term benefits, according to Anderson & Oliver (1987), are related to output control. Specifying performance enables a strong emphasis on price. The pricing mechanism is closely related to output control, defined as the extent to which the client controls the results or outcomes produced by the contractor (Aulakh & Gencturk, 2000). Output control is efficient if it is possible to measure goal achievement. Here, the client only tests for project outcomes, and no interim involvement is in progress. In this way, there is less focus on building a bond between the parties, as in social and process control, and purely on the outcomes of the whole process. As a result, Figure 3 shows this category is positioned in the right quadrant and focuses on low/(low)average trust and high/(high)average trust.

Figure 3 depicts the subdivision of the control mechanisms as previously substantiated. From this point, it serves as a guiding framework for mapping how the price mechanisms are scaled and compared based on the literature, focus groups, and case study interviews.

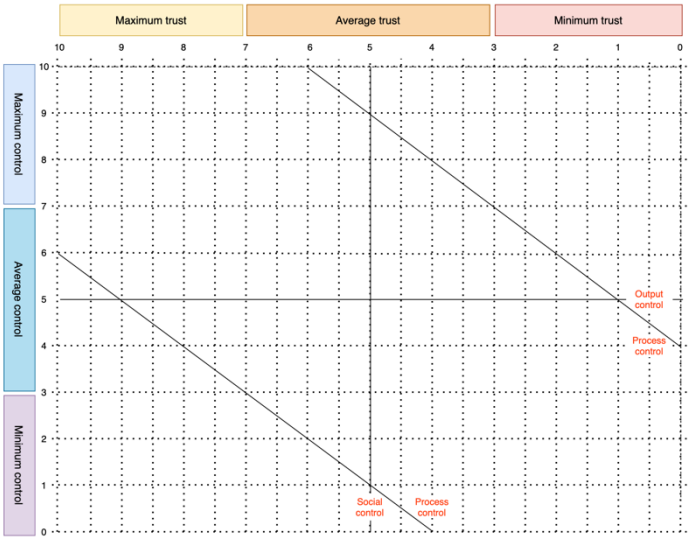

Figure 3.; Core graph control mechanisms

Price mechanisms

Pricing is a crucial yet complex aspect of construction projects and forms the basis for the second part of the theoretical framework, namely price mechanisms. Given the legal requirements of procurement law, price mechanisms hold significant importance in construction projects. This research focuses on price mechanisms relevant to deferred pricing within the two-phase approach. These mechanisms serve as instruments for clarifying the dynamics among the various parties involved in construction projects. Through an explanation, a rationale for the different price mechanisms has been mapped out.

It is essential to acknowledge that projects often employ combinations of price mechanisms, but in this research, they are treated as individual mechanisms.

- Tariff list (Material)

Unit price for material is a fundamental cost measurement method in construction, where costs are estimated on a unit basis, such as cost per square foot or linear metre. Unit pricing is a crucial cost estimation method in construction, providing accurate cost estimates, budget control, comparative analysis, and support for purchasing decisions. Although there are challenges, price per unit's cost predictability and transparency benefits make it a valuable tool in construction cost management. Typically, this mechanism consists of multiplying prices by notional quantities, where the charge should be sufficiently fixed to allow for the correct estimation of quantities. The advantage of this mechanism is that it is objective, with prices and rates arrived at through the market process. On the other hand, the disadvantages are that price may become decisive in the award of a contract and that this mechanism also allows for strategic behaviour. As for cooperation, it is expected to have limited returns.

- Price containment plan

Price control methods constitute another pricing mechanism, and a distinct feature in contrast to the previously mentioned mechanisms is that it does not score based on Euro amounts but instead relies on a qualitative assessment. When examining the characteristics of this mechanism, it is evident, as mentioned earlier, that it does not assess pricing directly but focuses on a qualitative score. Within this framework, the contractor is afforded the flexibility to adhere to budget constraints and implement transparency. Notably, strategic bidding is mitigated through the promotion of transparency and collaboration. This transparency, in turn, fosters equitable pricing and, consequently, fair remuneration for fair work.

However, this mechanism also has less favourable aspects, notably the absence of clarity and market dynamics regarding pricing during the procurement process. According to legal precedents, utilising "price control methods" as a price component in the bidding process is prohibited. Consequently, an alternative mechanism must always be integrated for legal compliance.

- Methods of monitoring (process)

The remaining pricing mechanisms identified can also be applied as pricing components in the research. The distinction between these two concepts lies in the fact that a pricing component allows for competition during the tendering process. The following mechanisms function more as process monitoring methods that are crucial for maintaining control over the cost element of the project throughout the process.

- Collegial Peer Review

Firstly, collegial peer review involves monitoring costs based on project team or organisation members. This may manifest as colleagues from the contractor or client assessing the current state of costs in a project.

- Open Budget (Unrestricted)

An unrestricted format open budget is similar to a detailed open budget. However, this monitoring method allows for free formatting, where the client only requests transparency in costs without specifying how the open budget should be structured. The distinction between these approaches will become more apparent in later stages when examining a trust or control-oriented approach in the project.

- Cost Table

A cost table consists of a group of experts who assess the project's costs. This can involve the client appointing an expert, the

contractor appointing an expert, and both parties jointly appointing a third expert. These parties collectively examine how costs are managed during the project. A cost table can also be employed when a client and a contractor, during one-on-one price formation, fail to reach a reasonable price. In such cases, it is usually contractually stipulated that the cost table's price must fall within a certain margin of the bid to be considered a valid offer.

- Project budget (fixed price)

Fixed price contracts are a prevalent procurement method in the construction industry. These contracts establish a predetermined, unchanging price for the completion of a construction project. Characteristics of this pricing mechanism are that the client sets a price, and there is no competition based on price. This results in the fact that competition takes place only on quality, and there is certainty regarding the maximum price of the work. On the other hand, there is no incentive for the contractor to seek cost savings actively, but there is a risk that the client will offer more quality than could be provided.

- Target budget

Target budgeting is a financial strategy employed in construction to establish clear and measurable financial goals for a project's planning, execution, and closeout phases. It is an effective management technique used in manufacturing for decades to achieve cost predictability (Zimina et al., 2012). Besides that, it is a vital tool for delivering them on time and within budget. This price mechanism is characterised by the client setting a maximum price for the project, in which the contractors conform to the fact that they realise the design for a maximum of the corresponding amount. The advantages of this mechanism are that there is room for (price) optimisations during the design phase, and there is certainty regarding the price. The downside of this mechanism is that there are no market forces regarding the price.

- General costs profit & risk (AK W&R)

The AK W&R, or General costs profit & risk, represents a fixed percentage applied to prices and rates relevant to the specific project. An advantage of this percentage is its ease of objective evaluation during the tendering process, as it is derived collaboratively with market participation. However, the AK W&R is not without its disadvantages. As observed by CROW (2020), empirical evidence from practical instances indicates that the allocation percentages vary, potentially resulting in adverse implications for smaller entities. Furthermore, this mechanism does not ensure price certainty for the overall costs and may encourage strategic behaviour, as bidders may submit lower percentages to seek subsequent compensation later.

- Exit regulation

The exit arrangement relates to the settlement of a project. This can mean that if the commissioning party and the contractor have not reached a price agreement during the one-to-one pricing and a review by, for example, a cost table has not been successful, the two parties can get out of the contract. During a two-phase approach, the exit arrangement is the last step before a possible realisation starts; this pricing mechanism can be applied at the end of the construction team phase regarding the price component. Other elite arrangements can also be made; however, this research focuses only on the cost element.

- Price for fixed parts

Price for fixed parts concerns the concept whereby a price can be established for fixed parts that have already been worked out. This results in limited space for solutions and coordinated cooperation on fixed parts. The advantages of this mechanism are that it is simple and objective, where there is price certainty. Also, the chance of strategic bidding is slight since it involves components outside the design phase. On the other hand, the price may be decisive in the award, and interfaces may need to be managed well since the prices are already fixed.

Legal framework

Within procurement law, it is crucial to consider the legal frameworks. Following the previously mentioned background regarding the two-phase approach in combination with a construction team agreement, this approach can eliminate many current problems, such as lack of cooperation and risk allocation. However, it should be noted that every project is unique; therefore, it depends on the client which choice is made for the construction organisation form, contract form and tender procedure (Jansen, 2009).

A side note to the construction team story does arise for this legal framework. Beyond these advantages, using a construction team agreement also has certain complications. Research by Masseur (2023) suggests that one problem arises: this agreement violates the prohibition on post-tender negotiation. The question that arises is how this can be resolved. Masseur (2023) refers in his paper to Chao (2021): A solution to this problem has been devised, whereby the procurement of the construction team phase is carried out simultaneously with that of the realisation phase of the project." (p.7). It follows that, in this form, the pricing process cannot be determined during the process.

However, this is slightly different, as pricing mechanisms can be used and applied both during the tendering of the construction team phase and during the 1-to-1 price formation. Here, a price component is still tendered, but the final price will only be finalised after the construction team phase. This takes care of the complication of construction team tendering.

Results

Price mechanisms

The initial phase of the findings is derived from the theoretical framework. Upon investigating guidance documents and nine relevant two-phase projects identified as "potential" case studies, it became evident that several pricing mechanisms were absent from the list previously compiled. Further examination of various contract documents and consultations with contract advisors identified additional pricing mechanisms. In addition, the researcher took a comprehensive view to identify mechanisms that could be relevant but are not found in the literature or current projects. These pricing mechanism additions are validated in the second block of this research through a focus group meeting.

- Tariff list (Equipment)

For this research, two categories of tariff lists were employed, commencing with the equipment tariff list. This mechanism is regarded as a method for measuring costs in construction, wherein costs are proportionally adjusted based on the quantity of man/machine hours necessitated during the project's realisation phase. Using this mechanism, predictability is instilled, as the involved parties possess visibility into the machinery and person-hours requisite for the project's execution. The merit of this mechanism lies in obliging the parties to elucidate the costs associated with their equipment at the project's inception. However, a drawback of this mechanism is that contractors may strategically tender bids to maximise returns from a given project.

- Construction team phase costs

The cost mechanism in the construction team phase exclusively centres on the expenses anticipated by a party during the construction team phase. These costs are unrelated to those incurred during the realisation phase. Given the difficulty of accurately estimating these costs in advance, competition among parties ensues based on the aspects they are willing to investigate during the construction team phase. An advantage of this mechanism is that it satisfies the pricing component in the tender, allowing the contractor considerable freedom in determining the

extent to which they wish to conduct detailed investigations into project elements. Keeping costs low, however, may lead to significant uncertainties and associated risks during the realisation phase. This represents the flip side of the mechanism. Additionally, the costs incurred during the construction team phase constitute a fraction of the overall contract sum, potentially allowing strategic bidding to be offset in the subsequent stages of the project.

- Methods of monitoring (process)

The remaining pricing mechanisms identified can also be applied as pricing components in the research. The distinction between these two concepts lies in the fact that a pricing component allows for competition during the tendering process. The following mechanisms function more as process monitoring methods that are crucial for maintaining control over the cost element of the project throughout the process.

- External Peer Review

External audits operate similarly to collegial peer review, but the key difference lies in the external perspective. In this case, an external entity, such as a fellow contractor or engineering firm, assesses whether all components proceed according to the required costs. The focus here is on an external evaluation by a company not involved in the project.

- Open Budget (Detailed)

A monitoring technique highly relevant to costs is an open budget, which can take two forms. Firstly, there is a detailed open budget, where the client requests transparency and the submission of an open budget. However, this variant requires the client to request a significant amount of data to be included in the open budget, resulting in a highly detailed presentation.

- Fixed profit percentage

A fixed profit percentage is also a possible price mechanism. With this price mechanism, contractual agreements are made in advance between the contracting party and the contractor. This agreement determines what percentage of the contract sum will be taken as a fixed profit percentage if the contracting party ensures that they stay below the intended maximum budget during the realisation phase. They receive a fixed percentage of this without performing the work. This pricing mechanism aims to increase optimisation from the contractor's side.

- Full reimbursement of expenses (Carte Blanch)

Full cost reimbursement is a pricing mechanism where the one-to-one pricing and realisation phase fully reimburses all costs incurred by the contractor. The contractor does not have to apply open budgeting or other monitoring techniques when this pricing mechanism is included individually. All the contractors must do is submit the receipts, but only after the commissioning party fully covers these costs.

- Price cap

The price ceiling is the last pricing mechanism investigated for this research. It is broadly similar to the task-setting budget; however, legally, there is a big difference between these two pricing mechanisms. Compared to the task-setting budget, the price ceiling ensures that the total sum of costs does not exceed the amount included in the price ceiling. In this way, a contracting party ensures that the project's cost does not exceed the project's budget.

Based on the established price mechanisms derived from the literature and relevant projects, twelve price mechanisms and five (price)monitoring mechanisms have been identified. These have been roughly scaled according to social, process, and output control categorisation. Figure 4 illustrates the differentiation between the three control mechanisms using a colour palette. Table 1 presents the categorization of each individual price mechanism, including the substantiation of mechanisms per category. In the subsequent phase, the focus group will provide a more comprehensive explanation for each pricing mechanism within one of the three categories based on their expertise.

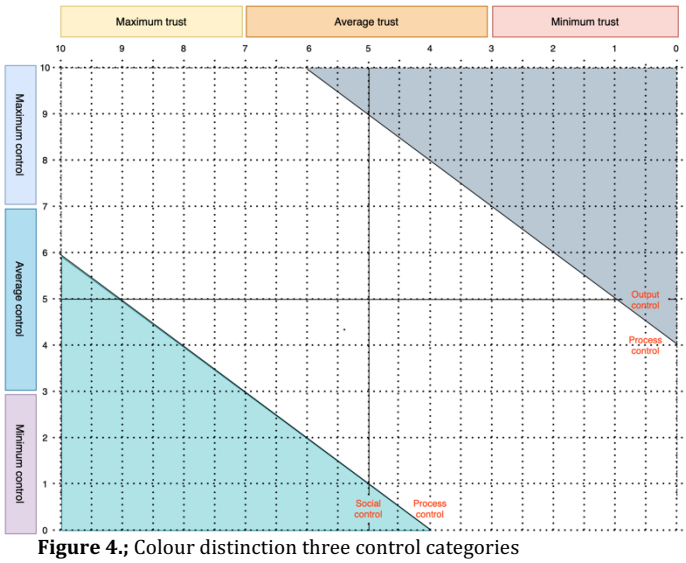

Figure 4.; Colour distinction three control categories

Nr.	List of price mechanisms	Score (Trust / control)	Nr.	List of pricemechanisms	Score (Trust / control)
1a.	Tariff list (Equipment)	.. / ..	4e.	Cost table	.. / ..
1b.	Tariff list (Material)	.. / ..	5.	Project budget (fixed price)	.. / ..
2.	Construction team phase costs	.. / ..	6.	Target budget	.. / ..
3.	Price containment plan	.. / ..	7.	General costs profit & risk (AK W&R)	.. / ..
4.	Methods of monitoring (process)	.. / ..	8.	Exit regulation	.. / ..
4a.	Collegial peer review	.. / ..	9.	Price for fixed parts	.. / ..
4b.	External peer review	.. / ..	10.	Fixed profit percentage	.. / ..
4c.	Open budget (detailed)	.. / ..	11.	Full reimbursement of expenses (Carte Blanch)	.. / ..
4d.	Open budget (unrestricted)	.. / ..	12.	Price cap	.. / ..

Table 1.; Allocation price mechanisms control categorisation based on literature

Substantiation of price mechanisms

Social control

Based on the literature by Eriksson & Laan (2007), the following price mechanisms are classified under social control. Compensation solely for the contractor's costs based on the time worked (Tariff list (Equipment)) and "Carte Blanch," where all costs are covered, indicates social control from the client. These mechanisms primarily emphasize mutual trust, with less control present.

Process control

Based on the literature by Eriksson & Laan (2007), the following price mechanisms are classified under process control. In the case of the price containment plan, the client assumes an authoritative controlling role in the project, with a certain level of trust and a degree of control over the entire project process. The project monitoring mechanisms function more as process monitoring methods crucial for maintaining control over the cost element of the project throughout the process. As the name suggests, these monitoring mechanisms focus on process monitoring, as they are observed during the construction team phase of the project to keep track of the cost element of the construction team and the ultimate realization phase.

The AKW&R (General costs profit & risk) and fixed profit percentage are classified under process control because the fixed percentage depends on the pricing process and the eventual costs incurred. As it involves a percentage, authority is expected to lie

with the client during negotiation, but it operates based on transparency and fair payment for work done.

The exit regulation, similar to the price containment plan, does not establish a fixed price but controls the process. The exit arrangement is applied when a definitive price cannot be determined. As a process control, the contracting party has authority in the price determination process. However, it still operates with a certain level of trust as it serves as the last possible recourse. These mechanisms indicate that process control is an element of authoritative control, yet trust is also involved as the price component is not yet determined.

Output control

Based on the literature by Eriksson & Laan (2007), the following price mechanisms are classified under output control: material cost pricing (Tariff list (Material)), fixed price (a compensation system that rewards the contractor for output), construction team phase costs, and price for fixed parts. These are all categorised under output control because the client has prior price control in each case.

The target budget for project costs and the project cap, which involves determining a price ceiling and, thus, a maximum budget for the project, are identified as output control because they entail price control by the client. According to this categorization, it can be inferred from the literature that the price mechanisms in the output control category emphasize formal control, working based on control rather than trust.

Focus Group meeting

The second block of the research, based on Figure 2, involved a focus group meeting to validate and position the pricing mechanisms from the theoretical framework. Six experts from Arcadis participated in this validation process to ensure the credibility of the focus group. Annex III provides an overview of the questions posed and the initial configuration of the matrix.

The initial stage of the focus group meeting focused on validating the formulated pricing mechanisms, allowing experts to offer substantial comments and observations, particularly from a legal standpoint, and to address any ambiguities. Subsequently, the individual pricing mechanisms were evaluated. It is important to note that during this evaluation, the experts were instructed to position the mechanisms based on the researcher's definition and the assumption that each individual pricing mechanism would be applied in a project. This positioning did not consider legal feasibility, as not all pricing mechanisms can be independently applied to projects. The decision to focus on individual mechanisms was driven by the researcher's intention to assess whether each pricing mechanism tended toward a perspective of control or trust.

The positioning exercise revealed that the experts assigned different scales to specific pricing mechanisms than the scaling derived from the theoretical framework. An additional step was incorporated into the research to ascertain the most valid scaling by comparing the theoretical framework and the experts' focus group. The impact of each pricing mechanism on the trust/control dynamics between the client and contractor was identified through case study interviews.

The expert evaluations indicated that most pricing mechanisms were equally distributed among the three categories. All process monitoring methods were scaled near the same point, apart from the open budget detailed method. The results of this positioning are presented in Figure 5, which serves both as a means of comparison and as a detailed scaling complementing the information in Figure 4. This score was determined using a Likert scale (Taherdoost, 2019), which assesses whether each pricing mechanism exhibits high, medium, or low trust. Table 2 presents the scoring outcome for the individual pricing mechanisms, providing direct insight into their high/low trust and control ratio. A detailed substantiation of the scoring can be found in Annex IV.

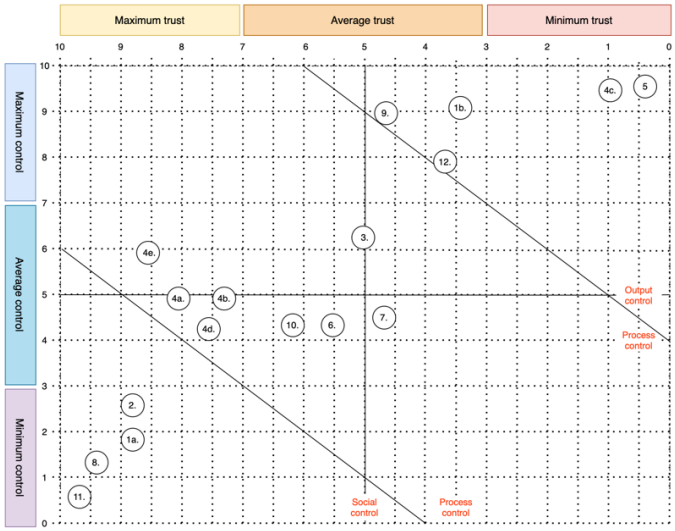

Figure 5.; Outcome positioning price mechanism based on expert opinion

Nr.	List of price mechanisms	Score (Trust / control)	Nr.	List of pricemechanisms	Score (Trust / control)
1a.	Tariff list (Equipment)	8.75 / 1.8	4e.	Cost table	8.5 / 6.0
1b.	Tariff list (Material)	4.5 / 9.0	5.	Project budget (fixed price)	0.5 / 9.5
2.	Construction team phase costs	8.75 / 2.5	6.	Target budget	5.5 / 4.5
3.	Price containment plan	5.25 / 6.25	7.	General costs profit & risk (AK W&R)	4.75 / 4.5
4.	Methods of monitoring (process)	NVT	8.	Exit regulation	9.25 / 1.25
4a.	Collegial peer review	8.0 / 5.0	9.	Price for fixed parts	4.75 / 9.0
4b.	External peer review	7.25 / 5.0	10.	Fixed profit percentage	5.5 / 4.25
4c.	Open budget (detailed)	1.0 / 9.5	11.	Full reimbursement of expenses (Carte Blanch)	9.75 / 0.5
4d.	Open budget (unrestricted)	7.75 / 4.0	12.	Price cap	3.75/ 7.75

Table 2.; Scoring individual price mechanism based on expert opinion

When comparing the outcomes of the literature of Eriksson & Laan (2007) and the focus group, it becomes apparent that four pricing mechanisms have received different categorizations. Further examination was conducted to capture the various reasons behind these categorizations.

The literature suggests output control for the costs of the construction team phase, while the focus group categorizes it as social control. This distinction arises because only the price for the construction team phase is determined, with subsequent phases being executed based on trust. The emphasis on trust stems from the fact that the final costs are determined later, and there is no complete control over the entire process.

The detailed open budget is categorised as process control in the literature, as it allows for cost management throughout the project, not solely relying on the budget outcome like output control. Conversely, the focus group views this mechanism as output control, as it provides more control from the client. The contractor must keep close and detailed track of the budget according to the client's specific requirements, promoting a more formal outcome from the client's perspective.

The literature categorizes the target budget as output control, which involves the client setting a maximum/ target price. However, this research suggests that such a mechanism implies more formal control and oversight than trust. On the other hand, the focus group considers it process control, providing a target amount to the contractor, allowing for greater flexibility in its precise implementation.

The exit arrangement is categorised as process control in the literature, as there is no fixed price but rather control over the process. This would result in process control in current practice, as there is ultimate control over the delivered products. However, the focus group argues that this mechanism leans towards social control, as including only an exit arrangement in the contract promotes trust. It should be noted that an exit arrangement cannot be applied as an individual mechanism, as it depends on a price determination.

Interviews

The interviews in this research are employed to clarify how price mechanisms influence the dynamics among the involved parties. A prognosis has been established to facilitate comparison, serving as a benchmark against the findings from the literature review and focus group session.

Several case studies were examined to demarcate the applied pricing mechanisms and assess how the initial customer perspective can be estimated. This process was facilitated using an interview guide, as shown in Annex V.

Both parties are requested to complete the provided graphs, reflecting their perceptions of social and formal control within the project. The researcher has presented the two extremes of maximum control and trust derived from the methodology's categorisation. These graphs aim to capture the subjective perspectives of the parties regarding the level of social and formal control present in the project.

Case I - Large-scale Dike Reinforcement Project

The project constitutes a coastal defence bordering the seaward side of the Wadden Sea. This dike was disapproved during the assessment due to height and outer covering issues. The project involves a previously completed two-phase contract with a construction team agreement and a UAV (GC) realisation contract. For this project, an exploration has been conducted to identify the price mechanisms contractually established, which are enumerated below:

- Price Containment Plan (3)
- Collegial Peer Review (4a.)
- Open Budget (unrestricted) (4d.)
- Cost Table (4e.)
- AK W&R (7)
- Exit Regulation (8)

When examined by individual pricing mechanisms, partly from Figure 5, the price containment plan and AK W&R have an average trust and control approach. The peer review has an approach of maximum trust and average control. The cost table and open budget have maximum trust and average control. The last implemented pricing mechanism is the exit arrangement, with maximum trust and minimum control as its approach. From this, it can be concluded that the dominant approach in this project tends towards higher trust and lower control. This inclination may be interpreted as indicative of social control exercised by the client. Subsequently, interviews will be undertaken to delve into this analysis further. The outcomes will be subdivided into three phases to be explained and depicted schematically in Figure 6.

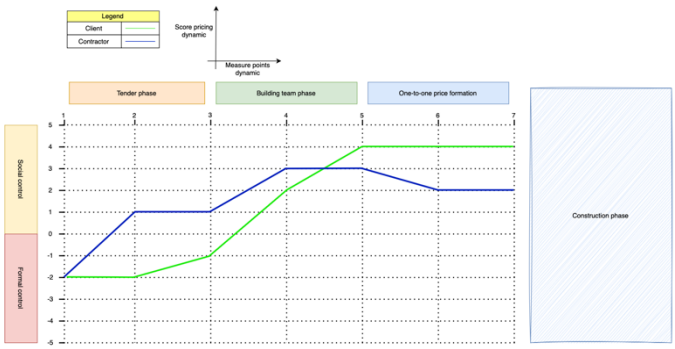

Figure 6.; Outcome mutual dynamic case study I

Tender phase

- *Client*

Before the project, the client had the idea of working with an 80% trust-based relationship while still maintaining control, which led to the selection of a two-phase approach for this project. At the start of the tender phase, the client positioned themselves as having formal control, as the focus was explicitly on the contract documents obtained from the contractors. Throughout this phase, formal control was maintained, as the formal review of the deliverables was conducted through process control, and other bidders were required to provide justifications for not being awarded the contract. The client argues that the score of -2 for formal control is based on a comparison with a previous process that took a much more formal approach, and -2 is not considered highly formal in their view.

The shift towards social control occurred towards the end of the tender phase, where the parties collaborated one-on-one during the detailed planning phase for an extended period, positively impacting the trust dynamics between them. According to the client, the contract reflected a social approach, which manifested further during subsequent phases. However, the client noticed that the contractor needed time to adjust to this way of working and the trust that was given. The delivered documents, including the price mechanism and price containment plan, aligned with the client's intended approach, positively influencing the changing dynamics. The price containment plan, a most economically advantageous tender (MEAT) in this project to demonstrate transparency, was one of the contractual price mechanisms, and this combination was also derived from a previous project. Towards the end, both parties assessed each other's plans, resulting in process control, and an offer was made for the price component in the construction team phase, leading to output control. The fact that the parties in the detailed planning phase started considering each other's interests also indicates a form of social control. This shift towards a more social control approach is evident in the dynamics at the end of the tender phase.

- *Contractor*

During the tender phase, the contractor experienced that the client formally controlled the contract and price documents, with the price being described only as a requirement and not yet as an offer. Therefore, the focus was primarily on process control from the client's perspective. In their plans, the contractor proposed implementing a price mechanism called the cost table, involving three individuals representing the client, the subsidy provider, and the contractor. The costs would be handled outside the project team to simplify the subsidy application process. The contractor also believes price mechanisms are necessary to meet the price component; however, during the tender phase, these price mechanisms regarding social or formal control were not considered.

Collaboration was a central aspect of this phase for the contractor. To make collaboration feasible, it was crucial to have willing individuals in the various project teams to achieve the success of this approach. Initially, both parties observed a need for adjustment to approach the project this way. The client perceived that the organisations involved still viewed the project through a traditional lens, requiring an adjustment period to align everyone's perspective.

According to the contractor, control started at a -2 level, but there was a quick upward trend during the tender phase. Through the dialogue and detailed planning phases, trust grew, reaching a level of +1 for social control in the tender phase. This was evident when estimating the construction team phase, where the client had their vision, and the contractor provided their estimate. The transparency and openness during this process, driven by the established trust, improved social control. In summary, while the contract was approached formally, there was a positive dynamic

shift during the dialogue and detailed planning phases. By the end of the tender phase, output control was applied to assess the estimates for the construction team phase, and other plans from the dialogue and detailed planning phases were further controlled through a combination of process control and social control.

Building team phase

- *Client*

In the construction team phase, further emphasis was placed on acting in each other's interests. From this point onwards, the client believed that actions were primarily based on social control, although the contractor still needed to adapt to this approach. The client's perspective was that a man's word is his bond, so it was unnecessary to document everything. With the assistance of the contract manager, the client believed that the project had been consistently approached with a vision of trust. As a result, trust was established, and it was no longer necessary to closely monitor everything the contractor said. However, it should be noted that there may be differences between the various aspects of the project. For example, meeting requirements are treated formally, while contract management allows for more flexibility and social control. The construction team phase ended with a dynamism level of +4, attributed to both parties respecting each other's interests and enhancing their overall dynamism.

- *Contractor*

According to the contractor, the construction team phase can be divided into three stages, with output control being implemented. In this project, it was decided to have a one-on-one price formation for the preliminary design (VO), final design (DO), and execution design (UA). This approach resulted in an increase in trust between the parties from the VO to the DO stage. However, there were communication issues during the UA stage because the engineering firm took longer to deliver the VO, resulting in pricing and indexation problems. Despite the two-month delay, the solid social control within the project minimised the impact on the overall dynamics and reduced the schedule overrun.

The construction team phase also revealed the influence of coupled projects on the dynamics and collaboration between the parties. Both parties closely monitored these projects, and ultimately, one coupled project was terminated due to its potential negative impact on progress and overall pricing. Social control was significant in this decision-making process, as there was effective and transparent communication. During this phase, the parties also collaborated to implement alternative pricing mechanisms. Significant cost items, such as those related to pandemics and wars, were removed from the contract and treated as provisional sums. Furthermore, the handling of additional contract work and changes (AKW&R) was approached differently due to the collaborative efforts. This collaboration resulted in a level +3 social control within the project, as evidenced by the overall dynamics.

One-to-one price formation

- *Client*

The final phase involved the one-on-one price formation phase, which entailed a negotiation process where the client aimed to minimise costs while the contractor sought the highest contract sum. This is a typical scenario in projects, but due to the established trust, both parties primarily considered each other's interests. The intense discussions occasionally impacted the dynamics, but the project manager consistently emphasised social control, intending to reach a mutually beneficial agreement.

A critical aspect of this project is the significant price increases resulting from a pandemic and war. As a result, the original price mechanisms, such as the additional contract work and changes (AKW&R), were abandoned. It was concluded that the AKW&R should be based on the initial preliminary design (VO), incentivising the contractor to search for optimisations in the final design (DO).

- *Contractor*

Whereas the previous phase ended with a social control level of +3, this level decreased during the one-on-one price formation phase. As mentioned earlier, these phases are intertwined, but a change in dynamics became apparent towards the final price. It was previously noted that a delay occurred due to the actions of the engineering firm, which ultimately resulted in an increased contract sum of 1.5 million euros, naturally leading to discussions. Thanks to the trust built earlier, the parties could adhere to the approach that had proven effective throughout the project. The dip in dynamics was exacerbated by the subsidy provider, who exercised more formal control than the client and contractor combined.

According to the contractor, the mechanisms established beforehand and adjusted during the project had a significant impact. The chosen contract form and accompanying mechanisms led to initiatives being undertaken, resulting in confident choices being considered and ultimately influencing the outcome regarding price and collaboration.

Case analysis

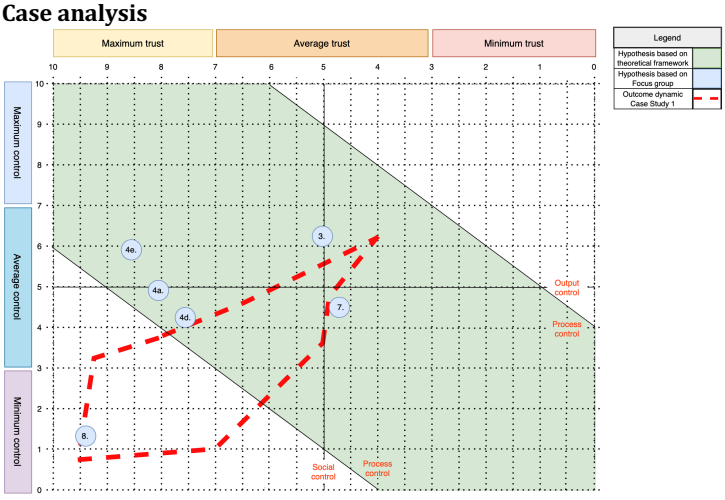

Figure 7.; Analysis Case Study I

Figure 7 compares the positioning of price mechanisms from the literature, the focus group, and the dynamics. The literature suggested a hypothesis that the price mechanisms belong to the process control category. The positioning of the price mechanisms by the focus group corresponded to this hypothesis, apart from the exit arrangement. When analysing the project dynamics, it can be concluded that during the early stages of the project, there was mainly an average level of trust and control, thus working within process control. Throughout the project, this dynamic shifted towards the lower left, indicating a more social control of the project. Compared to the pre-selected price mechanisms, the chosen price mechanisms and the dynamics are in the same area, inferring that the price mechanisms have achieved their initial goal. In the initial phase, there was a greater emphasis on control with tender documents. However, as the project progressed into the construction team phase and the one-on-one pricing, the focus shifted towards promoting trust in the collaborative relationship.

The client emphasized that the approach was to have 80% based on trust and partial control. Given the dynamics, this largely corresponds with an initial average level of trust and control that increased to a high level of trust and relatively moderate to low control. The most notable finding is that the focus group placed the exit arrangement under social control, which deviates from the literature-based positioning. However, the exit arrangement did

not impact the ultimate dynamics in this case study, as it was not implemented in the project.

Beyond the project, the willingness of both parties to collaborate, the project members, and the underlying organizations contributed to the success of the two-phase approach with deferred prices in this project.

Case II – Polder Pumping Station Project

The new (polder) pumping station is a circular pumping station installed to replace two depreciated pumping stations. This project has been in execution since the end of 2023 and involves a two-phase approach, including a construction team agreement and a UAV realisation contract.
The contractual pricing mechanisms for this project were investigated. These are shown below:

- Target budget (6)
- AK W&R (7)
- Open Budget (unrestricted) (4d.)
- Cost table (if no price agreement) (4e.)
- Exit regulation (8)

Examining this by individual pricing mechanism, it can be seen, partly from Figure 5, that the task-setting budget and AK W&R have an average trust and control approach. The open budget (unrestricted) and cost table individually have an approach of maximum trust and average control. It should be noted here that the cost table will only be applied if no price agreement can be reached. The last individual price mechanism applied in this project is the exit regulation, which, in line with the focus group, has an approach of maximum trust and minimum control.

Based on this, it can be preconcluded that the prevailing strategy in this project leans towards higher trust and moderate control. This inclination may be interpreted as indicative of the client's social control. Subsequently, interviews will be undertaken to delve into this analysis further. The outcomes will be subdivided into three phases, which will be explained and depicted schematically in Figure 8.

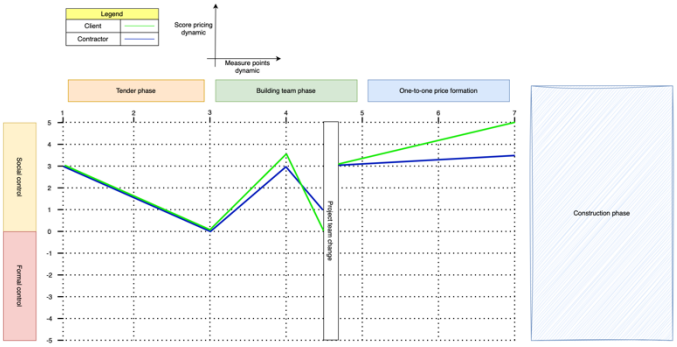

Figure 8.; Outcome mutual dynamic case study II

Tender phase

- *Client*

The client initially planned to execute this project based on a foundation of trust, resulting in a socially oriented dynamic from the start of the tender phase. The client believed this project lent itself well to such an approach as it required collaborative efforts to gather knowledge about sustainability and circularity. Throughout the tender phase, process control was used to steer the management of this stage. However, the initial intention to manage the project based on trust gradually diminished to a level of zero as the tender phase progressed. This shift was primarily due to a discrepancy between the cost estimates provided by the client and the contractor, resulting in differences in the expected costs. Consequently, the client adopted a more formal control approach, relying on output control based on the established cost estimates. The client openly questions why the pricing element was already tightly defined beforehand, suggesting that a more realistic price could have been determined for the project if it had been more flexible and detailed later in the process.

- *Contractor*

Due to previous projects, the contractor was already familiar with a two-phase approach, which was not the case for the client. As a result, the client faced some challenges during the tender phase. Initially, everyone started with a positive mindset, but motivation declined due to slow price formation. This was further exacerbated by the subpar quality of the documents being produced and submitted. The client took a leap of faith by adopting the two-phase approach, but the experience revealed that this approach was initiated from a traditional perspective. The parties aimed for a trust-based collaboration, but the client's mistrust emerged as they perceived the contractor to be too expensive. Early on, delving too deeply into the details and creating overly specific estimations for this phase of the project resulted in a cumbersome process for the contractor.
Additionally, the contractor experienced a lack of client transparency regarding the available budget. Initially, social control prevailed in this phase. However, due to team dysfunction, it transitioned towards formal control, with significant process control exerted by the client's authority and output control focused on the price component. The contractor suggests that a more approximate estimation would have been better for maintaining a positive dynamic, as it would have prevented continuous stagnation due to a low budget and lack of approval from the client.

Building team phase

- *Client*

Contrary to the decrease in social control observed in other case studies during the transition from the tender phase to the construction team phase, this project experienced an increase in the dynamics of collaboration. The influx of new project members did not lead to a decrease in social control as anticipated. Instead, it contributed to increased social control as the client perceived that the new team members had a clear vision and a comprehensive understanding of the project's expectations in this phase. As a result, social control increased while output control diminished compared to the tender phase. However, midway through the construction team phase, a shifting dynamic occurred, with a decline in social control and a greater emphasis on formal control. The client felt that this part of the construction team phase lasted too long and encountered less willingness to compromise on cost considerations. This resulted in a sluggish process, leading to a decision to replace the project team from the contractor towards the end of the construction team phase. The initial phase of the construction team phase emphasized process and social control, but in the latter part of this phase, social control diminished slightly, and a certain degree of output control was introduced. The pricing process was intertwined within the construction team phase throughout the project. The project experienced a significant price increase, partly due to the impact of the pandemic. Considering this substantial increase, the client explored the possibility of revising the predefined pricing mechanisms. However, internal constraints related to credit applications prevented the client from adjusting.

- *Contractor*

Contrary to the tender phase, trust grew during the initial stages of the construction team phase when the parties came together in construction meetings. A price was known at this point, and the

project's execution had been initiated. Transparency from the client also increased, leading the contractor to perceive a shift towards social control in the dynamics. However, a dip in the mutual dynamics became evident halfway through the phase, as the client, influenced by a traditional mindset, focused more on formal control than social control. This was partly due to the significant price increases caused by the pandemic, which resulted in delays as more discussions and investigations were required. The contractor experienced this in a way that was not conducive to effective collaboration within a construction team.

Additionally, the client in this phase realised that the emphasis on price formation had been too dominant in the project. Consequently, the entire project team representing the contractor was replaced within the construction team phase. This decision was driven by the perception that the project was at risk of stagnation and that a fresh approach was needed.

One-to-one price formation

- *Client*

The one-on-one price formation phase commenced immediately after the project team transition. In this phase, the client and contractor decided to proceed with a fixed-price approach. This led to formally determining the project budget and increased social control. The client experienced a willingness from the new project team to collaborate and find solutions. The fixed price arrangement eliminated the need for the client and contractor to negotiate a reasonable price for the work, alleviating a significant burden for the project teams and allowing them to focus on other aspects. At the start of the one-on-one price formation, there was a degree of output control in which the formal aspects were finalized. Subsequently, the focus shifted towards process and social control until the realization phase.

- *Contractor*

Following the team switch, constructive discussions occurred between the client and the contractor, with both parties still aiming to resolve the issue together. This resulted in a final offer where a fixed price was submitted to encompass the work, eliminating the consideration of additional or reduced work as it was already incorporated into the price. This form of output control led to the exclusion of previously established price mechanisms. Working with a fixed price in this project phase resulted in increased social control from the client. It is mentioned that if a fixed price had been implemented at the beginning of the project, a similar outcome would have been expected. Going forward, the contractor intends to prioritise transparency by using a target budget and collaborating with the client to create a rough estimate. The contractor believes that this approach will improve dynamics in future projects.

Case analysis

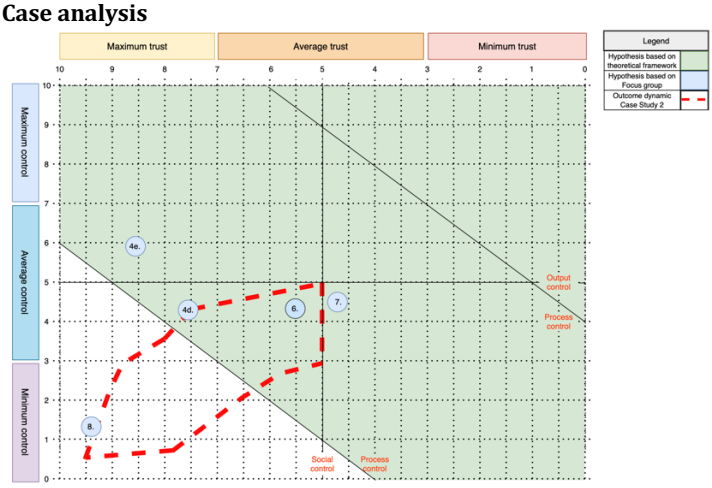

Figure 9.; Analysis Case Study II

Figure 9 compares the positioning of price mechanisms from the literature, the focus group, and the dynamics. The literature suggested a hypothesis that the price mechanisms belong to the process- and output control categories. The positioning of the price mechanisms by the focus group corresponded to this hypothesis, except for the exit arrangement. When analysing the project dynamics, it can be concluded that social control was employed mainly at the beginning of the project, which was also the initial intention of both parties. During the tender phase, the interpersonal dynamics regarding social control decreased and shifted towards an average of social and formal control, equating to more process control.

At the beginning of the construction team phase, the interpersonal dynamics again shifted towards more social control due to the actions of the project members and further collaboration on the contractor's side. However, during the second part of the construction team phase, there was a shift towards more average trust and control, or process control. The involvement of a new project team prioritized social control once again. From this project, it can be analysed that the individuals involved have had a significant influence on the interpersonal dynamics of the project.

The project team change helped ensure the feasibility of this project due to the organisation's willingness to complete it. Replacing the current mechanisms with a new price mechanism, in this case, the fixed price, initially classified as output control from the literature and the focus group, did not lead to a more controlling dynamic but more social control.

This project's complexity also contributed to the feasibility of the two-phase approach with deferred pricing.

<u>Case III - Provincial Support Point</u>

The provincial support point for ice control is designed to replace three outdated comparable locations. The already completed project involves a two-phase approach with a construction team agreement and a UAV (GC) realisation contract.

For this project, the contractual pricing mechanisms were investigated. These are shown below:

- Target budget (6)
- Open Budget (detailed) (4c.)

When examined by individual pricing mechanism, it can be seen, partly from Figure 5, that the task-setting budget has an approach of average confidence and average control. The open budget (free interpretation) and individual have an inference of maximum trust and average control. From this, it can be concluded that the dominant approach in this project tends towards medium to high trust and medium control. This inclination may be interpreted as

indicative of social control from the client. Based on this analysis, interviews will be conducted. The outcomes will be subdivided into three phases, which will be explained and depicted schematically in Figure 10.

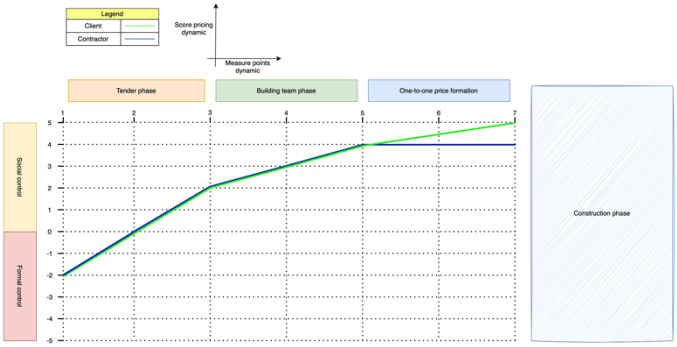

Figure 10.; Outcome mutual dynamic case study III

Tender phase

- *Client*

The tendering process for this project was conducted with a focus on trust. The project started formally, as it involved paperwork and offers. Initially, process control was primarily used to assess the bids formally. This approach was chosen because the client aimed to collaborate with a contractor where sustainability was considered an additional benefit. A target budget was selected, as this project involved a political organisation, allowing both parties to remain in control of the total costs. The open budget was implemented as it had proven effective in previous projects, providing transparency for the client from the contractor's side. Both pricing mechanisms contribute to social control, as the client has confidence in the presented information, which is clear and allows for verifiability, thus promoting a certain level of formal control.
The open budget is not a social control mechanism of the process but rather a formal sealing of the outcome. According to the client, social control provides formal control, as it is easier to monitor when a foundation of social control is established within a project. The project starts on a formal basis, then allows social control to grow, and ultimately ends on a formal basis.

The project started slightly more formally and quickly progressed towards social control. During the tender phase, one party took the question round seriously by adopting a formal approach, while the other party appeared unprepared, effectively removing themselves from the competition. A rapid increase followed mutual dynamics as the client emphasised trust and collaboration through specific pricing mechanisms.

- *Contractor*

At the beginning of this project, the parties were unfamiliar with each other, resulting in a lack of trust. Consequently, the contractor initially assessed the client with a formal rating of -2. The contractor does not attribute this rating to a lack of trust but instead to the formal nature of the tender phase, with the ultimate evaluation being based on the contractor's proposal. As the tender phase progressed, trust grew, and it was aided by a dialogue phase and increased communication, during which the plan was explained. This fostered greater mutual trust within the project, leading to a shift towards social control. The mentioned pricing mechanisms contributed to the development of increased mutual trust. The increase in dynamics also reflects the notion that the more open one is, the more trust is gained.

Regarding the pricing mechanisms, the contractor believes that it is not certain that these mechanisms ultimately led to the current outcome. For instance, the project could have been structured with a rate list. However, using a rate list may not fully capture the scope of the work in some cases, whereas an open budget allows for ongoing insight into the project's progress.

Building team phase

- *Client*

Throughout the construction team phase, there was a continuous increase in social control within the project. This was attributed to the parties getting to know each other and developing mutual respect for their knowledge and capabilities. During this phase, plans were developed, and social and process controls were implemented. The price was regularly discussed through interim estimations, facilitated using an open budget. Here, the element of output control was present to keep costs visible.
During the construction team phase, the parties encountered issues with incomplete required permits. However, this was not within the control of either party but rather a result of third-party negligence. The client believes that this period of inactivity was made more accessible due to the level of social control and resultant trust. However, they acknowledge that external influences hindered the process.

In construction projects, clients often deal with variations in work scope. In this project, the approach taken from a perspective of social control and collaboration involved discussing with the contractor what they considered a reasonable price for additional or reduced work. A budget was established based on these discussions, allowing the contractor to refer to it. As a result, this aspect no longer played a significant role in later stages, as the risks and associated costs were defined early on. This working approach was made possible by the mutual trust between the parties, with the client steering through social control.

- *Contractor*

The mutual trust and associated social control continued to grow during the construction team phase. The contractor was occasionally surprised by the level of trust demonstrated by the client. This trust was evident in providing interim estimations at each design iteration, which gave the client insights into the project. This also highlights the project's intertwining nature of the construction team phase and one-on-one price formation.
In the middle of the construction team phase, the parties encountered their first cost overrun from the target budget. However, this did not negatively impact the overall dynamics. The client never gave the contractor the impression that the cost increase would lead to difficult questions or the need for a cost expert to scrutinise the budget. The discussions focused more on why certain costs were higher, and the explanations provided were considered valid. This demonstrates a form of social control exercised by the client.

Despite this setback, the social control increased to level 5 during the construction team phase. This was also due to the project manager and the client giving the contractor the flexibility to handle the tasks needed simply. Risks that emerged during this phase, such as escalating costs, were promptly anticipated through early procurement of equipment facilitated by the mutual solid trust dynamics. However, this was treated as a formal matter due to formalities and the relatively large amounts involved.

One-to-one price formation

- *Client*

During the construction team phase, close attention was paid to price formation, which is also intertwined with this process. Both parties were aware of the cost overrun from the target budget through interim estimations. However, because this issue was addressed promptly, it did not negatively impact the dynamics as both parties remained in continuous dialogue to explore potential solutions or accommodations. The client did not initially disclose the maximum budget to the contractor, and by obtaining early visibility into cost overruns, they could discuss this with higher organisational levels.

- *Contractor*

During the construction team phase, the contractor states that the social control further increased to level 5. The final offer was discussed, but no changes were made. The contractor never felt that they would receive formal control from the client. According to the contractor, this led to the continuous rise of social control, reaching its highest point.

Regarding the cost overrun, the contractor believes they consistently stayed within the budget despite exceeding the client's initial budget. The contractor did not perceive any lack of transparency from the client, as they understood that it was reasonable to include a portion of the budget as a risk reserve. This one-on-one price formation process involved social control between the parties, process control over the deliverables, and output control from the client's perspective regarding the final price and interim estimations.

Case analysis

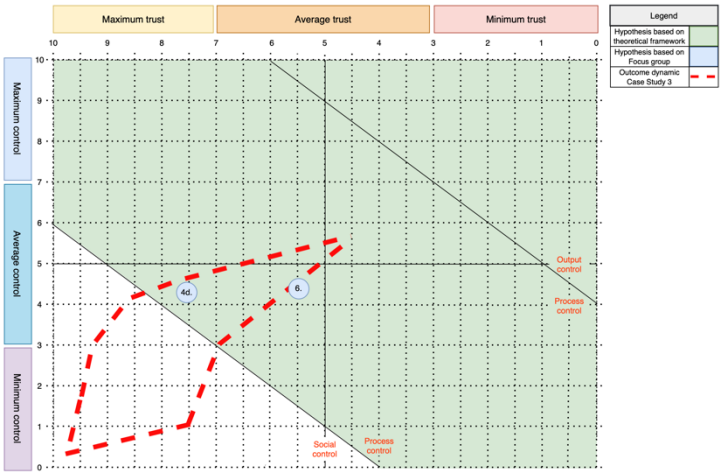

Figure 11.; Analysis Case Study III

Figure 11 compares the positioning of price mechanisms from the literature, the focus group, and the dynamics. The literature suggested a hypothesis that the price mechanisms belong to process- and output control categories. However, the focus group's positioning of the price mechanisms did not align with this hypothesis, and both were categorised under process control. When analysing the project dynamics, it can be concluded that there was primarily a light formal approach during the early stages of the project.

During the tender phase, it is evident that the interpersonal dynamics trended and continued towards social control. Comparing this with the literature and focus group, it can be said that this project primarily focused on social control, contrary to the initial influence of the price mechanisms. This indicates that other critical factors influenced the achieved interpersonal dynamics. In this project, the intention and willingness of both organizations to operate based on social control within the project team were vital.

Despite challenges related to cost overruns and formal control from third parties, the social control proved so robust that it had no negative impact on the project dynamics and the overall two-phase approach.

Case IV – Urban Dike Reinforcement Project

The dykes protect the city from water over multiple kilometres long trace. A significant part does not meet water safety standards. Typified as one of the most complex dyke reinforcement projects. The project involves a two-phase approach that is currently under construction. A construction team contract was chosen for phase one, and a UAV (GC) was chosen as the realisation phase contract.

The contractual pricing mechanisms for this project have been investigated. These are shown below:

- Cost Table (4e.)
- Open Budget (unrestricted) (4d.)

When this is examined by individual pricing mechanism, partly from Figure 5, the tasking budget has an insertion of average trust and control. The open budget (unrestricted) and individual have an inference of maximum trust and average control. From this, it can be concluded that the dominant approach in this project tends towards medium to high trust and medium control. This inclination may be interpreted as indicative of social control from the client. The interviews will be conducted based on this analysis. The outcomes will be subdivided into three phases to be explained and depicted schematically in Figure 12.

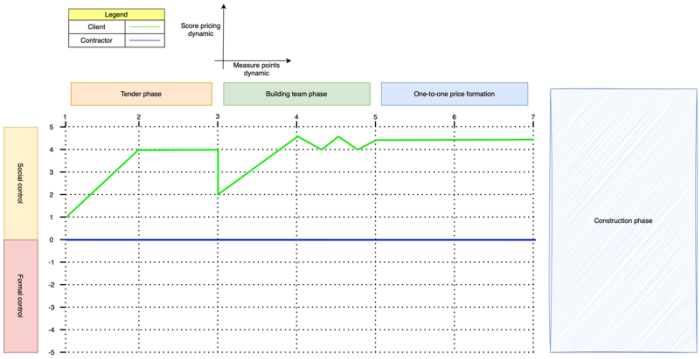

Figure 12.; Outcome mutual dynamic case study IV

Tender phase

- *Client*

The client initially emphasised social control in this project, aiming to work based on trust and collaboration. Throughout the tender phase, there was a clear progression towards a more social dynamic, driven by the introduction of various team members and effective risk management, which helped establish a sense of stability. There was no perceived contrast between social and formal control at the project's inception, as both aspects are necessary for successful project execution. A two-phase approach was chosen to ensure controlled project delivery. Regarding pricing, the client deliberately did not focus on price during the tender phase, omitting the aspect of output control. Instead, the client prioritised social control and process control over the deliverables. A financial management plan was established as a price mechanism to maximise transparency and facilitate collaboration, thus enhancing social control in the project. The collaboration was viewed as two parallel tracks between social and formal control, where the formal track represented a consistent level of cooperation. This suggests that the collaboration was rooted in a social approach. A cost table was implemented as a price mechanism to maintain cost control, led by an independent chairperson who assessed pricing based on quantities and societal

desirability. This price mechanism aimed to relieve pressure from the project team and empower individual stakeholders to contribute their expertise effectively. According to the client, this methodology is well-suited for projects requiring specialised knowledge, where a construction team collaboratively examines the project's content.

- *Contractor*

During the tender phase, the client and contractor collaborated on clarifying the contractor's responsibilities within the process and determining the setup of the cost table, one of the pricing mechanisms. The contractor had significant input in design choices and contributed to making the project manageable. The contractor believes that the effectiveness of this methodology depends on the individuals involved in the project team. Initially, the contractor had a positive impression of the price mechanisms. Another mechanism employed was the additional contract work and changes (AKW&R), which were established early on, albeit with some emotional discussions. A balance was found for this project.
Regarding control in this phase, the contractor asserts that social control can support formal control and vice versa. They state that a discrepancy in social control can be verified using formal control and vice versa. For example, the formal review of the cost table can instil confidence when the delivered results align. Thus, one form of control does not exclude the other. There is a score of 0 throughout this phase, as the two forms of control remain balanced. The contractor did not submit a formal bid for this project but demonstrated how the price formation should be structured. The client's approach, from the contractor's perspective, remained consistent.

Building team phase

- *Client*

At the start of the construction team phase, there was a decrease in the dynamics of social control from +4 to +2. This can be attributed to introducing new team members at the beginning of this phase. However, the dynamics quickly rose to at least the previous level of +4 as the client got to know the new team members. This aligns with the client's collaboration and trust (social control) objective. From this point onwards, fluctuations in social control were observed throughout the remainder of the construction team phase. This was influenced by the client's occasional dissatisfaction with minor project details and depended on the choices made or perspectives held on some issues. Disagreements were transformed into constructive conflicts to ensure that personal attacks were avoided. The overall increase and decrease in dynamics resulted from the teams actively working on resolving constructive conflicts through activities such as team building and the involvement of a team coach, contributing to an upward trend in dynamics. These constructive discussions were approached from the perspectives of both the client and the contractor. The sense of calm and trust in the project, which emphasised social control, was also supported by a well-structured formal control mechanism that allowed little room for deviation. The client's expert team exercised formal control in this project. This formal control represented the necessary standard oversight, while the social control fluctuated occasionally.

An example of the outcome of this collaboration was the decision to expedite the execution activities even though the project was still in the construction team phase. This decision aimed to achieve significant cost savings in the long term. The client acknowledges that this approach involved taking a high level of risk, but high social control made it possible to take such risks.

- *Contractor*

During the construction team phase, the contractor never experienced an approach different from the client's. Trust was quickly established, but the formal aspect was never disregarded, maintaining a balance in the eyes of the contractor. This balance allowed for output control in cost estimates through the cost table process control over delivered pieces in the form of authority. Social control ensured equilibrium by collectively addressing the task at hand.
Despite the trust, intermediate steps regarding control were never skipped. The goal is not to create a pleasant atmosphere in the project but to prioritise the project's best interests while representing both parties' interests. This entails formal moments being enforced.

To zoom in precisely, there was never any mistrust, neither decreasing nor increasing. This is due to the high level of transparency and the decision-making model through a cost table. According to the contractor, price mechanisms are rarely as well-balanced and equitable as other contracts. The better the alignment of these interests and the agreed-upon decision-making process, the less likely one is to exhibit improper behaviour. The contractor believes trust is fostered through interpersonal conversations, but social control only increases when formally documented. This indicates a balance between social and formal control in this project.

The collaboration between both parties and the combination of social and formal control effectively addressed all risks in this project. The contractor believes that if they had not worked together in this manner, the project could have faced multiple failures or continued in a traditional setting.

One-to-one price formation

- *Client*

In this project, a one-on-one price formation process is intertwined during the construction team phase, where cost estimates are prepared from the beginning and validated by the cost table. The price in this project is an outcome of rates, a detailed budget, and the object in question, which together form a cost overview. The client has attended the cost table multiple times, but there were no surprises due to the previously provided transparency. An external risk that played a role in this project was the significant price increase and revised regulations regarding chemical substances. This impacted the subsidy provider and the stakeholders but did not affect the client and contractor dynamics. On the contrary, according to the client, the pandemic brought the parties closer together. This is because the outcome of the collaboration does not determine whether something is right or wrong; instead, the quality of the delivered pieces is essential.

- *Contractor*

The costs ultimately escalated significantly in this project. However, according to the contractor, it did not impact the interpersonal dynamics because the client had already thought through the cost table's system before the project. Thus, the entire decision-making process had been organised, and a significant cost overrun could be effectively managed without altering the interpersonal dynamics. However, this was different regarding the subsidy provider, as they were not part of the project team and did not experience the intermediate moments. Consequently, the final subsidy application was not complex because the expert team could rely on the cost table's conclusions, and everyone had already reviewed the final budget.

The paths of both parties only diverge at point seven, as this is when the estimation is split between the client and contractor. The one-on-one price formation becomes more challenging, and both parties must avoid improper behaviour. However, there is a balance, and the interpersonal dynamics remain stable. This balance also positively influenced the project's progress because, according to the contractor, the government can quickly introduce

additional price mechanisms in the event of mistrust between the parties. However, this was not relevant to this project. However, the subsidy provider did create a sense of mistrust between the client and contractor, as they had little confidence in the proceedings between the parties involved in the project. The subsidy provider maintained a formal role in the project, which brought the client and contractor closer together in this project.

Case analysis

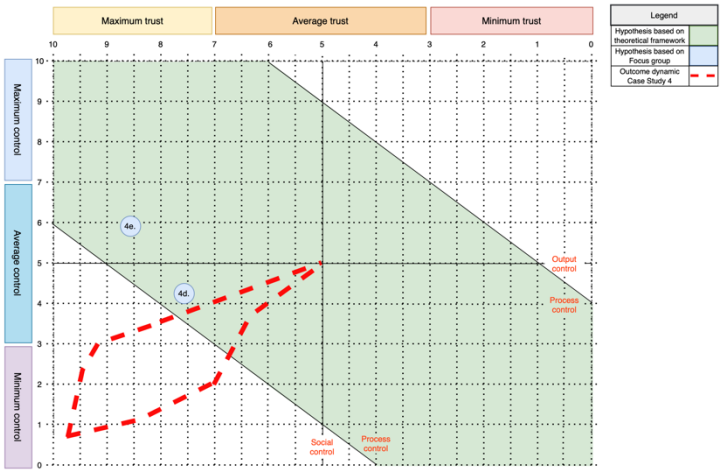

Figure 13.; Analysis Case Study IV

Figure 13 compares the positioning of price mechanisms from the literature, the focus group, and the dynamics. The literature suggested a hypothesis that the price mechanisms belong to the process control category. The positioning of the focus group aligned with this hypothesis, and they were categorised as process control. However, an interesting finding emerges from analysing the project dynamics.

The contractor maintains that the dynamics remained unchanged throughout the process, as there was always a presence of both social and formal control. On the other hand, the client initially started with a focus on social control, which increased during the tender phase, experienced a dip at the beginning of the construction team phase due to the expansion of the project team, and then increased again. After that, the dynamics fluctuated slightly but consistently remained high regarding social control.

This analysis reveals that while the price mechanisms were initially more aligned with process control, the client primarily emphasized social control. The decrease in social control at the end of the tender phase was attributed to adding extra project members, independent of the chosen price mechanisms. This highlights the significance of individuals in influencing the interpersonal dynamics within a project. The client's strong emphasis on social control was maintained through a willingness to collaborate and transparency between the parties.

Furthermore, the price mechanism of the cost table in this project contributed to a significant amount of social control as it was separate from the project team and, therefore, could not disrupt the dynamics despite significant cost overruns. This outcome contradicts the scaling provided by the literature and focus group.

<u>Case V – Large infrastructure project</u>

The major infrastructure project encompasses a kilometre-long reconfiguration and road widening to improve traffic flow and capacity. It utilizes a hybrid approach, with a portion being fixed price and a portion employing a two-phase approach currently in progress. A UAV (GC) was selected for the entire duration of the project.

The contractual pricing mechanisms for this project have been examined, as outlined below:

- Fixed price (5)
- Indicative values (6)

The outcomes will be subdivided into three phases, which will be explained and depicted schematically in Figure 14.

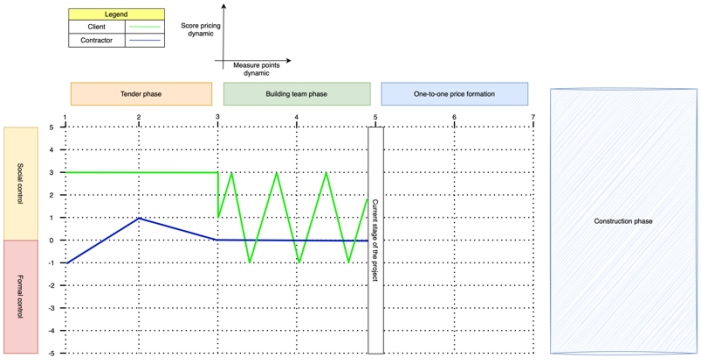

Figure 14.; Outcome mutual dynamic case study V

Tender phase

- *Client*

The project was initiated based on social control, where openness, culture, and behaviour are essential indicators. However, contractual agreements are also needed, which are ultimately assessed by the client from a strictly legal perspective, with little consideration for social factors. This evaluation focuses on compliance with norms and regulations purely from a legal standpoint in the project. However, what was possible within the project's boundaries was done based on social interaction with the contractor.

The hybrid approach was chosen because the client provided a regular section with a fixed price and a two-phase section where the client established an indicative value as a target budget. A price containment plan is requested for the two-phase section, and the final price is determined once there is a better understanding of the associated risks. Through this approach, the client aims to achieve a realistic price for the two-phase component through process and social control. To promote collaboration and reduce tender tension, the client decided to allow the parties in the tender to propose a solution within the indicative parameters using their expert judgment.

The client believes that the initial basis of the contract for this project is formal control with a strong emphasis on social factors. Hence, several contractual mechanisms, as mentioned earlier, have been implemented. As a client, one cannot solely rely on trust; social control, interaction, and the right vision have always been prioritised. This is reflected in the development of a vision document, which outlines the expectations of the contractor and what the contractor can expect from the client. This social control received significant attention during the tender process.

- *Contractor*

This project represents the contractor's first instance of working with indicative parameters. From the assignment, the contractor clearly understood the client's vision regarding collaboration and trust. The tender process began for the contractor at level -1, as many aspects were contractually determined. However, halfway through the tender phase, there was an upward trend towards social control, as dialogue focused more on trust than the contractual setup. Physical meetings and verbal conversations contributed to building trust rather than relying solely on written documents.

The contractor noticed that the hybrid approach led to a different mindset in the project, with one part involving a regular price and another following a two-phase approach. The contractor observed a well-balanced integration of what was stated in the contract with the dialogue discussions, mainly when introducing the indicative value. By the end of the tender phase, the parties had a high level of trust and a strong balance between formal and social control. The fact that this balance was achieved at level 0 is due to the ultimate trust established, although the evaluation of the bid was not based on mutual trust but on what was presented in the proposal. Towards the end of the tender phase, the client mainly focused on process control, while during the dialogue, the client placed greater emphasis on social control.

Building team phase

- *Client*

At the start of the construction team phase, everyone is on cloud nine because the contractor has been awarded the project. However, as new individuals join the project and team members from the tender phase move on to other projects, the level of control shifts more towards the formal side due to unfamiliarity among team members. Initially, after the award, the project team from the contractor's side requires time to get up to speed. After this initial phase, problems arise, shifting the dynamics towards a more formal approach. Issues include documents, not meeting requirements, misinterpreting information, or disagreements regarding intentions versus what is stated in the contract. This requires constant adaptation and shifting between formal and social control. At this point, a stronger emphasis is placed on formal control, reaching level -2. The client starts to exercise process control through authoritative control measures. For example, the client may heavily emphasise the indicative value, although it does not align with the desired collaborative approach. In such cases, the client and contractor jointly attempt to lower the level of expectation for the next phase. More time and effort are dedicated to finding solutions, leading to a swift shift back towards social control. This process alternates throughout the entire project duration, even daily.

Projects of this nature generally require a formal foundation, enabling the client to hold the contractor accountable for planning and performance statements. Occasional assessments may be conducted, and all documents must be checked. However, the client observes that formal control becomes less prominent when things are going well because social control takes precedence. It is noticeable that as one goes lower in the organisation, there is an increased reliance on formal control, such as verifying and validating requirements. As higher management levels are reached, a greater emphasis is placed on social control. The client considers this factor necessary for how external stakeholders, such as shareholders and executives, perceive the project as their influence can impact the dynamics within the project team.

In this project, pricing and the post-award phase are intertwined. As this phase is not yet complete, it is impossible to determine how the dynamics of the pricing process may change. During the tender process, the client provided indicative values that align with developing designs for the two-phase approach. At this stage, the design process estimates that the indicative parameters may be exceeded, including possible indexations to reduce the price. As the design is still in its early stages, there are many uncertainties, providing an opportunity for both parties to collectively assess and ensure a decrease in the level of expectation. This process involves formal control from both sides and rigorous questioning of the other party. The indicative value serves as a guiding point in the process, helping to prevent getting lost. The client observes a good balance between social and formal control in this context. If the client agrees with a plan, it pertains to a formal control aspect. It sends a signal if the plan is not approved due to non-compliance. On the other hand, the client also emphasises social control due to the numerous uncertainties, making it a complex puzzle to find the right solution.

- *Contractor*

The contractor experiences that after the award, the dynamics of trust have been maintained between the parties despite adding new project members to both teams. The contractor and client actively focused on building mutual collaboration and trust to ensure a smooth start. However, the contractor has discovered that when operationalising this approach, more time and effort are required to manage it effectively. In this project phase, the contractor observes a divergence in dynamics, with one part of the client's organisation emphasising social control and trust. Their motto is that when good actions are taken, it is easy to communicate this to the parent companies. The other part of the organisation leans more towards formal control and ensuring that the contractor adheres to their contractual obligations. The contractor perceives this as a struggle, preventing complete alignment towards social or formal control, thus remaining at level 0. Keeping the teams together within the contractor's organisation requires significant time, energy, and human resources, impacting the project's progress. Emphasising formal control leads to a significantly longer project duration than focusing on social control. The contractor also realises that it was initially established that the client would be involved in impactful decisions. However, according to the contractor, the client seeks involvement in all aspects, making the collaboration more intensive than initially expected. The contractor also experiences that more efficiency can be achieved as it requires additional effort to involve the client in every detail. From a social perspective, increased efficiency would contribute to building more trust from the client. However, the contractor acknowledges that trust needs to be nurtured in the project's initial phase, which calls for a more critical approach to control.

One-to-one price formation

- *Client*

In this project, pricing and the post-award phase are intertwined. As this phase is not yet complete, it is impossible to determine how the dynamics of the pricing process may change. During the tender process, the client provided indicative values that align with developing designs for the two-phase approach. At this stage, the design process estimates that the indicative parameters may be exceeded, including possible indexations to reduce the price. As the design is still in its early stages, there are many uncertainties, providing an opportunity for both parties to collectively assess and ensure a decrease in the level of expectation. This process involves formal control from both sides and rigorous questioning of the other party. The indicative value serves as a guiding point in the process, helping to prevent getting lost. The client observes a good balance between social and formal control in this context. If the client agrees with a plan, it pertains to a formal control aspect. It sends a signal if the plan is not approved due to non-compliance. On the other hand, the client also emphasises social control due to the numerous uncertainties, making it a complex puzzle to find the right solution.

- Contractor

The price in this contract is intertwined with the post-award phase. The contractor initially perceived the price to be built upon a triangular relationship between time, money, and quality. Within this triangle, the parties were expected to collaborate and make joint decisions based on what was best for that project phase. However, the contractor now observes that the price is less flexible, as indicated by the indicative values provided beforehand. Instead, it seems that the client views it as a maximum amount, and if there are potential cost overruns, adjustments will be made to the quality requirements, thus setting the final price above the required quality standards. The contractor believes tensions may arise between the parties when the indicative values are exceeded.

This could potentially impact social control, leading to process and output control concerning the price rather than social control.
Another risk the contractor foresees for the client is using unit prices, which the client employs to maintain control and ensure that the prices obtained through the pricing process conform to the market. The client expects the contractor to demonstrate transparency in how specific values have been determined, with the budget demonstrating that the prices are market conform. Through periodic formal control in the form of output control, the client seeks to maintain control over the price-related aspects of this project.

Case analysis

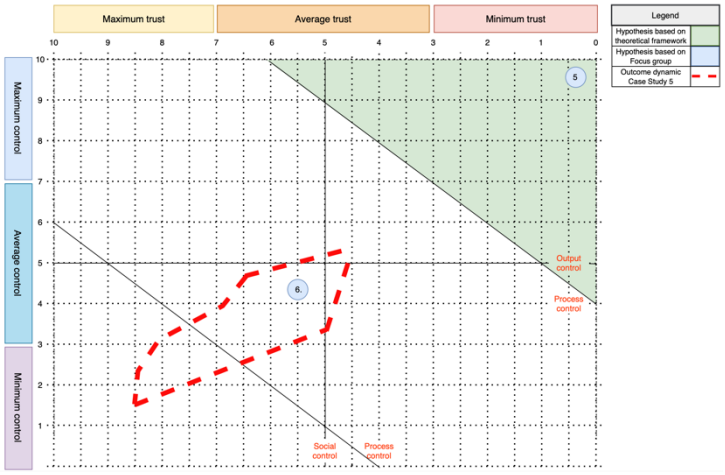

Figure 15.; Analysis Case Study V

Figure 15 compares the positioning of price mechanisms from the literature, the focus group, and the dynamics. The literature suggested a hypothesis that the price mechanisms belong to the category of output control. The positioning by the focus group scales these price mechanisms in both process- and output control. Examining the dynamics, it is notable that the client perceives their approach from the start as focusing on social control. At the same time, the contractor experiences it as more focused on process control. The control exerted by the client fluctuates between formal and social control throughout the project, whereas the contractor perceives it as consistently at the same level. Given the price mechanisms in this hybrid approach, the dynamics seem to lean more towards social/process control rather than process/output control.

This project highlights the significance of willingness to collaborate between the parties. However, the hybrid approach complicates this process as it is based partly on collaboration and partly on a fixed price and, thus, output. In this project, the contractor perceives the client as overly involved in the collaboration, resulting in a level of control, while the client aims to achieve social control. Furthermore, the complexity and willingness of both parties to collaborate contribute to the two-phase approach. However, according to the contractor's perspective, the client's excessive involvement deviates from the initial goal of achieving social control. On the other hand, this project's complexity lends itself well to a two-phase approach, with the involvement of critical individuals remaining crucial to maintaining manageable dynamics.

Discussion

This chapter examines the research findings and the literature, highlighting the primary outcomes from the focus groups, case studies, and theoretical framework. Subsequently, the research's limitations will be discussed, followed by insights regarding recommendations for potential future research.

Trust and control are considered complementary in this discussion rather than opposed to the hypothesis. While the background initially presented these concepts as opposites, the literature review and all case studies revealed that these concepts can be complementary (Das & Teng, 2001). For this research, the social concerns are the willingness of parties to work together and build and act on their mutual relationship based on a bond of trust; in contrast, the formal steers more towards a more distant bond. Here, the client steers more towards controlling project outcomes and working together based on a bond of trust is subordinate to controlling the contractor. From these concepts, the research implies that a proper balance between trust and control is necessary to achieve and maintain effective project dynamics. Excessive control from the contracting party can undermine trust on the contractor's side and vice versa, while a lack of control can hinder project management. Thus, the research results establish that balancing these two elements is crucial for a successful two-phase approach.

The findings of this research highlight the nuanced nature of scaling pricing mechanisms, revealing differences between the literature, focus group, and case studies. Contrary to the literature, which presents a broader range of positions, the case studies indicate a more aligned scaling with the dynamics from the focus group. This suggests that the broader scaling in the literature may be influenced by different interpretations and contextual factors affecting the positioning of pricing mechanisms.

Furthermore, the case studies indicate that the initial control began in three of the five projects from average control to average trust. A visible pattern that emerges is that these projects move from the middle (process control) to the lower-left quadrant (social control) in the positioning of pricing mechanisms. This suggests a general trend in project practice where there is a shift from more process control to a greater emphasis on social aspects during the project. What emerged from the other two projects is that an initial focus on social control negatively influences the dynamics change during the project. One possible rationale for this is the lack of clear boundaries at the beginning of the project, which leads to a gradual evolution towards more formal control as the project progresses. In cases where the boundaries are more defined through a more formal control, the emphasis on social control is maintained or increases during the project.

Figure 16 provides an overview of the dynamic outcomes in all case studies, revealing that the projects mainly move from the middle to the lower left quadrant. An important finding from this research is that, unlike some pricing mechanisms, there is no dynamic overlap with output control, and no overlap is visible in the maximum control/maximum trust and minimum trust/minimum control quadrants. This can be viewed as an important finding, indicating that current pricing mechanisms do not steer towards these areas of the trust vs. control index.

Moreover, it can be inferred from the figure that a clear relationship is visible between the considered case study projects from various disciplines, as different mechanisms are employed in all projects, and the quadrants overlap. Therefore, it cannot be determined clearly in what form individual price mechanisms affect the dynamics between the parties involved. The examined projects often involve a combination of multiple pricing mechanisms, and it was beyond the scope of this research to investigate the influence of these mechanisms on each other. Overall, the project members seem to see the pricing process as a whole and do not comprehend the influence of the individual pricing mechanisms on the project. Through this qualitative research, it should be noted that studying different projects may have a crucial impact on the research findings, as different projects may lead to different outcomes in this research.

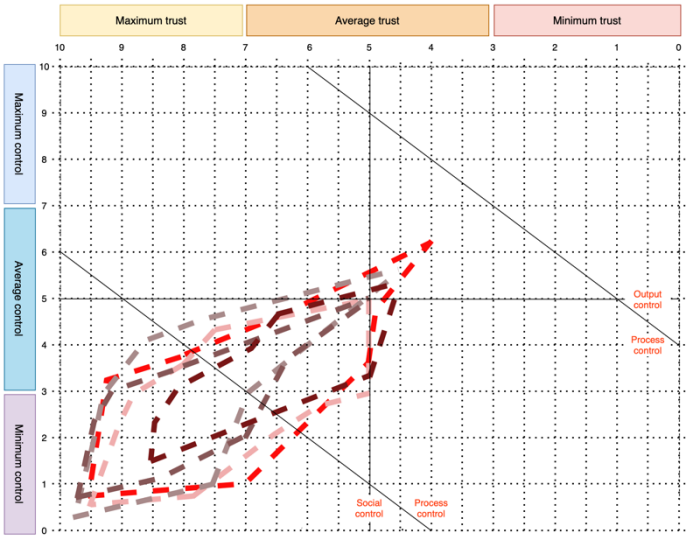

Figure 16.; Overview Case Study dynamics

From the analysis of specific pricing mechanisms, one mechanism in particular should be highlighted. Both the literature and focus group scale the fixed price as output control. Lahdenperä (2010) suggests that the current approach with fixed price often leads to adversarial relationships. However, it emerged from one of the cases that when the fixed price was determined, it generated much trust because the parties no longer had to deal with issues, such as additional work. In addition to this project, the other case studies all indicated that mutual trust has many benefits, such as reduced lead time and a more straightforward decision-making process. This aligns with research by Lewicki et al. (1998), which indicates that all parties recognise the many benefits of trust within projects. Complementing these insights, several overlapping factors emerge from the case studies that, in addition to pricing mechanisms, are important to make a two-phase approach with deferred pricing feasible. For the completeness and ultimate applicability of the outcomes of this research, it is essential to identify these critical factors as a supplement to the pricing mechanisms. The first two critical factors are the willingness to collaborate and transparency among the parties involved, which play a crucial role. In line with this, Vosman et al. (2020) asserted that transparency between the client and contractor is essential when project control is reduced. This transparency can be effectively integrated into the pricing process through various pricing mechanisms. From this research, it may thus be suggested that when both the client and the contractor are open to approaching a project with mutual trust, the feasibility of this goal is significantly higher. Compared with the research by Stevens et al. (2015), which states that optimal performance in a project is achieved when trust and distrust (control) are balanced, this is highly dependent on the context of a project and the client's approach, for instance.

The case studies have shown that when the parties' or stakeholders' transparency and willingness are not reciprocal, the pricing mechanisms can help identify the expected dynamics between one another in advance. However, it should be noted that further studies on the influence of interrelated pricing mechanisms are required to achieve more definitive results.

The exit mechanism is another pricing mechanism that should be highlighted because of the disclosure related to this research. This research could not demonstrate the influence of a mechanism that was ultimately not applied in the project, with follow-up research to provide insight into the distinction between an actively and passively involved pricing mechanism and how it affects interpersonal dynamics.

The third critical factor is the people in the project and the underlying organizations, which significantly influence the dynamics. Due to the willingness of both individuals and organisations, all case studies have shown that it has benefited mutual dynamics and, in several cases, ensured the project's feasibility. The final critical factor that emerged from the research is the complexity or novelty of project components, which is the basis in multiple cases for making the two-phase approach with deferred pricing relevant for the respective project.

Finally, the initial aim to explore sector-wide projects has revealed a clear relationship. The outcomes regarding the dynamics from the case studies suggest that there should be no distinction in which pricing mechanisms apply to different work areas. The case study interviews did not reveal notable differences regarding pricing mechanisms' influence on the parties' dynamics.

Limitations

Several limitations have been identified throughout the research period that are relevant to the overall quality of the research. These limitations specifically pertain to data collection and the applied analytical techniques.

The first limitation concerns the collection of relevant academic sources. The scarcity of academic literature on two-phase approaches, particularly in combination with deferred pricing, resulted in exploratory research in which potentially relevant insights may have been overlooked.

The second limitation is the researcher's lack of experience conducting focus group meetings or multiple interviews. Due to this lack of experience, the quality of the interviews may be lower than what would have been achieved by an experienced interviewer.

The third limitation of the research is the chosen strategy for multiple case studies. While the number of case studies is suitable for exploratory research, a larger pool of projects could have provided a more consistent overview and different insights. However, using multiple case studies with a comparative analysis makes a smaller pool more suitable for a detailed examination of each case.

The final limitation is the disparity in perspectives between the interviewer and the interviewees regarding the level of detail in the research. The researcher approaches this from a detailed perspective, while the interviewees view it more holistically. This difference may have influenced the input for the research, impacting the research output.

Recommendations

The final section of this chapter comprises recommendations for potential further research. First, it should be noted that a project can never be replicated identically to assess the relevance of individual pricing mechanisms to the dynamics within it. However, a more extensive set of case studies can be used to draw general conclusions for each pricing mechanism.

Another potential avenue for further research involves identifying any missing pricing mechanisms and understanding how this complete set of mechanisms mutually influence each other and whether the active or passive influence of the mechanisms is significant. It may then be possible to conclude that when social and output control converges, this always results in process control. Additionally, while this research mainly focused on civil engineering and infrastructure projects, it would be valuable to explore how these pricing mechanisms are expressed in other two-phase contracts and projects, such as several utility projects, which were not highlighted in this research.

Finally, follow-up research could investigate how to enhance the willingness of both major and minor civil engineering parties to adopt a two-phase approach with deferred pricing.

Conclusion

This paper aims to delineate where a balance can be struck in the price formation process of a two-phase approach. After extensive research, it can be concluded that a two-phase approach can be categorised under the term "coopetition," where a portion is competitively tendered based on quality, and collaboration is fostered to achieve the best outcome and pricing. Moreover, it has been found that deferred price formation is feasible in a project, provided that one of the established price mechanisms is utilized.

Academic sources and relevant projects have indicated that the list of price mechanisms is incomplete and requires additional items. Three subgroups, namely social control, process control, and output control, can be applied to map a balance in a project. The focus group meeting confirmed the validity of the price mechanisms from a legal perspective, emphasizing that their positioning and implementation depend on the individuals involved.

The research revealed that deferred price formation is an emerging phenomenon requiring substantive knowledge and willingness from both contracting and contracted parties. Case studies indicated that the balance between trust and control in the price formation process depends on various factors, such as willingness to collaborate, transparency among the parties involved, the people in the project and the underlying organizations and the complexity or novelty of the project components.

In addition, this research can conclude that the balance is not a fixed combination but rather a grey area between the different price mechanisms and the factors already mentioned. Thus, a balance between social control and formal control will have to be designed differently in each project, and this research can serve as a basis for finding the balance that best fits the context of the project in question.

Data Availability Statement

All data, models, or code produced or utilized during the research are of a proprietary or confidential nature and may only be provided with restrictions. This status pertains to the following data:

- Confidential documents
- Data obtained through the focus group
- Data obtained through the interviews

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Annexes

List of annexes:

- Annex I – Relevant projects
- Annex II – Overview case studies
- Annex III – Guide focus group
- Annex IV – Substantiation of price mechanism positioning
- Annex V – Interview guide

References

Alsaawi, A. (2014). A Critical Review of Qualitative Interviews. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2819536

Anderson, E., & Oliver, R. L. (1987). Perspectives on Behavior-Based versus Outcome-Based Salesforce Control Systems. In *Source: Journal of Marketing* (Vol. 51, Issue 4).

Aulakh, P. S., & Gencturk, E. F. (2000). International Principal-Agent Relationships Control, Governance and Performance. In *Industrial Marketing Management* (Vol. 29).

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Chao, A. M. B. (2021). 'Bouwteam samenwerking als een procesinrichting om het informatierisico en de gevolgen daarvan het hoofd te bieden. *Tijdschrift Voor Bouwrecht*, *8*.

CROW. (2020). *Handreiking "Aanbesteden van twee fasen contracten."*

Das, T. K. (1998). BETWEEN TRUST AND CONTROL: DEVELOPING CONFIDENCE IN PARTNER COOPERATION IN ALLIANCES. In ** Academy of Management Review 199B* (Vol. 23, Issue 3).

Das, T. K., & Teng, B. S. (2001). Trust, control, and risk in strategic alliances: An integrated framework. *Organization Studies*, *22*(2), 251–283. https://doi.org/10.1177/0170840601222004

Duijverman, A. (2022). *Aanwijzing: evenwichtig contracteren in de bouw – prijsstijgingen en levertijden*.

Erik Eriksson, P., & Hampp Verlag, R. (2006). *Procurement and governance management: Development of a conceptual procurement model based on different types of control* (Vol. 17, Issue 1). Rainer Hampp Verlag. http://hdl.handle.net/10419/78951

Eriksson, P. E., & Laan, A. (2007). Procurement effects on trust and control in client-contractor relationships. *Engineering, Construction and Architectural Management*, *14*(4), 387–399. https://doi.org/10.1108/09699980710760694

Huith, G. J. (2021). TBR 2021-96 Eerlijk werk voor eerlijk geld_. *Tijdschrift Voor Bouwrecht*, *23*(8), 6–6.

Jansen, C. E. C. (2009). *Leidraad Aanbesteden Bouwopdrachten 2009 Regieraad Bouw Commissie Aanbesteden voor de Bouw*.

Lahdenperä, P. (2010a). Conceptualizing a two-stage target-cost arrangement for competitive cooperation. *Construction Management and Economics*, *28*(7), 783–796. https://doi.org/10.1080/01446193.2010.487534

Lewicki, R. I., Mcallister, D. I., & Bies, R. J. (1998). TRUST AND DISTRUST: NEW RELATIONSHIPS AND REALITIES. In *Management Review* (Vol. 23, Issue 3).

Masseur, B. (2023). *Het selecteren van de beste samenwerkingspartner in aanbestedingsrechtelijk perspectief*.

Rijkswaterstaat. (2019). *Rapport-toekomstige-opgave-rijkswaterstaat-mei2019*.

Scholz, R., & Tietje, O. (2012). Types of Case Studies. In *Embedded Case Study Methods* (pp. 9–14). SAGE Publications, Inc. https://doi.org/10.4135/9781412984027.n2

Smolders, A. (2019). *Trust unravelled In inter-organisational relationships in a regulated tender environment* (Vol. 147). https://doi.org/10.4233/uuid:9c06cd80-10a2-465b-ba58-21bf3ad6795e

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Stake, R. E. (2013). *Multiple Case Study Analysis* (Vol. 342). Guilford Publications.

Stevens, M., MacDuffie, J. P., & Helper, S. (2015a). Reorienting and Recalibrating Inter-organizational Relationships: Strategies for Achieving Optimal Trust. *Organization Studies*, *36*(9), 1237–1264. https://doi.org/10.1177/0170840615585337

Taherdoost, H. (2019). What Is the Best Response Scale for Survey and Questionnaire Design; Review of Different Lengths of Rating Scale / Attitude Scale / Likert Scale. In *International Journal of Academic Research in Management (IJARM)* (Vol. 8, Issue 1).

UNETO-VNI. (2018). *MARKT VISIE - De techniek achter Nederland*.

Vosman, L., Volker, L., Boes, J., Vosman, L., Volker, L., & Boes, J. (2020). *From project to programme: drivers to a programmatic procurement approach in the Dutch construction industry*.

Wong, P. S. P., & Cheung, S. O. (2004). Trust in construction partnering: Views from parties of the partnering dance. *International Journal of Project Management*, *22*(6), 437–446. https://doi.org/10.1016/j.ijproman.2004.01.001

Yin, R. K. (2003). *Design and Methods* (K. Wiley, S. Robinson, & G. Dickens, Eds.; 3rd ed., Vol. 5). Sage Publications.

Zimina, D., Ballard, G., & Pasquire, C. (2012). Target value design: using collaboration and a lean approach to reduce construction cost. *Construction Management and Economics*, *30*(5), 383–398. https://doi.org/10.1080/01446193.2012.676658