Collaboration in construction consortia

A client's perspective

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COLLABORATION IN CONSTRUCTION CONSORTIA: A CLIENT'S PERSPECTIVE

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ABSTRACT

The current construction market is segregated, under-performs and becomes more complex. Often leaving the client helpless when projects go wrong. Consortia arise to handle the complexity and segregation, while improved collaboration between contractors can raise performance, but do consortia solve these problems? This research examines whether consortia affect the collaboration between contractors and if the client can influence this collaboration. Therefore, research objective is: *"Improving collaboration in construction consortia in the Netherlands by gaining insight in (different client and contractor related) factors, which influence unanticipated key moments."*. The research question that is answered to reach the research objective is: *"How does the client's influence, on decision-making by contractors in key moments, differ when working with a consortium instead of a main contractor with subcontractor?"*

The research considered three factors and five hypotheses that have been derived from literature. The factors are expected to be influential for collaboration, being: management style, relational capability and contractual context. All include more specific, measurable sub-factors. The hypotheses are expected consequences of working with a consortium and relate to collaboration between contractors and to the involvement of the client. The influence of the client on the factors has been assessed, as has the factors' influence on collaboration. This is done in four Dutch construction projects, using a combination of semi-structured interviews and surveys. Two of the projects are consortia and two are executed main contractor – sub-contractors (MC-SCs). Collaboration is examined using an 'unanticipated key moment'-approach, where two unexpected decision (during execution) were analysed. The decision-making process is traced to find which factors were of influence in which project and whether the client had an influence on them. The influences have been gathered and combined per case to conclude which factors influence decision-making and whether the client has an influence on this. The findings were then compared cross-case to draw better founded conclusions and to find what is affected by working in a consortium. This includes confirming or rejecting the hypotheses. As a last step, the results are validated using an expert panel of tender and contract managers from the client's side.

The research found that, though all factors influenced decision-making, the client's influence was limited. Relational capability has the highest influence on decision-making and the client has the most influence through the contractual context (i.e. incentives and contract type), the broadening of solution space and improving the contractor's higher management commitment. Though, the differences between MC-SCs and consortia were small for the factors, the hypotheses gave more insight in the differences. Working with a consortium does not improve the relation between contractors, neither does it improve goal alignment or reduces negative impact of conflicts. Working with a consortium does reduce the influence of the client on decision-making.

Knowing that working with a consortium reduces the client's influence and knowing that the contractual context, broadening of solution space and improving higher management commitment are possibilities for the client to influence decision-making, it is recommend to the client to use a combination of these if a larger influence is wanted. Above all, even though consortia are sometimes seen as a remedy against segregation, they are definitely not a guarantee for good collaboration and integration.

ACKNOWLEDGEMENTS

This thesis is the tangible and proud result of six months work. Six challenging and also exciting months, which now feel above all rewarding. In these months, I was often put out of my comfort zone more than I appreciated, but I also learned that in the end perseverance will be rewarded and that people are always willing to help. With those lessons, it feels like an appropriate ending of my seven years of study in Delft, being the last step to complete the MSc programme of Construction Management and Engineering at Delft University of Technology.

Considering that I wrote a thesis about collaboration, I realise that I could not have accomplished this without the help that I got. I therefore owe many thanks to everybody who helped me, most noticeably my committee. I would like to thank Afshin and Wijnand, for their intensive supervision and tremendous experience with properly setting up a research, which proved very valuable. Hans, for providing clear and concise feedback in the limited time he has, whilst still being available whenever necessary. Simone and Dik, for their tremendous experience with contracting in practice, full devotion to the smallest details of my research and for the ability to experience their work in tendering and procurement. I would like to thank the interviewees, since without their help, this research would not have been possible. Also, to all who helped me in my quest for cases, thank you for taking a moment of your time to speak to me, show enthusiasm for the subject and for trying to help me in any way. And last but foremost I want to thank in no particular order: Anne, Edith, Leon, Maartje, Marleen, Martin, Ruud and TwynstraGudde's C&RM department.

Though this is only a narrow and confined research, I do honestly hope that it can contribute in the slightest manner to the improvement of construction projects in the Netherlands. With that said, all that is left for me is to wish you a very pleasant read.

J.P.J. van Wijngaarden
Rotterdam, June 2019

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND GLOSSARY

ACRONYMS

D&C Design and Construct 84
E&C Engineering and Construct 95
IOC inter-organisational collaboration 51
JV joint venture 4
MC-SC main contractor – sub-contractor 110
NITE not in this example 88
PBJV project based joint venture 8
R&D research and development 7
RECAP relational capabilities assessment 73
RWS Rijkswaterstaat 84
SCM steering committee meeting 86
SPV special purpose vehicle 9

GLOSSARY

Although independent readability is endeavoured throughout this report, some terms need explanation that cannot be given every time the term is used. These often used terms are introduced in no particular order in this glossary. The terms are grouped per topic.

Research methodology

FACTOR Something of influence on decision-making. Those found in literature to be of influence on decision-making are: management style, relational capability and contractual context.

SUB-FACTOR A division of the factors from literature into more specific aspects.

ADDITIONAL FACTOR A factor that is not a result from literature, but is named by an interviewee to be of influence.

STATEMENT A by an interviewee given description of a (sub-)factor or influence.

Management style sub-factors

The shortened version of the following terms is used in tables, the longer version (in brackets) is used in text.

SPEED (OF DECISION-MAKING) A sub-factor of management style describing the speed of decision-making.

- **QUICK** A speed of decision-making typed as 'focus on rapid decision-making and decisiveness'.
- **CAREFUL** A speed of decision-making typed as 'a search for consensus in a careful decisions making process'.

POSITION (OF CONFLICT) A sub-factor of management style describing the position of conflict.

- **CENTRAL** A position of conflict typed as 'Organise central discussion with project direction'.
- **SEPARATED** A position of conflict typed as 'Move conflict to outside of process, offer extra forums for negotiation'.

COMMITMENT (FOR THE DECISION) A sub-factor of management style describing the commitment for the decision.

- **DEMANDED** A position of conflict typed as 'Ask for commitment on all major decisions'.
- **POSTPONED** A position of conflict typed as 'Offer stakeholders possibility to postpone commitment to decisions'.

AFTERCARE (OF THE DECISION) A sub-factor of management style describing the aftercare of the decision.

- **COMPENSATED** An aftercare of the decision typed as 'Invest in management of losers'.
- **NONE** An aftercare of the decision typed as 'Focus on cooperation with winners'.

RECAP descriptions

LOW A relational capabilities assessment (RECAP) score lower or equal to 3.5, based on the definition of Suprapto (2016).

HIGH A RECAP score higher than 3.5, based on the definition of Suprapto (2016).

Influence

NONE There is no influence possible.

NOT FOUND Though it is seen as possible, no influence was found.

NOT IN THIS EXAMPLE (NITE) The influence exists, but not in the examined decisions.

INDIRECT The influence exists, but is only partially attributed to this factor.

LOW The influence exists, but it did not impact the outcome of decision-making.

HIGH The influence exists and it did impact the outcome of decision-making.

1 INTRODUCTION

This chapter introduces the research that is carried out in this thesis. First the context is discussed, from which the problems that will be addressed follow. The knowledge that would help to solve the problem is then explored and a research goal is formulated, that helps to find this knowledge to solve the problem. Finally, a reading guide is presented.

1.1 PROBLEM AND CONTEXT

This section will introduce the context and the problem, and therefore also include the objective and relevance of this research. When looking at the current (Dutch) construction sector, one of the evident developments is that construction projects are becoming more and more complex over time (Williams, 2005)(Williams, 2002). At the same time, these construction projects are already inefficient and uncertain by nature (Cox and Thompson, 1997), often leading to projects not meeting their initial goals of budget, time and quality (Shenhar and Dvir, 2007). There are various reasons for and opinions on this, summarised for example by Dubois and Gadde (2002), but this research will focus on collaboration and the possibilities to improve it. Especially in consortia the collaboration is relevant, as many of the recent larger construction projects in the Netherlands, such as the ZuidasDok (900 million), A4 Midden-Delfland (700 million) and the new lock system in IJmuiden (500 million), are constructed by consortia. These consortia as a contractual relationship are in essence imposed by the larger financial risks and uncertainty of these projects, because the increasing size and complexity of construction projects increase the risk which can often not be borne by one single company (Cox and Thompson, 1997) (Gruneberg and Hughes, 2006).

A significant characteristic of consortia is the way in which they relate to the client (Gruneberg and Hughes, 2006). In the predominating consortium arrangement, the client has a less direct relationship with the work (Gruneberg and Hughes, 2006), which can mean that arising issues are handled internally without the client. Also, they are formed by companies who can have very different cultures and are in other projects competitors, while in the consortia they have to collaborate. These circumstances form a risk for the collaboration in the consortia and therefore for the project which they perform (Phua and Rowlinson, 2004). This raises the question how the client influences the collaboration in a consortium compared to a more traditional form of contracting, such as a (non-consortium) main contractor with several sub contractors. This form will from now on be named as main contractor – subcontractor.

To allow an analysis of the relatively vague subject of 'collaboration' the scope of the research must be limited to a more tangible process, which is decided to be the process of conflict resolution or *decisions in unanticipated key moments*. The research objective is therefore *Improving collaboration in construction consortia in the Netherlands by gaining insight in (client and contractor related) factors, which influence unanticipated key moments*. The examined moments will focus on the construction phase, however the influencing factors can also be present in other phases such as the tendering. This results in the research main question *"How does the client's influence, on decision-making by contractors in key moments, differ when working with a consortium instead of*

a main contractor with subcontractor?" More on the research questions and research approach can be found in Chapter 3.

This topic is relevant, because it is currently unclear which factors influence and can improve the collaboration specifically in consortia in the construction industry. On an academic level there are various works on collaboration, but none specifically on conflict resolution in consortia and the role of the client in this. This academic relevance will be elaborated in the next chapter during a literature review. On an industry level this is important for both the contractor and the client; the contractor because bad collaboration can hinder the performance of his project, the client because he can have a positive or negative influence on the conflict resolution and he wants what is best for the project. The construction industry, including important clients such as Rijkswaterstaat, has showed in his 'marktvisie' that they find good collaboration very important (Rijkswaterstaat et al., 2016). This proves the relevance on an industry level.

1.2 READING GUIDE

This research can be divided in three parts. The first part is the research framework, consisting of the literature study (Chapter 2) and research methodology (Chapter 3). The second part is the analysis consisting of the analysis itself (Chapter 4) and the validation (Chapter 5). The last parts are the results (Chapter 6), formed by the conclusion, discussion and recommendations. This is also graphically presented in Figure 1.1. To improve readability, the essence of each section is, if not put in a figure or table, summarised in a text-box. These red text-boxes appear throughout the report and, together with the figures, show the structure of the research at a glance.

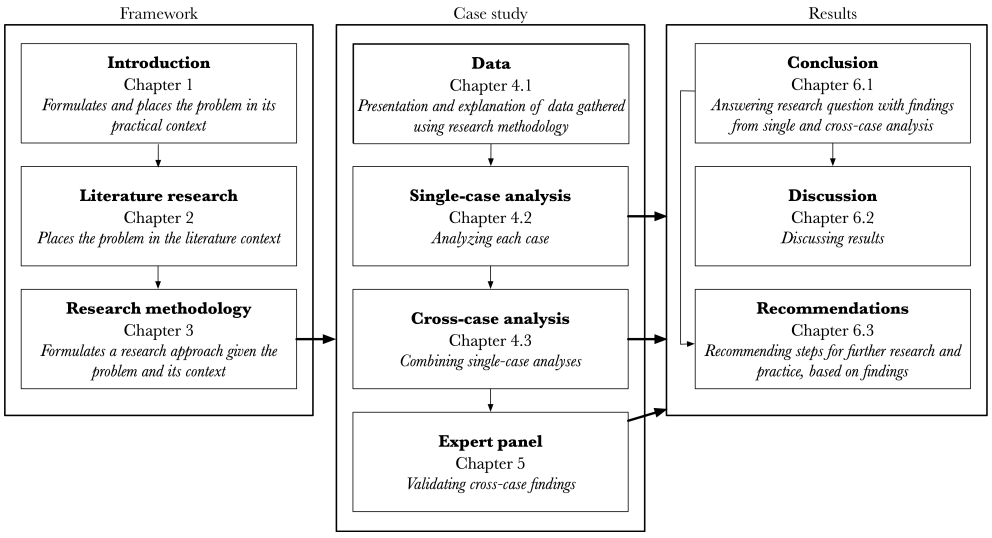


Figure 1.1: Reading guide

2 LITERATURE STUDY

This chapter will consist of a literature study, which is meant to review existing work on the topic to establish what has and has not already been researched to show the importance of the work and to show what the current understanding of the topic is. This chapter will also be used to answer five questions:

1. How is the term consortium defined in this research?
2. What hypotheses on the benefits of consortia results from literature?
3. Which types of unanticipated key moments exist according to literature?
4. Which factors influence the decision-making regarding unanticipated key moments according to literature?
5. How can the impact of unanticipated key moments be measured according to literature?

These five questions will be answered using the literature study and therefore relevant literature on these topics will be discussed in this chapter.

2.1 COLLABORATION IN PROJECTS THROUGHOUT HISTORY

The following sections show an overview of the introduction of collaboration in projects throughout history. From the start of project management and inter-organisational collaboration to an increasing interest in specific forms of collaboration and the changes and events in practice.

2.1.1 1950 - 1970

Although it is argued that project management is not only a 20th century discipline (Kozak-Holland, 2011) and significant contributions were for example already made in the 1910's by Henry Gantt (Chiu, 2010) it was not since the 1950's that systematic approaches started to appear (Seymour and Hussein, 2014). Also large (construction) projects such as the Hoover Dam, Manhattan Project and the Interstate Highway started to show the principles which influenced the development of standard practices for managing projects (Shenhar and Dvir, 2007). From that point on, together with technological advancement, project management kept evolving (Kwak and Stoddard, 2004).

2.1.2 1970 - 1985

The period from 1970 - 1985 showed the start of research into temporal inter-firm collaboration, which was in the field of organisation management. The research field of organisation management and organisational forms knows a long and broad history, but a starting point for inter-firm network and joint-venture research is the industrial economic research from the 1970's, elaborated with organizational research from the 1980's on how to design inter-firm networks and collaboration (Grandori and Soda, 1995). It was also in this period that the traditional theory of

vertical and horizontal integration was first supplemented with the introduction of quasi-integration (Blois, 1972).

2.1.3 1985 - 2000

A literature review regarding joint ventures (JVs) indicated that the period from 1985 - 2000 showed an increasing interest in JVs as a collaboration form and kept on increasing in popularity in the early 1990's (Lyons, 1991). Other research found similar results (Geringer and Hebert, 1991) and added that underperformance of **ijv!**s (**ijv!**s) ranged from 30% to 70% according to research from this period, creating an increased interest in the performance of JVs (Janger, 1980)(Killing, 1983)(Stuckey, 1983)(Beamish and Banks, 1987).

2.1.4 2000 - 2010

Following on the increasing interest for JVs, this period was a disruptive one, with an enormous increase of interest into forms of client-contractor collaborations (Bresnen and Marshall, 2000), but also a low point for trust between client and contractor. In the Netherlands, where this research focuses on, this showed in the form of the construction fraud (Dorée, 2004). In theory a trend towards the establishment of inter-firm relationships was seen, with main issues in cooperation (Söderlund, 2004). It was found that to improve project performance, the relationships between actors must be better understood and managed (Smyth and Pryke, 2008)(Smyth and Pryke, 2008). Literature examining a softer approach suggest improvement of project performance through partnering and collaborative working (Ahola, 2009)(Brady and Söderlund, 2008)(Bresnen and Marshall, 2001)(Geraldi and Adlbrecht, 2008)(Maurer, 2010)(Smyth and Pryke, 2008). There was also negative attention for consortia. It was said that construction consortia are merely a marketing device used by contractors, which only trouble the clients view on the work (Gruneberg and Hughes, 2006). In the Netherlands low point in trust was a result of corruption activities in 2002 (the 'Bouwfraude') which led to dishonest and strategic behaviour in the sector (Dorée, 2004) and got combined with the economic crisis in 2008.

2.1.5 2010 - 2019

This period marked the transition from increasing interest in research towards actual changes in practice, also due to the negative attention from the 'Bouwfraude' and economic crisis. This resulted in increased interest from clients shown in the development of the 'Marktvisie' since January 2016. This 'Marktvisie' is a development from several large infrastructure clients in the Netherlands, led by Rijkswaterstaat with the goal to change the culture in the sector. Both clients, contractors, advisers and end-users were involved to develop this vision. The 'Marktvisie' consists of five principles to reach the higher goal of increasing collaboration. One of these principles is tendering, which focuses on involving more collaboration in this process. (Rijkswaterstaat et al., 2016). Also in 2016, the new Procurement Directive was introduced together with the increased allowance of two tendering procedures and the introduction of one new tendering procedure. All of them focusing on positive factors for collaboration (Eriksson, 2010). In 2019 the renewed Dutch contracting law UAV-GC 2019 is to be introduced, with more focus on collaboration (Koenen, 2018).

In conclusion, inter-firm relations were introduced in the early 1970s, shortly after the introduction of modern project management, and gained momentum through the interest in JVs in the 1980s. In the 1990s, these JVs were also well known forms of collaboration in the construction sector and became also known as consortia. In the early 2000's there was an increasing interest in forms of client-contractor

collaboration and the performance of consortia was questioned. Following is a trend towards soft factors and collaboration, which despite some negative attention in the early 2000's is still showing in recent years. This is summarised in the simplified timeline in Figure 2.1.

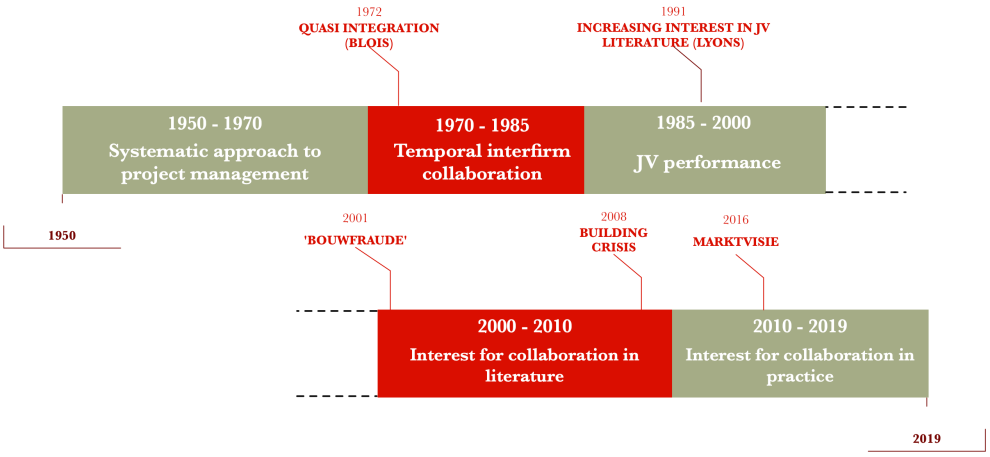


Figure 2.1: Highly simplified timeline of the development of relevant research

2.2 FORMS OF COLLABORATION IN PROJECTS

This section will first address some literature on the general conceptualisation of collaboration in projects, secondly discuss various forms of collaboration as they can be seen in literature, thirdly define a consortium as it will be used in this research and the case study and lastly draw up hypothesis on the benefits of consortia.

2.2.1 Collaborative relations conceptualised

The conceptualisation of collaborative relationships is discussed to create a general idea and framework to be able to compare the different forms of collaboration in projects. There are many works on the conceptualisation of collaborative relationships, many of them within the organisational management literature. A collaboration between companies is here often named a strategic alliance (Lorange et al., 1992), which can be confusing due to the use of (strategic) alliances as a contractual form in the construction sector (Sakal, 2005) (Crowley and Karim, 1995) (Ingirige and Sexton, 2012)(Todeva and Knoke, 2005). In the following paragraph, the term *strategic alliances* indicates any form of collaboration between companies.

Lorange and Roos classified strategic alliances based on the type of relationship which the parent organizations are going to have, which are based on the resources (human, organisational or physical) (Lorange et al., 1992). There are two types of resources: the ones used as input and the ones retrieved as output. Resources as input can either be sufficient for short-term operation or long-term adaptation and the output can either be retained in the alliance or returned to the parents. This creates four types of alliances: Ad hoc pool, Consortium, Project-based Joint Venture and Full-blown Joint Venture. This is show in Figure 2.2.

Other forms of conceptualisation are based on the degree of commitment (Robinson and Clarke-Hill, 1994), their strategic intent (Jarratt, 1998) or on a combination of factors such as number of firms, competitive position, equity structure and tasks (Garrette and Dussauge, 1995). From all these options the framework of Lorange and Roos is chosen because it has only two factors which are also relatively ease

to recognise, making this framework the most practically usable. The framework is shown in Figure 2.2

In this work it can already be seen that the term Consortium is in literature sometimes used for a different type of alliance, a long-term one, from which the parents retrieve the output. Therefore, the following section will discuss various forms of consortium collaboration found in literature and their differences.

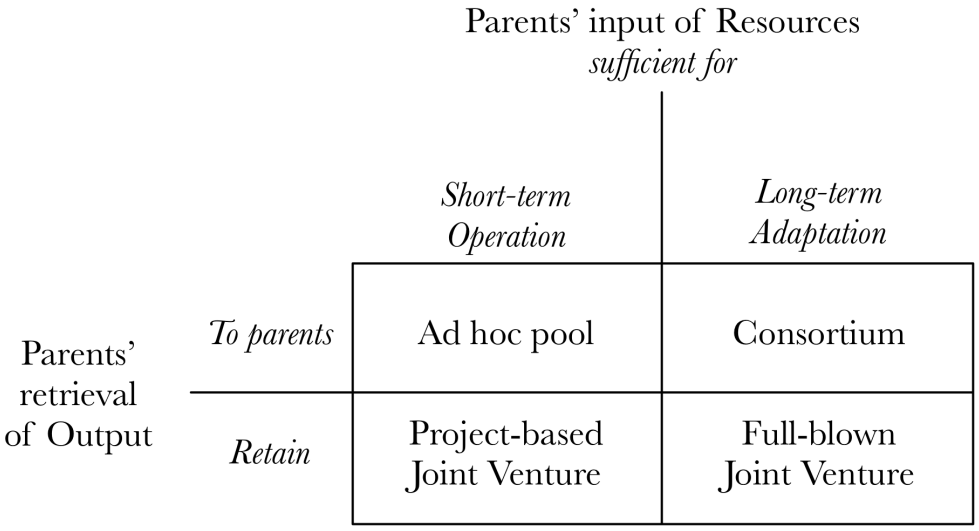


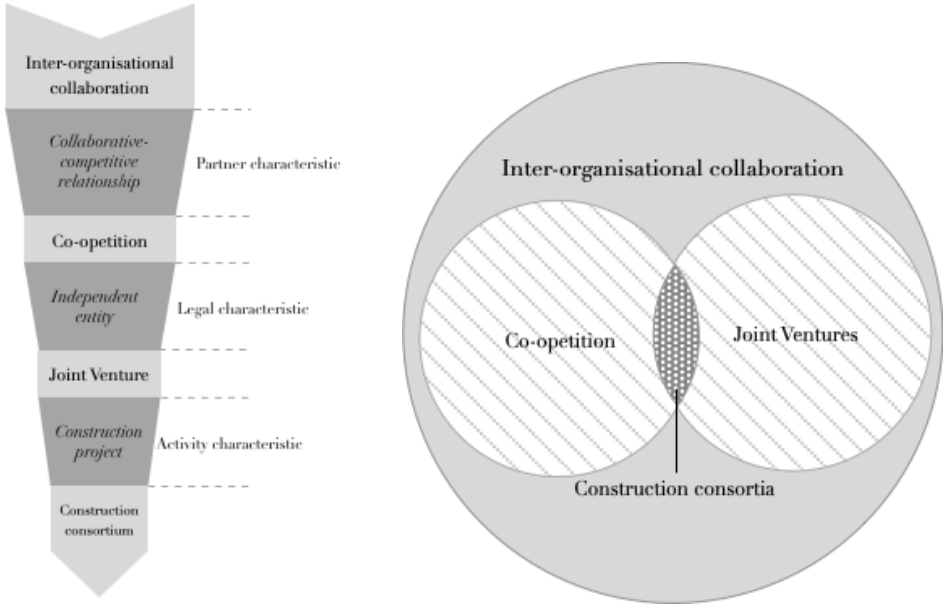
Figure 2.2: Classification of strategic alliances (Lorange et al., 1992)

2.2.2 Forms of consortium collaboration found in literature

There are many ways to classify these forms of collaboration and therefore a choice has to be made. Todeva and Knoke (2005) classified thirteen different organisational forms from literature, which would be too elaborate and are not often seen in construction. Albers et al. (2016)reviewed strategic alliance structures and found that the current typology can be summarised as either on collaborative activity, partner characteristics or legal entity, which can be operationalised and used to examine consortia from different viewpoints. From a partner characteristic viewpoint, the consortium collaboration can be seen as a form of *cooperative competition*, from a legal entity viewpoint, the consortia can best be seen as a *JV* and from an activity viewpoint, the consortia are off course best seen as a *construction consortium*.

This provides a selection process of organisational forms that narrows the selection every step based on the typology by Albers. As a starting point for the selection, the general form of inter-organisational collaboration (IOC) is added. Specifying on partner-characteristic, the typical collaborative-competitive relationships results, followed by the specific forms of JVs when applying the legal characteristic and lastly the construction consortia within this based on the activity viewpoint. This funnel is shown in Figure 2.3, together with a Venn diagram, showing that cooperative competition and a JV is a certain form of inter-organsational collaboration and that consortia are a subset of this being always cooperative competitive and a JV, but not every JV is cooperative competitive (Gruneberg and Hughes, 2006)(Bengtsson et al., 2010)(Gruneberg and Hughes, 2006)(Lyons, 1991). This division is simplified and can differ depending on the definition of the collaboration forms, but is made based on the definitions used in this section.

The four forms of collaboration will be examined in the following way: first several definitions are discussed and then relevant research on the form and its impact on collaboration is mentioned.



(a) Organisation funnel **(b)** Simplified Venn diagram of organisations

Figure 2.3: Relations between organisational forms

Inter-organisational collaboration

IOC is defined as *"a cooperative, inter-organizational relationship that is negotiated in an ongoing communicative process, and which relies on neither market nor hierarchical mechanisms of control"* (Hardy et al., 2003). Another, more broad, definition comes from Robinson and Clarke-Hill (1994): *"a coalition of two or more organisations intended to achieve mutually beneficial goals"* and by Varadarajan and Cunningham: *"the pooling of specific resources and skills by the cooperating organisations in order to achieve common goals, as well as goals specific to the individual partners"* (Varadarajan and Cunningham, 1995).

Research found that IOCs show complex dynamics and change over time (Majchrzak et al., 2015), explaining why some thrive and some under-perform (Das and Teng, 2000)(Greve et al., 2010) (de Rond and Bouchikhi, 2004)(Park and Ungson, 2001). It was also indicated that the negotiation of the contract is a vital process for the IOC alliance in a case study of research and development (R&D) alliances (Faems et al., 2008).

Cooperative competition

cooperative competition is defined as follows: *"we define cooperative competition as a process based upon simultaneous and mutual cooperative and competitive interactions between two or more actors at any level of analysis (whether individual, organizational, or other entities). Through this interaction, actors over time develop a cooperative competitive relationship."* (Bengtsson et al., 2010). They also define a cooperative and competitive continuum, which they used to characterise different forms of cooperative competition. Within the arena of dynamic cooperative competition, there is enough competition to stimulate development and enough cooperation to avoid over-embeddedness. An earlier and more broad definition by them is *"The dyadic and paradoxical relationship that emerges when two firms cooperate in some activities, such as in a strategic alliance, and at the same time compete with each other in other activities"* (Bengtsson and Kock, 2000) or even more basic *"a strategy embodying simultaneous cooperation and competition between firms"* (Gnyawali and Park, 2011).

Research has shown that, although challenging, the cooperative competition is helpful to advance technological innovation and benefits the partnering firms (Gnyawali

and Park, 2011). It is also said that cooperative competition is the most complex, but also most advantageous relationship between two companies and that the competitive and collaborative part of the relationship should be separated to manage it successfully. Meaning that the two relationships must be divided over different individuals (Bengtsson and Kock, 2000). In a later research a drawback is also mentioned: the strength of interactions on the continua must be moderate. If one of the two is overly weak or strong, the cooperative competition is not efficient as one of the continua is relatively strong and destructive (Bengtsson et al., 2010).

Joint Ventures

The number of definitions for JVs is extensive and differs greatly as said by Lyons (1991) and illustrated with the example of Borys and Jemison (1989) definition *'Joint Ventures result in the creation of a new organisation that is formally independent of the parents; control over and responsibility for the venture vary greatly among specific cases'* versus Christelow (1989) who defines joint-ventures to *'include both jointly owned business enterprises and long-term contracts covering supplies, technology exchange, production methods, licensing agreements and the like'* One of the more practical ones, which will be used here is *"A joint venture is characterised by a number of firms collaborating on a project, or a number of distinct projects, with a view to sharing the profits, each firm being paid on the basis of its agreed contribution in kind or in financial terms"* (Gruneberg and Hughes, 2006).

Research found that in project based joint ventures (PBJVs), smaller parties experience more market growth and are more successful, also, partners with a high legitimacy (client trust) are more likely to gain short-term income, while showing market loss in the long-term. Also, culture match plays a significant role in ensuring profitable joint-venture returns (Sillars and Kangari, 2004). This research is the result of a survey in the U.S. construction sector where success is measured as both joint venture and organisation return and the change in market position.

Construction consortia

Gruneberg defined construction consortia "as an arrangement between several firms, in which each firm contributes an equity stake in the form of risk capital or payment-in-kind in order to qualify as a member. Remuneration of consortium members may be calculated as a share of the net profits of the consortium" (Gruneberg and Hughes, 2006). However, it was also Gruneberg and Hughes who said that no single definition for consortia exists, and that several terms are used interchangeably which leads to confusion. Garrette and Dussauge (1995) for example examine consortia with a more long-term collaboration aimed at marketing a common product, such as the development and production of the Concorde supersonic airline project. It also is often used for R&D alliances, which collaboratively work on one or multiple developments, resulting for example in patents, but also for very specific purposes as the development of ICT-communication standards from which the results are openly shared (Xia et al., 2012). Another very specific use of the term is for a network organisation aimed to promote and facilitate knowledge sharing between an extensive group of consortium partners, e.g. aimed at sustainable living, which does not entail the production of a tangible product (Motloch et al., 2007).

Research has argued that a consortium is not a preferred way of working, but only a necessity due to size and complexity and a marketing device helping to win the contract, which afterwards mainly forms a barrier between the client and the construction process (Gruneberg and Hughes, 2006). They also said *"The consortium arrangement itself does not necessarily lead to closer working relations between the member firms. However, the personal relationships between the key members of the consortium are an essential component for the success of the project"* and *"the main source of risk and conflict is the reliance on other members of the consortium to deliver"*.

2.2.3 Defining the construction consortium

When defining the construction consortium for this research, the first demarcation comes from Lorange and Roos, choosing for their 'short-term', 'retrieving within entity' classification. In practice, this means that the consortium is a temporary and project-based collaboration, for which a legal entity or special purpose vehicle (SPV) is created with its own cash flow (Lorange et al., 1992). An addition to this comes from Gruneberg. He proclaimed in his definition of a consortium that each firm contributes an equity stake in the form of risk capital or payment and remuneration is calculated as a share of the net profits. Since in this research, there is especially an interest in the equal relationship in consortia, this is defined as the members providing a largely equal share of knowledge, accepting a largely equal share of risks and getting a largely equal share of the profits (Gruneberg and Hughes, 2006). The definition of a consortium to use in this research, resulting from literature, is as follows:

In short: ***Consortium definition***

A legal entity with its own cash flow formed by firms, contributing a largely equal share of risk capital or payment for temporary operation, who, after termination, retrieve a largely equal share of profits.

2.2.4 The purpose of construction consortia

As mentioned in the introduction of this chapter, the benefits of consortia are to be tested in this research. To do this, an overview is needed of such benefits as they occur in literature. Various hypothesis on the purpose of consortia can be found in literature. The literature review by Gruneberg and Hughes (2004) provides a recent literature study on the benefits and drawbacks of a consortium. Thirteen hypothesis have been distilled and shown below. The first four (in bold) fit best in this research' scope of collaboration and the role of the client.

Working with/in a construction consortium:

- **results in less destructive conflict**
- **improves collaborative working by improving the goal alignment of contracting**
- **does not result in a better relationship between underlying partners**
- **makes it more difficult for the client to oversee execution**
- is purely a marketing consideration
- reduces the duplication of effort
- lowers transaction costs
- is a, by contractors unwanted, result of the market consisting of several small suppliers.
- improves risk allocation
- is as inherent to conflict as traditional collaboration.
- creates a vertically more integrated process
- results in less fragmentation
- takes advantage of the management resources of all partners.

In short: *Hypotheses*

The four hypotheses in bold, at the end of the previous page, are the benefits of consortia resulting from literature that will be used in this research.

2.3 UNANTICIPATED KEY MOMENTS

This section will discuss relevant literature regarding unanticipated key moments and their conceptualisation (Section 2.3.1). Unanticipated key moments are something which, if not addressed swiftly, results in a conflict, and when being less specific it can also be seen as a decision moment. In the paragraphs following the conceptualisation, these moments will be categorised based on the events resulting in these moments (Section 2.3.2), as well as the way in which their resolution was approached (Section 2.3.3). Lastly, the ways to measure the impact which they have had will be discussed.

Research shows that it is evident that a project is ambiguous and filled with unexpected events (Pavlak, 2004) (Söderholm, 2008) and because these are impossible to assess and control, projects will change (Engwall, 2003) and unexpected events will show (Perrow, 1999) (Geraldi and Adlbrecht, 2008). Not just projects, also organisations show such events. As organisations pursue certain values and goals, which can be conflicting. Pondy (1992) states that instead of seeing organisations as cooperative and harmonious, they can be seen as a means to internalise conflicts. The amount of conflicts in an organisation also positively influences the amount of perceived differences between one's own contribution and that of others (Nauta and Sanders, 2001).

So, unexpected events occur and are leading to decisions to be made, known as unanticipated key moments. Unexpected events can be categorised and the decision process used to address the key moments can be categorised as well, which will be done in Section 2.3.2 and Section 2.3.3, but it starts with the conceptualisation of unanticipated key moments which will later help to examine these moments.

2.3.1 Conceptualising unanticipated key moments

When trying to conceptualise these unexpected key moments, the work of Pondy is crucial. Pondy (1967) described the process of conflict and conceptualised it in a way that is still applicable and became the basis for many more recent articles. Other notable work is the division of outcomes by Euwema et al. (2003), being relational versus substantive outcomes of conflict. Barclay (2011) made a model for interdepartmental conflict specific for organisational buying. Butler Jr (1973) examined the relationship between conflict and project management, but he found that more needs to be known about behaviour of employees and the function of conflict before predictions regarding their causality can be made. Rahim (2002) conceptualised many parts of the conflict management process, suggesting that conflict intervention can be structural or process orientated and is needed if the amount of conflict is not in balance with the type of conflict and task. Amongst other things he mentioned that a proper diagnosis of conflict consists of the measurement of the amount of conflict, the personal styles of handling conflict, the cause of conflict and whether the conflict was effective or informative.

The conceptualisation by Pondy (1967) helps to understand the conflicts and systematically compare them. Latent conflict is best described as the condition that is causing the conflict. Perceived conflict and felt conflict are different in the way that perceiving is about the awareness that the conflict exists, while feeling is about the tensions and anxiety, or the 'personalisation' of conflict. The perception of conflict

can differ per person. If felt conflict escalates, people might start attacking each-other instead of using factual arguments. Manifest conflict is the way in which the felt and perceived conflict discloses itself through communication. This can be seen in many forms: strategic behaviour, annoyance or distrust are examples (Walton et al., 1969). When this manifestation becomes dysfunctional it is called a 'dispute' (Pondy, 1967). Conflict management is the combination of all the attempts and effort to keep a conflict functional, as it can be both positive and negative, and involves all phases (Pondy, 1967)(Bercovitch, 1983)(Gray and Starke, 1984)(Baron, 1991)(Rahim, 2002). This aims to find a balance in the right amount of conflict and not about removing all conflict (Maylor, 2010) (Zikmann, 1992) (Meredith and Mantel, 2010). Conflicts can have a negative effect, but can also be positive. The aftermath entails the relationship between all experiences from the resolution of conflict or dispute and the following (felt) conflict. Earlier events form the basis for future cooperation, leading to less trust or on the contrary stimulate cooperation (Walton et al., 1969) (Pondy, 1967) (Koppenjan et al., 2011). This conceptualisation is simplified by Op de Woert (2013) and shown in Figure 2.4.

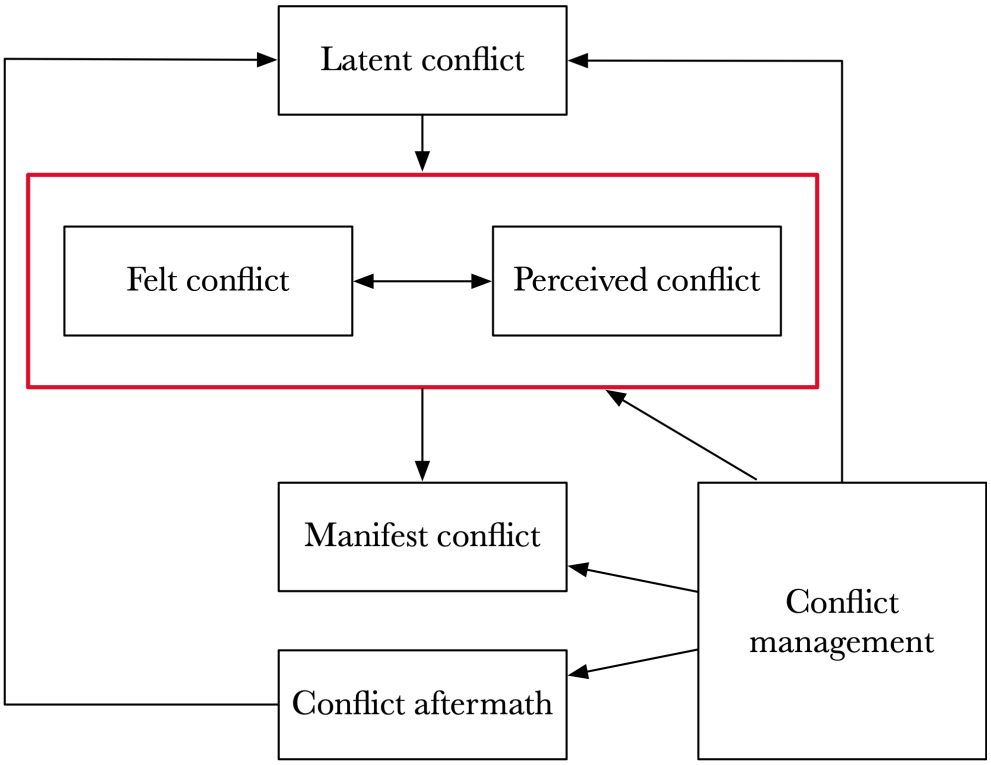


Figure 2.4: Conceptualization of conflicts by Pondy (1967) (adapted by Op de Woert (2013))

The work on process tracing is also helpful to analyse and compare conflict and decision-making. Especially the work on theory building, a specific type of process tracing (Loyens, 2014) (Beach and Pedersen, 2013). However, this is more relevant for the way the research is executed than for the topic of the research, and therefore the methods of process tracing will be elaborated in the Methodology chapter.

2.3.2 Categorising unanticipated key moment causes

In this section the various ways of categorising causes for unanticipated key moments will be discussed, after which one categorisation will be chosen.

A first division of these moments is made by Miller et al. (2000), being internal or external. Bröchner and Badenfelt (2011) make this a little more elaborate by naming that there can be multiple sources for these moments, such as political ones. Meredith and Mantel (2010) categorised concrete problems in performance, costs

and time. Priemus (2010) described thirteen pitfalls, from which some can be seen as unanticipated key moments. In addition to this, there are some distinctions based on the stakeholders causing the unexpected moment, being a distinction by power and interest most regularly used (Olander and Landin, 2005).

van Boggelen (2011) combined these sources into one uniform classification of unanticipated key moments with thirteen different categories. These categories will not all be named individually. For this research with four cases and eight moments, this categorisation is too broad. Because it is unlikely that this will result in many moments within the same category, which reduces comparability. The categories are therefore combined to the following broader categorisations of unanticipated key moments:

- Changes made by the client (scope, specification, contract).
- Changes due to the contractors (resources, under performance).
- Misalignment of contractors (information, physical situation).
- Abrupt stakeholder movement (media/social).
- Changes made by other external factors (technology, rules and regulations, natural factors).

2.3.3 Categorising unanticipated key moment management styles

Approaches used to address unanticipated key moments can be a project management or process management style (Meredith and Mantel, 2010), but will in practice always be a combination of the two (Koppenjan et al., 2011) (Geraldi and Adlbrecht, 2008). Another possibility is for example the work by Lehmann (2010) on the traditional and renewal school of management, but the project vs process is more widely used and therefore better comparable to other work. Project management is about predicting the design, tasks, time and budget of a project (Koppenjan et al., 2011). It consists of easy and pragmatic tools and can be seen as a "command and control" approach (Geraldi and Adlbrecht, 2008). Process management can be seen as the opposite end of the spectrum, where "command and control" is replaced by "prepare and commit" (Koppenjan et al., 2011).The difference between project and process management is often described by naming characteristics of both approaches (van Boggelen, 2011), but also by more concise definitions (De Wit, 2010). Another, more elaborate, approach is the one designed by Op de Woert (2013) with a total of 20 possible interventions of conflict, based on the conceptualisation of conflict by Pondy (1967).

The categorisation by Op de Woert (2013) is not used, as it would provide more details than useful in a case study of four cases and because the project versus process approach makes the results better comparable to other work. The project versus process approach will be used with the definitions used in interviews by De Wit (2010) *"Projectmanagement focuses on structured execution of a determined and demarcated scope while it steers on the control of time, money and quality. Process management focuses on together making it possible to create an dynamic and open scope while steering on increasing support, acceptance and feasibility."*. The work by van Boggelen (2011) can be used in the analysis by scoring whether parts of the conflict management shows more project or process management characteristics. In addition to this, the four principles by de Bruijn et al. (2010) are used to assess whether the process was of good quality: "A good process is an open process in which parties are offered security through protection of their core values, which offers sufficient incentives for progress and momentum and which offers sufficient guarantees for the substantive quality of the results". In Appendix A, the work of De Wit (2010) is displayed in more detail, including the general differences of project and pro-

cess management and the differences in conflict resolution for project and process management is displayed.

2.3.4 Measuring the impact of key moments

One approach to measure the impact of key moments has been designed by Op de Woert (2013), based on three different measures of successful management: project, process and organisational performance. Project performance can be measured in time, quality, costs and a trade-off between them (Maylor, 2010). Process performance is measured by checking whether goals are met, whether parties have learned, whether parties have build relationships, whether parties are satisfied and if the process was fair (Veeneman et al., 2012). Organisational performance is measured specifically for the rail network, which was the focus of Op de Woert his work, in which public values played an important role. All of these values (safety, punctuality, robustness, customer satisfaction and sustainability) can be seen as part of the quality of the project performance and are therefore not separately examined. The project performance and process performance together result in the table with indicators shown in Table 2.1.

Perspective	Topic	Explanation
Project	Time	"What is the effect of the conflict on meeting the project schedule?"
	Quality	"What is the effect of the conflict on quality of the project?"
	Costs	"What is the effect of the conflict on meeting the project budget?"
	Trade-off	"Was the trade-off between time, cost and quality in line with the" project goals?
Process	Goals	"Have goals, including new goals, been realized while resolving the conflict?"
	Satisfaction	"Do parties perceive the outcome of the conflict and its process as satisfactory?"
	Learning	"Have the parties learned during the management of the conflict?"
	Fairness	"Was the process of resolving the conflict fair?"
	Relationships	"Have long lasting relationships developed, that will facilitate future cooperation?"

Table 2.1: Impact of key moments (based on Op de Woert (2013))

2.4 FACTORS INFLUENCING CONSORTIUM COLLABORATION

There is an extensive amount of work on collaboration and factors influencing this. To examine this clearly, the start will be a general exploration of more broad literature regarding collaboration, then focusing on more specific literature. This specific literature will be used to find relevant fields of factors, that will be elaborated elaborated in separate sections.

The broad exploration can be found in the following section (Section 2.4.1, the more focused exploration in Section 2.4.2 and the more elaborated literature study in section Section 2.4.3 and Section 2.4.4.

2.4.1 General exploration of influencing factors

When looking from the broadest perspective, the work by Coase, Williamson and Hofstede is relevant. It describes the motives and intentions of firms and professionals in collaborative relationships. Coase's work from 1937 is often considered as the start of the New Institutional Economics and in 1991 awarded by a Nobel prize in Economics, proving it's relevancy today (Coase, 1937)(Williamson and Coase, 1989). Coase's main question was: "If the market is indeed efficient, then why do firms decide to merge?" (Coase, 1937). He answered this by saying that when buying in a market, there are transaction costs added to the price of the good in the form of transaction costs, e.g. bargaining costs, trade secrets or enforcement costs. The

decision whether to gather resources from the market or temporarily merge in a consortium has already been made in the cases, but the previous considerations can still be influential for the way the collaboration works.

Williamson's work elaborated on the transaction costs economics in various publications (Williams, 2002). He introduces dimensions to describe transactions (uncertainty, frequency and asset specifity) and a layer model for social analysis of institutions with the levels of resource allocation, governance, institutional environment and embeddedness (Williamson, 1975) (Williamson, 1998). It is argued that according to transaction cost theory, the bargaining and political influence costs is higher in a JV than in a hierarchy (Pearce, 1997). As said before, the TCE can help analyse the decision to work in a consortium, and the added framework can help to analyse behaviour of the contractors.

Hofstede's work focused on the differences in culture between people. He found six dimensions, being Power-Distance, Individualism, Masculinity-Feminity, Uncertainty Avoidance, Long Term Orientation and Indulgence vs Restraint (Hofstede, 2001). These help to understand the differences in culture between people from different origins and are often used to explain cultural differences between countries. In addition to this, there are also six cross-organisational dimensions, which are less often used. It has been found that in IJVTS the negative effect of culture on performance does not originate from differences in national culture, but from differences in organisational culture (Pothukuchi et al., 2002). Sui Pheng and Yuquan (2002) calculated these cultural dimensions for a small sample of construction projects in China and Singapore, which were significantly different than the national scores. The consequences for these differences were listed in a general way. This could provide a manner to compare cultural factors influencing collaboration, but a more specific and organisation oriented framework is preferred.

2.4.2 Focused exploration of influencing factors

Several researchers have examined collaboration in a more focused way, in relationship to conflict management. Thompson (1961) found that inter-organisational conflict is determined by four factors, then there are the seven behavioural factors by Euwema et al. (2003) that influence the effectiveness of conflict behaviour and Jehn (1997) used a division of relational conflict, process conflict and task conflict and found several relationships. Many more research has been done and many aggregations of such factors have been made, for example the 103 factors by Korvinus (2017) and the elements of collaborative relationships by Suprapto (2016). Both aggregations show two main types of factors influencing consortium collaboration in which this research is interested: contractual factors and relational factors. This division is validated by various literature stating that contracts have an influence on collaboration (Suprapto, 2016) (Demirel et al., 2017) (Consoli, 2006) as well as on project execution (Nissen, 2001) (Walker and Rowlinson, 2008). The influence of relational factors on collaboration is shown in regard to partnering (Chan et al., 2004)(Larson, 1995)(Meng, 2010), but also relational factors in general can have positive or negative effects on collaboration (Cheung, 2009)(Smyth and Pryke, 2008). These two categories will therefore be analysed further in the following sections.

In short: ***Exploring influencing factors***

Though the theories from economical and cultural science do not yield directly usable factors, it does show that the factors mainly fall within two categories: contractual and relational factors. These two categories will be examined further.

2.4.3 Contractual factors for consortium success

Different contract forms can lead to a different relationship between client and contractor (Griffiths, 1989) (Veld and Peeters, 1989). So contractual factors must be examined and selected to make a good comparison between collaboration in cases possible. This section will start with a classification of contract forms and continues with other factors in the contract context that might influence collaboration.

Contracts can be categorised in many different ways, with common ones being their remuneration principle, governance mechanism or incentive and risk sharing scheme (Suprapto, 2016). Moree (2013) discussed many of the categorisations, which eventually resulted in the categories of lump sum, unit rates and partnering contracts. This categorisation is often seen, but when performing a case study with four cases in the same period, country and sector, the chance is high that all contracts will fall in the same of these broad categories. This shows in the work by Suprapto (2016) where in 119 projects over different sectors the share of the three contract types was 54%, 34% and 12% percent. Giving a significant chance of nine[1] percent that all contracts will fall in the same category making this part of the analysis impracticable.

Therefore, a broader categorisation will be used. To ensure the practical applicability of the categorisation the work of Moonen (2016) is used, which is specific for the Dutch construction and infrastructure sector. The following forms are used on a scale from traditional to life cycle contracts.

- Bill of quantities ('Regie')
- Bill of quantities specified according to the RAW specification (a Dutch standard for Civil Engineering projects).
- Design Bid Build with early contractor involvement ('Bouwteam')
- Engineer and Construct
- Design and Construct
- DBFM
- DBFMO
- Concession Agreement

This is also displayed in Figure 2.5. The first two forms are forms of unit rate contracts. The next three are lump sum contracts and the last four are alliance contracts.

There are also other contract related aspects which can influence the collaboration (Op de Woert, 2013) (van Boggelen, 2011) (Suprapto, 2016). Meng (2010) combined all this in a literature study together with expert opinions resulting in eight criteria with sub-factors. Many of those overlap with relational criteria (Objectives, Trust, Collaboration, Communication and Problem Solving). The ones not overlapping with relational factors are the Risk Allocation and Continous Improvement and will be used with the following defined subcriteria to get more insight in the contractual context:

- Risk Sharing (Risk Allocation): "to assess whether the parties are willing to share the risks or not" (Meng, 2010).
- Incentive mechanism (Continuous Improvement): "to assess whether single-incentive or multiple-incentives are established in order to motivate the parties to achieve best value and ensure project success" (Meng, 2010).

[1] $0.54^4 = 0.09$

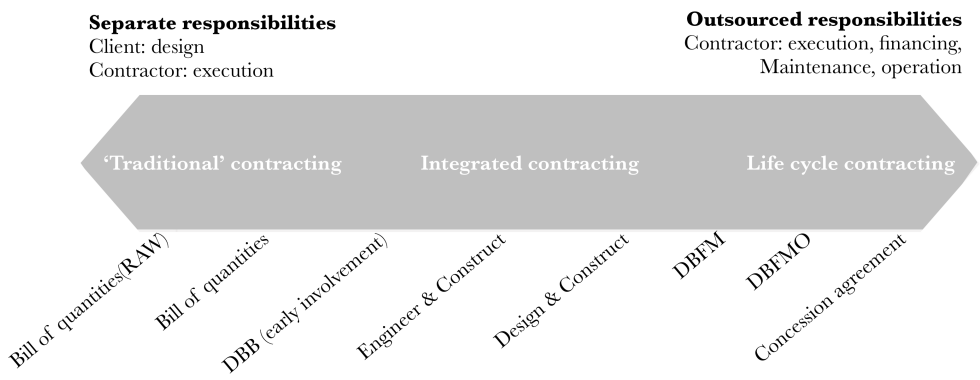


Figure 2.5: Categorisation of contract types (adapted, from Moonen (2016))

- Performance measurement and feedback (Continuous Improvement): "to assess whether there are common performance measures between the parties and whether the performance measurement is fed back on a formal and regular basis" (Meng, 2010).

2.4.4 Relational factors for consortium success

This section will discuss the relational factors that can lead to a difference in the way unanticipated key moments evolve, after which a choice is made for the categorisation of these factors.

Six factors of good collaboration were found using a statistical model (Suprapto et al., 2015): quality of communication, cohesion, balanced contribution to the work being done, aligned effort, affective trust between partners and mutual support. These factors are a very useful measure of good collaboration, but are too abstract and broad to be measured in this case study. A year later, Suprapto presented another work: the RECAP model, which provides an assessment of the relational capabilities of a client and contractor based on various aspects in a detailed and well validated manner (Suprapto, 2016). Wu et al. (2017) used a survey to test the impact of several variables regarding communication willingness, formal communication and informal communication on conflict and project success. He found that a total of nine variables from all three categories had significant impact on conflict and project sucess.

Although, Suprapto's work focused on a single client-contractor relationship and not on a contractor-contractor relationship, there are various reasons why his work is still applicable. First, RECAP named the most specific, validated and practical factors. Second, the contractor-contractor relation might be different than the owner-contractor relation in the sense that it is a different inter-firm relation, but RECAP is also developed to examine the inter-team relation at project team level (Suprapto, 2016). The project team is of equal composition whether it regards owner-contractor or contractor-contractor relations and in that sense, RECAP already examined contractor-contractor relations. Lastly, as this does not make the relations completely equal, the research by Wood and T Ellis (2007) found that these two relations are similar in partnering contracts. Their research in the UK construction sector indicated that the views on 'upstream' (owner-contractor) and 'downstream' (contractor-(sub)contractor) relations are similar. Therefore, his work is most suitable to use and is elaborated in the next section.

In short: *The factors*

The factors, resulting from literature to influence decision-making, that will be used in this research are: management style (process vs. project management), relational capability (using relational capabilities assessment (RECAP)) and contractual context (contract type, risks, incentives and performance measurement).

The RECAP model

The RECAP is designed by Suprapto (2016) to measure "the state of the owner-contractor collaboration". It does so using four "significant collaborative factors" and two "performance criteria" (Suprapto, 2016). These factors and criteria are derived from theory using an extensive literature study. The study resulted in a conceptual framework. This framework was tested empirically using Q-methodology and the reflections from 30 project practitioners. The resulting hypotheses on relational and contractual factors were tested using a sample of 113 capital projects, applying partial least squares structural equation modelling. The resulting collaborative factors and performance criteria are combined in a tool. This tool, named RECAP, was validated using three projects and thus three pairs of owner and contractor. The validation suggested that RECAP is a useful self diagnosis tool for different project phases. It also helps to build awareness and constructive discussions to improve relationships. The tool uses an assessment form with different questions. These questions together form the scores on sub-criteria which are compared between owner and contractor, showing score gaps that indicate potential misalignment between owner and contractor. The RECAP model also has drawbacks: it is originally meant to assess the relational capability of a client-contractor relationship and will now be used to assess a contractor-contractor relationship, which is a cooperative competitive one. The RECAP model will be used to map the relationship between the contractors, so that more can be said about their behaviour during unanticipated key moments and the influence of the client on this. To do this, the questions have to be slightly adapted to indicate the contractor-contractor relationship.

2.5 THE COMBINED FRAMEWORK

When combining these factors it is important to know how these factors relate to the contractor-client relationship. On a general level the role and relationship of the client-contractor is best described by the Principal-Agent theory (Jensen and Meckling, 1976) and has been a motivation for the design of incentive contracts (Laffont and Martimort, 2002). However, studies have been unable to fully capture the interaction between client and contractor (Chang, 2013). More specific, the role of the client and its relationship with the contractor is often examined in combination with the project performance. The results of various studies on this show a major effect of this relationship on performance (Larson, 1995)(Meng, 2012). A way to use this relationship to improve performance is often suggested to be partnering (Suprapto et al., 2015), which however shows both positive and negative effects. This does not directly tell much about the influence of the client on the relationship between contractors, neither does other research. This research will try to start filling this knowledge gap by examining if and how the client influences the relationship between contractors.

When the various factors for client influence found in this literature (the contractual context, management approach and the relational capabilities on one hand and the classification of the decisions on cause and impact on the other hand) are com-

bined in one framework, the literature based framework results. This framework is schematised in Figure 2.6.

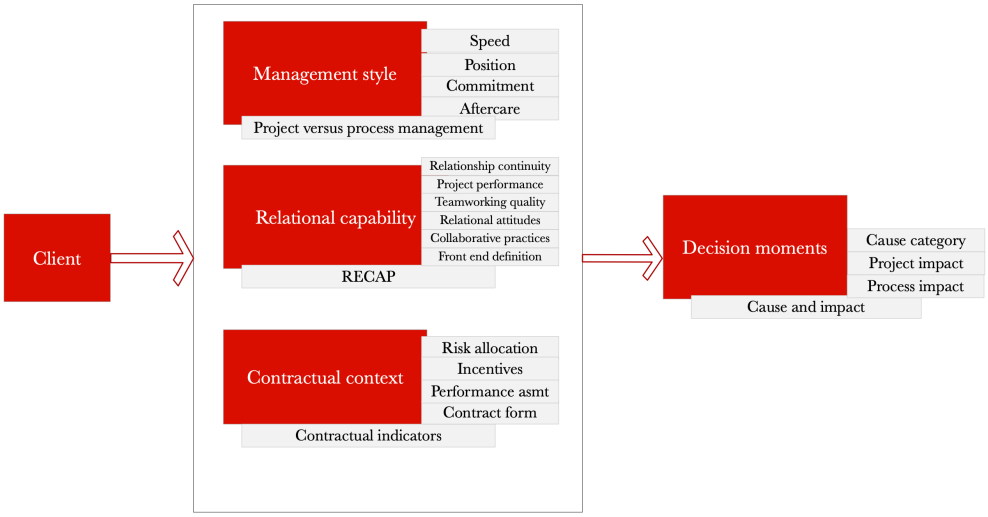


Figure 2.6: Combined literature based research framework

2.6 CONCLUSIONS FROM LITERATURE RESEARCH

The definition of a consortium to use in this research, resulting from literature, is as follows: *A legal entity with its own cash flow formed by firms, contributing a largely equal share of risk capital or payment for temporary operation, who, after termination, retrieve a largely equal share of profits.* Conflict resolution is best conceptualised by Pondy (1967) and can be further compared by categorising the causes of unanticipated key moments, being changes made by the client, changes due to the contractors, misalignment of contractors, abrupt stakeholder movement and changes made by other external factors. These causes are adapted from Op de Woert (2013). The factors influencing conflict resolution tend to fall within two categories: contractual and relation factors. Relational factors are best assessed with RECAP by Suprapto (2016). Contracts are most relevant categorised by Moonen (2016), but to create a more detailed view of the contractual factors, the characteristics derived by Meng (2010) must be added: risk allocation, incentives and performance assessment as described in the contract. In addition to this, the management approach used to address the unexpected key moment is best examined by scoring it on project versus process management, for which indicators from De Wit (2010) and Op de Woert (2013) are derived in Appendix A. The resulting impact of the key moments is measured on project and process factors as described by Op de Woert (2013).

All the above is used to address the differences between (the client's influence on decision-making when) working with a consortium and working with a main contractor – sub-contractor (MC-SC). The following four hypotheses result from literature and fit within this research' scope as the benefits of working with a consortium. Working with/in a construction consortium:

- results in less destructive conflict.
- improves collaborative working by improving the goal alignment of contracting.
- does not result in a better relationship between underlying partners.
- makes it more difficult for the client to oversee execution.

3 RESEARCH METHODOLOGY

This chapter elaborates on the methodology used to answer the research questions. The problem, context and current state of the research field are known, so the scope of the research can be determined together with a plan on how to execute the research. This chapter will start with the scope and goal of the research, by defining research questions. Then follows the body of the research by defining what will be examined: the key moments, cases and factors and in which steps these will be analysed. Lastly, the validity and reliability of the results of the research are discussed.

3.1 RESEARCH QUESTIONS

The research objective is:

Research objective

"Improving collaboration in construction consortia in the Netherlands by gaining insight in (different client and contractor related) factors, which influence unanticipated key moments."

The research question that must be answered to reach the research objective is:

Research question

"How does the client's influence, on decision-making by contractors in key moments, differ when working with a consortium instead of a main contractor with subcontractor?"

This makes the research a practice-oriented research focusing on the design of theory (Verschuren and Doorewaard, 2010). The question will be answered using a case study (Yin, 2009), examining two parts. The study starts to examine several factors that, according to literature, affect the quality of decision-making in key moments. The key moments are decision moments where the contractors take an explicit decision during execution which is characteristic for the collaboration between the contractors. The case study secondly tests hypotheses which, according to literature, are why consortia are beneficial for clients and collaboration. The factors and hypotheses have already been defined in the literature study in Chapter 2 and will not be named in the sub-questions. This leaves the following sub-questions:

1. How do the **factors** that were found in literature (relational capability, managerial approach and contractual context) **influence the decision-making in practice**?
2. Are the **factors** (relational capability, managerial approach and contractual context), and therefore the decisions, **influenced by the client** in practice?
3. Are there **differences** in the decision-making **between consortia and main contractor – sub-contractors (MC-SCs)**?

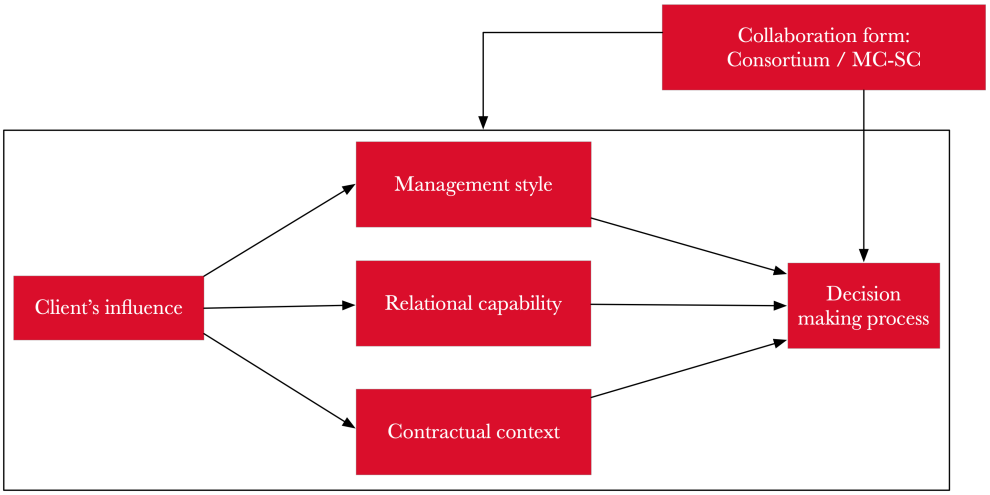


Figure 3.1: Elaborated research framework

When projecting this onto the research framework, there are some causal relations that become evident and that must be tested. This research framework was developed in Chapter 2 and the elaborated version is shown in Figure 3.1. The first sub-question results in the causal relations from the factors[1] to decision-making. The second sub-question results in the causal relations from the client to the factors. The third and last sub-question relates to the causal relations from the collaboration form. The first two sets of relations (and first two sub-questions) are tested in the interviews. The last two sets of relations (and the last sub-question) are found by comparing these findings. The way in which these propositions are tested is explained in the following sections.

3.2 RESEARCH DESIGN

The scope and goals of the research are determined, now follows how these questions can be answered. This is done with a qualitative study formed by a literature study, interviews and an analysis of the found information. The analysis includes a validation session. The three steps will be explained here, including the theoretical design, but starting with a recap of the literature study.

3.2.1 Recap of literature study

The literature study has already been performed in Chapter 2 and gave answers to the first five (research) questions: the definition of a consortium, hypothesis on the benefits of consortia, how to measure the type and quality of conflict resolution and the (operationalised) factors that influence decision-making.

The three factors that are found are the contractual context, the management style and the relational capability. These are operationalised in the literature study and selected in the interview protocol, because not all factors can be examined in the limited time available for the interviews. The interview protocol can be found in Appendix C and includes the following factors:

- Contractual context
  - Type of contract (Bill of quantities, DBB, Engineering and Construct (E&C), Design and Construct (D&C), DBFM(O) or concession)
  - Risk sharing in contract

1 These factors are: the management style, relational capability and contractual context

  - Measuring performance
  - Incentives in contract
- Managerial approach (project versus process)
  - Speed of decision-making. Are decisions quick and decisive or careful and with as much consensus as possible
  - Position of conflict. Are decisions discussed centrally or as much separated from other processes as possible?
  - Commitment for the decision. Was commitment demanded directly or was this postponed?
  - Aftercare of the decision. Was there after the decision more attention for compensation of the losers or for cooperation with the winners?
- Relational capability

  The relational capability is tested using an adapted RECAP assessment in a survey after the interview. The full survey can be found in Appendix E. The survey results in a score on the following factors:
  - Relationship continuity
  - Project performance
  - Teamworking quality
  - Relational attitudes
  - Collaborative practices
  - Front-end definition

These factors will help to answer the first two research questions. The last research question is answered using hypotheses that were also constructed during the literature study. The hypotheses from literature are rephrased and put in the framework shown in Figure 3.2. In this figure, the relation to the research framework of Figure 3.1 is shown, in which two coloured arrows are shown, relating to the coloured hypotheses. The positive (green) hypotheses relate to the relational capaibility of consortia and the negative (red) arrow to the client's influence on consortia.

3.2.2 Theoretical design

For this type of research an embedded multiple-case (type 4) design (Yin, 2009), using theory-testing process-tracing, is used (Beach and Pedersen, 2013). A case study is suited because the research question is a 'how' question and therefore needs the possibility to take complexity and the richness of reality into account in the research (Yin, 2009). A multiple-case design is used since this is possible and therefore preferred over a single case design (Yin, 2009). The embedded type analyses two units (i.e. decisions) per case (i.e. project). This is used to better return to the larger unit of analysis (i.e. collaboration) (Yin, 2009). The process-tracing is used to get insight in the unit of analysis: the decisions, and is a form of explanation building as a case study analytic technique. It is suitable for this, because it goes a step further in studying causal mechanisms by looking into the intermediate factors between cause and effect and does so already on case level (Beach and Pedersen, 2013). The theory testing form is relevant because literature revealed propositions on causal mechanisms for which the presence and function must be tested (Beach and Pedersen, 2013). The complete research design is schematically presented in Figure 3.3 and the embedded multiple-case design is shown in Figure 3.4. In the following sections the three steps of literature study, interviews and analysis are explained.

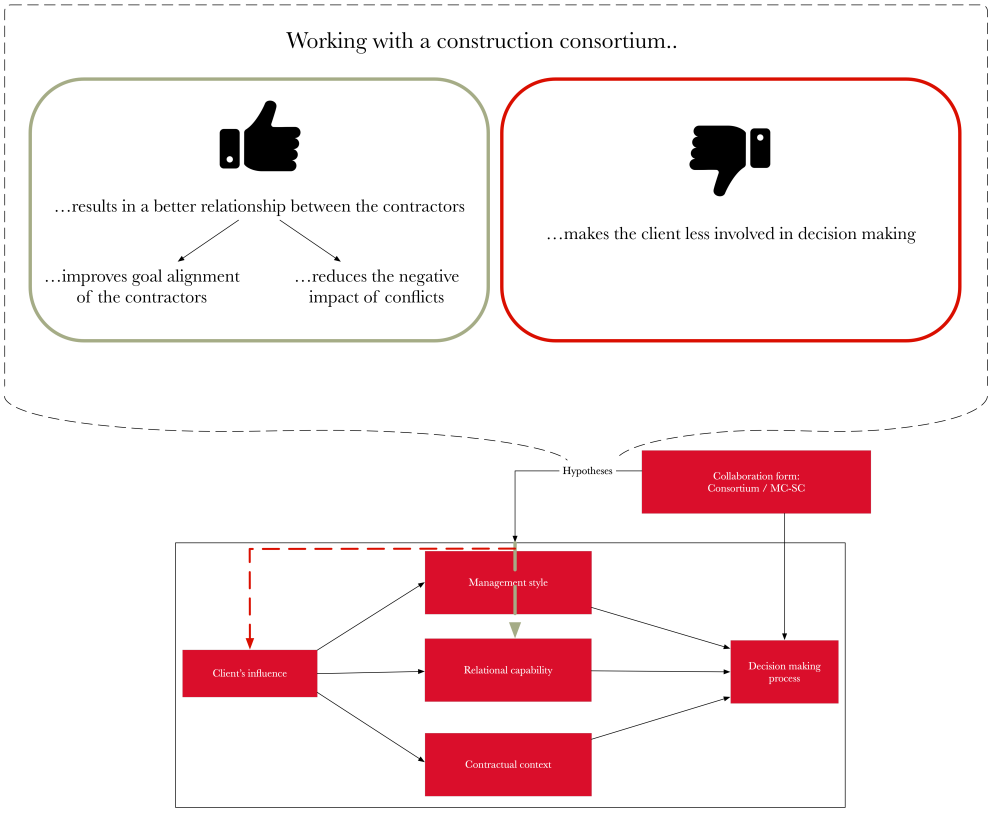


Figure 3.2: Hypotheses framework to answer last research question

3.2.3 Interviews

The second phase consist of the interviews. With the interviews, this research strives to gather generalised findings and tries to shed empirical light on the working theory formed from literature. Process tracing is used as a framework to link the practice to theory. These interviews are semi structured and involve both contractors and the client. The semi-structure helps to gather comparable data, whilst still being able to cope with the variety of decisions. The interview focuses on the presence of influential factors on decision-making (relational capability, managerial approach and contract), the resulting quality of decision-making, the influence of the client on this all and how this might have been different when the contractors worked in a different relation. The process of decision-making is traced in the interviews. The interview protocol can be found in Appendix C in full detail.

The cases where interviews will take place are a total of two consortia and two MC-SCs. Within each of these, two conflicts will be examined, making a total of eight conflicts. These conflicts will be studied using multiple interviews (with both the client and contractor) and need proper planning as well as extensive preparation. The cases will be further discussed in Section 3.3.

3.2.4 Analysis

The theory-testing process-tracing is conceptualised and operationalised in the literature study. This leads to the theory formulated in the propositions on which evidence is collected during interviews and then tested against the theory. The testing of the propositions is done by summarising per project what is said in the interview whilst referring to the interviewee, providing the data. The audio files of the interviews are not added, but the summaries with the data per project are. The data of each case consist of some general information regarding the project, the interviewees, a description of the decision-making process and the found presence

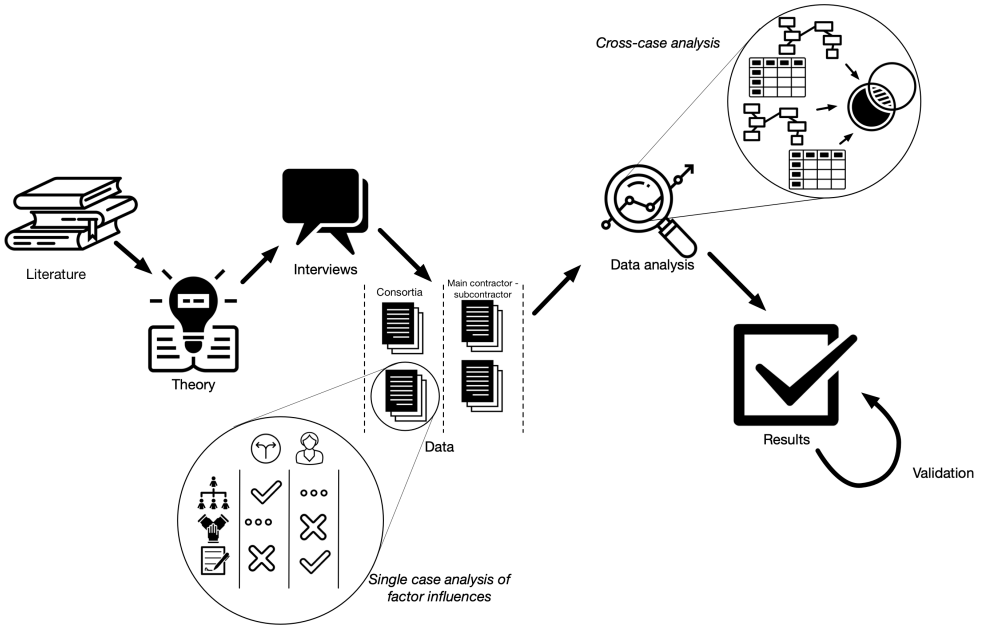


Figure 3.3: Overview of research design

of the factors[2]. The influence of the factors on the decision-making and the influence of the client on this is described in the summaries. In addition it is graphically presented in the form of Figure 3.1 and it is quantitatively presented in a table showing which factors were found, in which form, whether they influenced the decision moment and whether they were influenced by the client. This helps to increase the comparability.

The second phase is the comparison, or cross-case analysis, of the cases. The found relations in the cases are compared and those that have showed in multiple cases are presented, while those that show in single cases are discussed. The combination of this can lead to a conclusion on each of the relations proposed in the theory in Figure 3.1. With this data it should become possible to answer the last research question, *"How does the client's influence, on decision-making by contractors in key moments, differ when working with a consortium instead of a main contractor with subcontractor?"*, and reach the research objective.

To give more insight in this complete process, it is summarised in Figure 3.3.

3.3 THE CASES

There are several decisions made for the case selection of this research:

- The consortium has to have two parties.
- Both parties are Dutch firms.
- One of the parties is a contractor and the other party can either be a contractor or a specialist in the technical domain (e.g. an engineering firm or installation company, but it can not be a bank or pension fund).
- The main contractor can have multiple sub-contractors, but only one will be involved per studied decision.
- The sub-contractor can either be a contractor or a specialist in the technical domain (e.g. an engineering firm or installation company, but not a bank or pension fund).

2 These factors are: the management style, relational capability and contractual context

Project	Phase	Contractors
Real estate		
Erasmus MC	Delivered (2018)	BAM & Ballast Nedam
Paleis het Loo	Construction phase	Several separate contracts (BAM, VSF, Heijmans)
flood control		
Project A	Confidential	Contractor A & Contractor B
Project B	Confidential	Contractor C & Subcontractor X
rail infrastructure		
Project Charlie	Confidential	Contractor D & Contractor E
Project Delta	Confidential	Contractor E & Subcontractor Y

Table 3.1: Short list of projects

- The projects are roughly of the same size, are in execution or have been finished not more than 2 years ago and the projects fall in the same category (e.g. dike reinforcement or real estate construction).
- Preferably the projects are commissioned by the same client and are executed by (partly) the same (type of) contractors.

3.3.1 Selection process of cases

First, a long list of projects was constructed. This list is based on the projects in which TwynstraGudde was involved in 2018, providing a sample of 30 projects in the Dutch construction sector. The long list contains the part of those projects that are now in execution or recently delivered and is shown in Appendix B, including the argumentation for not adding them to the short list. From this long list three pairs were made in the categories real estate, flood control and rail infrastructure. The pairs are based on fulfilling as many of the previously mentioned criteria as possible. The short list is shown in Table 3.1 and from this list all project teams were contacted. The Erasmus MC did not want to cooperate, eliminating the real estate pair and leaving two pairs to be examined. These are two flood control project Project A and Project B and two rail infrastructure projects named project C and project D.

3.3.2 Key figures of cases

To give a quick overview of the cases, some key figures are presented on the examined projects as well as the contractors and the interviewees. These can be found in Table 3.2 and Table 3.3. More elaborate information on the interviewees can be found in Appendix D.

3.3.3 Selection of key moments

The selection of key moments is done in the context of each case and less 'process-based' as the selection of cases. The most important reason for this is that there is no explicit list of decisions that has been taken, making the researcher dependent on the interviewee to find the right key moment. Also of influence is that the interviewees can decide that they do not wish to elaborate on certain conflicts, for example those that escalated to a legal conflict. However, there are some general guidelines in the process with the interviewee for finding the key moments that were followed. Most importantly, (1) the key moments must be indicative for the collaboration, (2) the key moments must be in the execution phase (e.g. not in the tender phase) and (3) must have been explicit decisions (e.g. not a fault or problem

	Project A		**Project B**	
	Contractor A	Contractor B	Contractor C	Subcontractor X
Revenue of contractor (mill €)	>2000	1000-2000	100-300	100-300
Size of the project (mill €)	50-100		100-300	
Duration (execution - delivery)	3 years		4 years	
Contract type	D&C		D&C	
Sector	flood control		flood control	
Client	Rijkswaterstaat (RWS)		RWS	
	Project C		**Project D**	
	Contractor D	Contractor E	Contractor E	Subcontractor Y
Revenue of contractor (mill €)	100-300	100-300	100-300	50-100
Size of the project (mill €)	100-300		0-50	
Duration (execution - delivery)	5 years		1 year	
Contract type	E&C		E&C	
Sector	Rail		Rail	
Client	ProRail		ProRail	

Table 3.2: Key indicators on projects and contractors

	Project A		**Project B**	
	Contractor A	Contractor B	Contractor C	Subcontractor X
Interviewees				
Experience at project (avg; years)	4		2	
Experience in function (avg; years)	7		10	
Experience in project management (avg; years)	18		19	
Client				
Project Manager				
Contract Manager	Yes		Yes	
Technical Manager	Yes		Yes	
Contractor				
Project Manager	Yes, from Contractor A		Yes, from Contractor A and Subcontractor X	
Contract Manager				
Technical Manager	Yes, from Contractor B			
	Project C		**Project D**	
	Contractor D	Contractor E	Contractor E	Subcontractor
Interviewees				
Experience at project (avg; years)	4		2	
Experience in function (avg; years)	9		11	
Experience in project management (avg; years)	21		26	
Client				
Project Manager				
Contract Manager	Yes		Yes	
Technical Manager				
Contractor				
Project Manager	Yes, from both contractors		Yes, from both contractors	
Contract Manager				
Technical Manager				
Other				

Table 3.3: Key indicators on interviewees

that caused conflict without a decision to take). The interviewees are asked for decisions which fit these criteria and can help to shed light on the collaboration in the context of this research. This has resulted in the embedded multiple-case design, including the selected key moments, as shown in Figure 3.4.

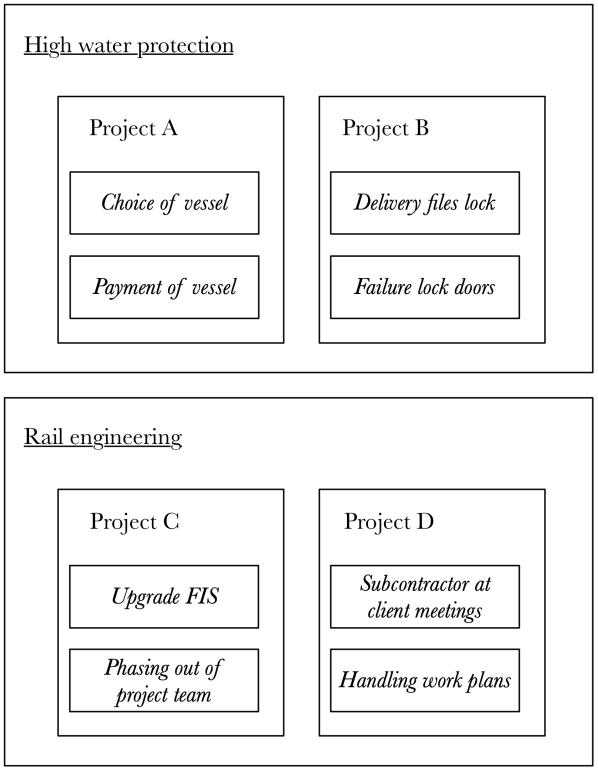


Figure 3.4: The embedded multiple-case design showing the decisions per project, sector and organisational form

3.4 VALIDITY AND RELIABILITY

To guarantee the quality of the research four tests are performed: construct validity, internal validity, external validity and reliability. These are commonly used to establish the quality of any empirical social research Yin (2009).

3.4.1 Construct validity

A construct validity test checks whether correct operational measures for the concepts being studied are identified. This is done in the literature study, where all the concepts are founded and operationalised.

3.4.2 Internal validity

Internal validity checks whether the explanation building and process tracing is correct. This is checked by sending the findings of each case to the interviewees of the project. The interviewees check whether the facts and process tracing are correct and whether they recognise the conclusions. Attention is payed to correct inference, consideration of rival explanations and convergence of the evidence. All in all, they check whether everything is airtight. A problem for the internal validity is formed by the many undesirable inconstant factors in each project. Those factors create many differences between the projects, making it difficult to conclude

whether differences in the decision-making can be attributed to being or not being a consortium. This will be discussed during the analysis.

Extra attention will be payed in the analysis to the conclusion on what is influenced by (not) being a consortium. The reason for t

3.4.3 External validity

External validity checks whether the domain to which the findings can be generalised is correctly defined. This research is exploratory and aims to find directions for further research. It does not pretend to deliver generalised lessons for the whole construction sector in one study. So, lessons learned might be constructed, but further research is needed before the findings can be generalised.

A validation session is organised to improve the validity of the last research question, as this is the least valid conclusion. The validation session uses an expert panel with whom the hypotheses are tested on reliability. Given their broad experience in practice, the recommendations are also tested by them on effectiveness and feasibility.

3.4.4 Reliability

Since many parts of the data are confidential, the reliability is weak, because the data collection procedures can not be exactly replicated. This is mitigated by giving the graduation committee access to all interview files.

4 ANALYSIS

4.1 THE DATA

This chapter gives an overview of the data that has been gathered from the interviews. The interviews are, as explained in Chapter 3, conducted at four projects: two consortia and two main contractor – sub-contractors (MC-SCs), in the flood control and rail sector. Both contractors and clients have been interviewed. The chapter is separated in two parts: the explanation of the data interpretation and the data itself. The first part, explaining the data interpretation, explains how the data is used and the second part gives an overview of the data.

4.1.1 Explaining the data interpretation

This section explains how the data is interpreted. The data consist of statements gathered using interviews. More specifically, the data interpretation explains which statements are gathered, how the statements are interpreted and how the interpretations result in a value for a sub-factor and a value of influence. First, the interpretation is explained per factor[1], then the influence is explained and lastly all other data is explained.

Explaining the interpretation per factor

The interpretation is explained per factor: management style, relation capability and contractual context.

The management style is assessed using four sub-factors. Each sub-factor is coupled to one interview question. The interview question names two typologies and asks which fits best to the management style used during decision-making. The interviewees give examples why a certain typology fits best. The total of statements is gathered to attach a value to the sub-factor (i.e. process or project management). If all statements relate to the same value, that style is applied, otherwise the sub-factor is judged to be mixed. If the question did not apply to the decision-making, the sub-factor is typed as undetermined. The amount of statements differs from one to three. The sub-factors and statements are explained in Appendix A based on De Wit (2010) and Op de Woert (2013). The sub-factors and statements are as follows:

- The first sub-factor, speed of decision-making, is assessed using the typologies *'focus on rapid decision-making and decisiveness'* and *'a search for consensus in a careful decisions making process'*. The sub-factor is in short referred to as 'speed' and the typologies respectively as 'quick' or 'careful'.
- The second sub-factor, position of conflict, is assessed using the typologies *Organisee central discussion with project direction'* and *'Move conflict to outside of process, offer extra forums for negotiation'*. The sub-factor is in short referred to as 'position' and the typologies respectively as 'central' or 'separated'.
- The third sub-factor, commitment for the decision, is assessed using the typologies *'Ask for commitment on all major decisions'* and *'Offer stakeholders possibility to postpone commitment to decisions'*. The sub-factor is in short referred

1 These factors are: the management style, relational capability and contractual context

to as 'commitment' and the typologies respectively as 'demanded' or 'postponed'.

- The fourth sub-factor, aftercare of the decision, is assessed using the typologies *'Focus on cooperation with winners'* and *'Invest in management of losers'*. The sub-factor is in short referred to as 'aftercare' and the typologies respectively as 'compensated' or 'none'.

The values for relational capability are determined using a survey. The questions and how these build up to sub-factors are explained in Appendix E. The sub-factor values are interpreted as follows: below or equal to 3.5 is low, higher than 3.5 is high (Suprapto, 2016). Some questions from the relational capability data are also used to test the hypothesis *'Working with a construction consortium improves the goal alignment of contractors'* and *'Working with a construction consortium results in a better relationship between underlying partners'*. These questions can be found in Appendix H.

The contractual context is assessed using four sub-factors (contract type, performance measurement, incentives and risk sharing). The contract type and performance measurements are factual and asked only in the first interview. Performance measurement is done with the same approach in every case: 'prestatiemeten'[2]. The amount of incentives and risk sharing are asked in the interview to be characterised as relatively low, normal or relatively high. The most often stated value is used, where only one case showed a difference in perceptions.

Explaining the interpretation of the influence

To assess whether there was an influence the interviewees were asked: (1) to describe the decision-making process, (2) whether the factor[3] had influence on the decision-making and (3) whether the client had influence on the factor. The statements are derived from both the first description and the latter two direct questions. The statements are linked to a sub-factor when possible, but there is not enough data to do this for every sub-factor. For the client's influence on the contractual, there is never a link to a sub-factor, since the client always influences all parts of the contract.

The statements are summarised in one of the following five categories:

NONE There is no influence possible.

NOT FOUND Though it is seen as possible, no influence was found.

NOT IN THIS EXAMPLE (NITE) The influence exists, but not in the examined decisions.

INDIRECT The influence exists, but is only partially attributed to this factor.

LOW The influence exists, but it did not impact the outcome of decision-making.

HIGH The influence exists and it did impact the outcome of decision-making.

When the data of the influence of sub-factors is combined, the most influential category precedes, so if one sub-factor is of indirect influence and another of low, the overall factor has low influence. Overall influence is judged by combining the factor's and client's influence. If both influences exist, the overall influence is judged to be existing. Lastly, a reliability score is calculated for every influence[4]. This is

2 Prestatiemeten is an instrument to assess collaboration and performance in Dutch construction projects. The system is developed by Rijkswaterstaat (RWS) and used as quarterly evaluation by all large clients in the Netherlands.

3 These factors are: the management style, relational capability and contractual context

4 The reliability score is not given to: (1) relational capabilities assessment (RECAP) scores (as these are all gathered using a survey), (2) the client's influence on the contract (as this influence is always high, regardless of the interview statements) and (3) the contract type and performance measurement (as these are facts and a reliability does not apply).

done by combining the amount of statements per influence with the amount of interviewees supporting the statement (e.g. an influence based on one statement from two interviewees and one statement from one interviewee has a reliability of three).

Explaining the interpretation of other data

Besides the factors[5] and influences on the decision-making process, there are two other parts of importance: the general description and the additional factors. The description contains information on the impact of the decision on the project and involvement of the client, which is used to test the hypotheses. The impact on the project is measured in impact on time, cost, quality, relation between the contractors and satisfaction of the client as estimated by the interviewees. More impacted factors are interpreted as a larger negative impact. The involvement of the client is measured in the awareness of the decision-making (not aware, informally aware or formally aware) and the involvement in the decision-making (involved or not involved). The additional factors are factors which the interviewees named as being an important influence on the decision-making. These are named as additions to the factors gathered from literature. If they were named in multiple projects, they are interpreted as factors with an influence on decision-making that is too subtle to find as a pattern.

Explaining the usage of the data cross-case

The data is used cross-case in two ways: to generalise findings on the influence on decision-making and to test the hypotheses. The generalisation is done based on the amount of projects where the influence showed. To do this, the categories of influence must result in a 'yes' or 'no' regarding the existence of influence. The categories of none, not found, not in this example and indirect mean that there was no direct influence from the factor to the specific decision. Therefore, no influence showed, resulting in a 'no'. The low and high categories do result in a 'yes'. The hypotheses testing is done by comparing the findings from the consortia with the findings from the main contractor - subcontractors.

4.1.2 Data overview

This section will present the data from the cases. Since the data consists of single statements, it is not possible to present all data. It is chosen to present tables showing in short which status and influence every interviewee described. This is combined with one example of a full statement, explaining to which description this led. This is all done per project.

Project A data overview

Project A is a flood control project performed by a consortium of Contractor A and Contractor B. Four people have been interviewed. One project manager from each contractor (interviewee 1 and interviewee 2) and the contract and technical manager from RWS (interviewee 3 and interviewee 4). Table 4.1 shows the data from Project A based on the status and influence named by each interviewee (Int.). The influence of the client on management style and relational capability is only gathered on factor level and the influence of the client on contractual context is not given per interviewee.

An example of how this data is gathered is the statement "The decision was very much influenced by the fact that contractor B already had more revenue from existing vessels" by Project Manager Contractor A and Project Manager Contractor B.

5 These factors are: the management style, relational capability and contractual context

	Status				Influence on decision				Influence of client			
(sub)factor	Int. 1	Int. 2	Int. 3	Int. 4	Int. 1	Int. 2	Int. 3	Int. 4	Int. 1	Int. 2	Int. 3	Int. 4
Management style												
Speed	Careful	Careful	-	-	Low	-	-	-				
Position	Mixed	Mixed	-	-	-	-	-		Not found	Not found	Not found	Not found
Commitment	Demanded	-	-	-	-	-	-					
Aftercare	Compensated	Compensated	-	-	High	High	-					
Relational capability					Low	Low	Low	Low				
Relationship continuity	3.0	4.5	-	-	-	-	-	-				
Project performance	3.3	3.8	-	-	-	-	-	-				
Teamworking quality	4.2	5.0	-	-	-	-	-	-	None	None	None	None
Relational attitudes	4.0	4.3	-	-	Low	Low	Low	Low				
Collaborative practices	3.5	4.8	-	-	-	-	-	-				
Front-end definition	4.3	5.0	-	-	-	-	-	-				
Contractual context												
Type		Design and Construct (D&C)			None	**NITE!** (NITE)	-	-			High	
Risks	-	Fair	-	Fair	None	None	-	-			High	
Performance measurement		'Prestatiemeten'			None	None	-	-			High	
Incentives	-	-	-	Low	None	None	-	-			High	

Table 4.1: Data overview of case A per interviewee

This makes that the influence of the aftercare of the decision, part of the management style, on the decision is high.

Project B data overview

Project B is a flood control project performed by a consortium. The relationship of one of the main contractors (Contractor C) with a subcontractor (Subcontractor X) is discussed. Four people have been interviewed. One project manager from each contractor (interviewee 1 and interviewee 2) and the contract and technical manager from RWS (interviewee 3 and interviewee 4). Two decisions have been discussed. Table 4.2 shows the data from Project B based on the status and influence named by each interviewee (Int.). The influence of the client on management style and relational capability is only gathered on factor level and the influence of the client on contractual context is not given per interviewee.

	Status				Influence on decision				Influence of client			
(sub)factor	Int. 1	Int. 2	Int. 3	Int. 4	Int. 1	Int. 2	Int. 3	Int. 4	Int. 1	Int. 2	Int. 3	Int. 4
Management style												
Speed	Mixed	Mixed	-	-	Not found	Not found	-	-				
Position	Central	Central	-	-	-	-	-	-	-	-	NITE	-
Commitment	Unclear	Unclear	-	-	-	-	-	-				
Aftercare	None	None	-	-	-	-	-	-				
Relational capability												
Relationship continuity	5.0	4.5	-	-	-	-	-	-				
Project performance	3.5	3.3	-	-	-	-	-	-				
Teamworking quality	4.6	3.3	-	-	-	-	-	-	None	None	None	None
Relational attitudes	5.0	4.2	-	-	Low	Low	NITE	-				
Collaborative practices	4.0	3.8	-	-	-	-	-	-				
Front-end definition	4.7	3.7	-	-	-	-	-	-				
Contractual context					Not found							
Type		D&C			Indirect	-	-	Indirect			High	
Risks	Fair	Fair	-	-	-	-	-	-			High	
Performance measurement		'Prestatiemeten'			-	-	-	-			High	
Incentives	High	-	-	-	-	-	-	-			High	

Table 4.2: Data overview of case B per interviewee

An example of how this data is gathered is the statement "Handing new solutions can influence the management style and decision-making, but was not applied in the two decisions" from Contract Manager RWS. This makes that the influence of the client on the management style is 'Not in this example' (NITE).

Project C data overview

Project C is a rail project performed by a consortium of Contractor D and Contractor E. Three people have been interviewed. One project manager from each contractor (interviewee 1 and 2) and a contract manager from ProRail (interviewee 3). Table 4.3 shows the data from Project C based on the status and influence named by

each interviewee (Int.). The influence of the client on management style and relational capability is only gathered on factor level and the influence of the client on contractual context is not given per interviewee.

	Status			Influence on decision			Influence of client		
(sub)factor	Int. 1	Int. 2	Int. 3	Int. 1	Int. 2	Int. 3	Int. 1	Int. 2	Int. 3
Management style									
Speed	Quick	Quick	-	High	High	-			
Position	Mixed	Mixed	-	-	-	-	-	Low	-
Commitment	Demanded	Demanded	-	-	-	-			
Aftercare	-	Aftercare	-	-	-	-			
Relational capability									
Relationship continuity	3.5	2.0	-	-	-	-			
Project performance	3.1	1.7	-	High	High	-			
Teamworking quality	3.7	2.8	-	-	-	-	Low	-	-
Relational attitudes	3.0	1.8	-	High	High	-			
Collaborative practices	4.0	2.7	-	-	-	-			
Front-end definition	4.3	4.0	-	-	-	-			
Contractual context									
Type	Engineering and Construct (E&C)			-	-	-		High	
Risks	Fair	Fair	-	-	-	-		High	
Performance measurement	'Prestatiemeten'			-	-	-		High	
Incentives	High	-	-	Low	-	Low		High	

Table 4.3: Data overview of case C per interviewee

An example of how this data is gathered is the statement ”Both decisions are taken quick and dirty” from Project Manager Contractor E. This makes the speed of the decision-making, part of the management style, to be described as quick.

Project D data overview

Project D is a rail project performed by Contractor E and Subcontractor Y. Three people have been interviewed. One project manager from each contractor (interviewee 1 and 2) and a contract manager from ProRail (interviewee 3). Table 4.4 shows the data from Project C based on the status and influence named by each interviewee (Int.). The influence of the client on management style and relational capability is only gathered on factor level and the influence of the client on contractual context is not given per interviewee. An example of how this data is gathered is the statement: ”The project manager from contractor A perceived the first decision to be taken at the last moment” by the Project Manager from Contractor A. This makes the speed of the decision-making described as careful.

	Status			Influence on decision			Influence of client		
(sub)factor	Int. 1	Int. 2	Int. 3	Int. 1	Int. 2	Int. 3	Int. 1	Int. 2	Int. 3
Management style									
Speed	Quick	-	-	High	-	-			
Position	Separated	-	-	-	-	-	Not found	Not found	Not found
Commitment	Demanded	-	-	-	-	-			
Aftercare	None	None	-	-	-	-			
Relational capability									
Relationship continuity	3.0	3.5	-	-	-	-			
Project performance	2.6	3.1	-	Low	Low	-			
Teamworking quality	3.4	3.6	-	-	-	-	Not found	Not found	Not found
Relational attitudes	2.2	3.8	-	-	-	-			
Collaborative practices	3.7	3.3	-	-	-	-			
Front-end definition	3.3	3.7	-	Low	Low	-			
Contractual context									
Type		E&C		-	-	-		High	
Risks	Contractor	-	Fair	-	-	-		High	
Performance measurement		'Prestatiemeten'		-	-	-		High	
Incentives	High	-	-	High	High	-		High	

Table 4.4: Data overview of case D per interviewee

4.2 SINGLE CASE ANALYSIS

This chapter analyses the data of every single case, as explained in the previous section. This is done to gather insights and structure the data, making a cross-case analysis possible. The single case analysis consists of two parts: the analysis of influences (both from client and on decision-making) and the analysis of hypotheses. The full deduction of the findings regarding influence can be found in Appendix F. The full testing of the hypotheses can be found in Appendix H.

4.2.1 Single case influence analysis

The analysis on influence is presented per case and per factor. Discussing how the factors[6] showed, how they influenced decision-making and whether they were influenced by the client. The findings are also summarised in a table and figure per case.

Project A influence analysis

In project A the management style is process orientated. The management style did not have an overall influence. It had a high influence the decision-making, but the client did not influence the management style. The relational capability is high. The relational capability did not have an overall influence. It has a low influence on decision-making, but the client did not influence relational capability. The contractual context is a D&C with fair risk sharing and low incentives. The contractual context did not have an overall influence. It is influenced by the client but did not influence the decision-making in the examined decisions. The conclusions are summarised in Table 4.5. The table only shows client influence for those factors that showed an influence on decision-making. The conclusions are (simplified) shown in Figure 4.1. In the figure, an arrow means that an influence is found.

Project B influence analysis

In project B the management style is project orientated. The management style did not have an overall influence. An influence on the decision-making was not found and the client did not influence the management style in the examined decisions.

6 These factors are:the contractual context, the management style and the relational capability

			Influence on decision		Influence of client	
Factor	**Found (sub)factors**	**Status**	Influence	Reliability	Influence	Reliability
Management style			***High***	2	***Not found***	2
	Speed	Careful	Low	1		
	Position	Mixed	-	-		
	Commitment	Demanded	-			
	Aftercare	Compensate	High	1		
Relational capability			***Low***	6	***None***	2
	Relationship continuity	3.8	-			
	Project performance	3.6	-			
	Teamworking quality	4.6	-			
	Relational attitudes	4.2	Low	6		
	Collaborative practices	4.2	-			
	Front-end definition	4.7	-			
Contractual context			***not in this example*** (NITE)	3	***High***	
	Type	D&C	NITE	1		
	Risks	Even	None	2		
	Performance measurement	'Prestatiemeten'	None	2		
	Incentives	Low	None	2		

Table 4.5: Summarised analysis of case A

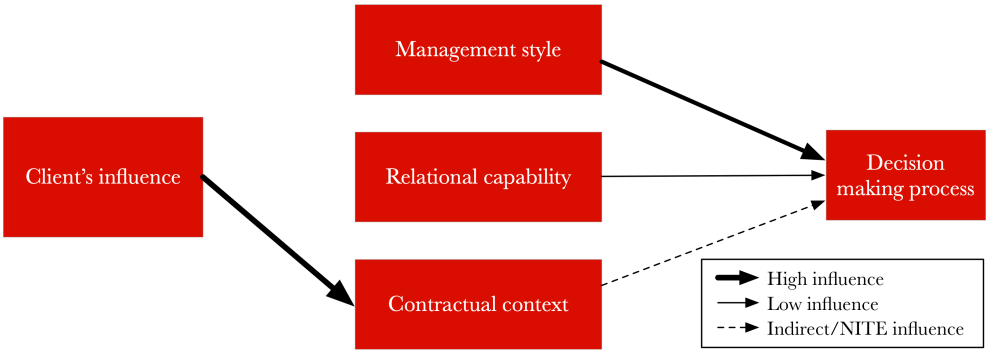


Figure 4.1: Simplified analysis of case A

The relational capability is high. The relational capability did not have an overall influence. It did have a low influence on the decision-making, but the client did not influence the relational capability. The contractual context is a D&C with fair risk sharing and average incentives. The contractual context did not have an overall influence. It is influenced by the client, but the contractual context only had an indirect influence on the decision-making. The conclusions are summarised in Table 4.6. The conclusions are (simplified) shown in Figure 4.2. In the figure, an arrow means that an influence is found.

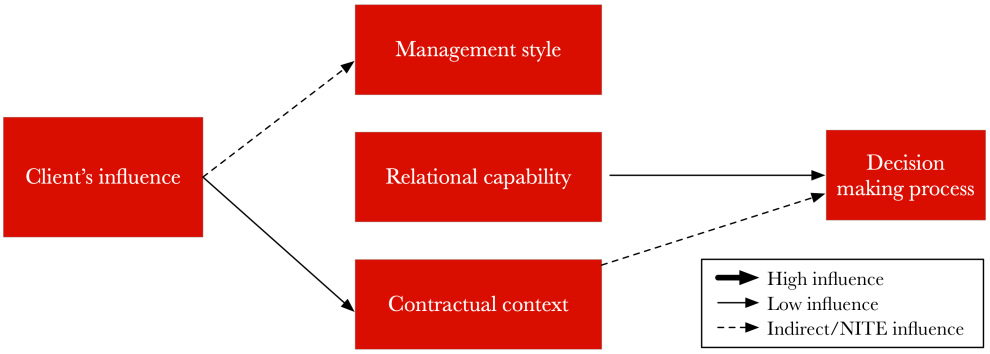


Figure 4.2: Simplified analysis of case B

			Influence on decision		Influence of client	
Factor	**Found (sub)factors**	**Status**	Influence	Reliability	Influence	Reliability
Management style			***Not found***	2	***Yes***	-
	Speed	Mixed	-		Yes	
	Position	Central	-		-	
	Commitment	Undetermined	-		Yes	
	Aftercare	None	-		-	-
Relational capability			***Low***	4	***None***	4
	Relationship continuity	4.8	-		-	
	Project performance	3.4	-		-	
	Teamworking quality	3.9	-		No	
	Relational attitudes	4.6	Low	4	No	
	Collaborative practices	3.9	-		-	
	Front-end definition	4.2	-		-	
Contractual context			***Indirect***	4	***High***	
	Type	D&C	Indirect	2		
	Risks	Even	None	2		
	Performance measurement	'Prestatiemeten'	None	2		
	Incentives	Average	None	2		

Table 4.6: Summarised analysis of case B

Project C influence analysis

In Project C the management style is mixed. The management style did have an overall influence. It had a high influence on the decision-making and the client had a low influence on the management style. Relation capability is low. The relational capability did have an overall influence. It had a high influence on the decision-making and the client had a low influence on relational capability. The contractual context also had an overall influence. It had a low influence on decision-making and the client has a high influence on the contractual context. The conclusions are summarised in Table 4.7. The conclusions are (simplified) shown in Figure 4.3,. In the figure, an arrow means that an influence is found.

			Influence on decision		Influence of client	
Factor	**Found (sub)factors**	**Status**	Influence	Reliability	Influence	Reliability
Management style			***High***	1	***Low***	2
	Speed	Quick	High	1		
	Position	Mixed	-			
	Commitment	Demanded	-			
	Aftercare	Compensated	-			
Relational capability			***High***	5	***Low***	1
	Relationship continuity	2.8	-			
	Project performance	2.4	High	2		
	Teamworking quality	3.3	-			
	Relational attitudes	2.4	High	3		
	Collaborative practices	3.3	-			
	Front-end definition	4.2	-			
Contractual context			***Low***	3	***High***	
	Type	E&C				
	Risks	Even				
	Performance measurement	'Prestatiemeten'				
	Incentives	High	Low	3		

Table 4.7: Summarised analysis of case C

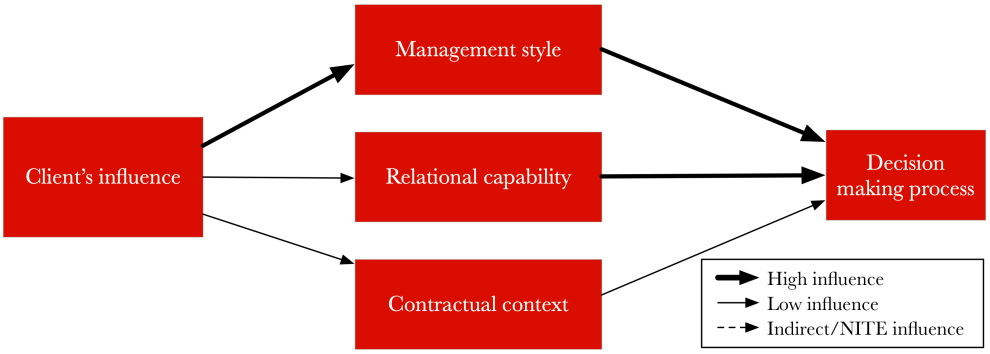


Figure 4.3: Simplified analysis of case C

Project D influence analysis

In Project D the management style is project orientated. The management style did not have an overall influence. It had a high influence on decision-making, no influence of ProRail on the management style was found. The relational capability is low. The relational capability had an overall influence. It had a low influence on decision-making and ProRail had a high influence on the relational capability. The contractual context did have an overall influence. It had a high influence on the decision-making and ProRail had a high influence on the contractual context. The conclusions are summarised in Table 4.8. The conclusions are (simplified) shown in Figure 4.4. In the figure, an arrow means that an influence is found.

			Influence on decision		**Influence of client**	
Factor	**Found (sub)factors**	**Status**	Influence	Reliability	Influence	Reliability
Management style			***High***	2	***Not found***	3
	Speed	Quick	High	2		
	Position	Separated	-			
	Commitment	Demanded	-			
	Aftercare	None	-			-
Relational capability			***Low***	3	***No***	-
	Relationship continuity	3.3			-	
	Project performance	2.8	Low	2		
	Teamworking quality	3.5				
	Relational attitudes	3.0				
	Collaborative practices	3.5				
	Front-end definition	3.5	Low	1		
Contractual context			***High***	2	***High***	
	Type	E&C				
	Risks	Even				
	Performance measurement	'Prestatiemeten'				
	Incentives	High	High	2		

Table 4.8: Summarised analysis of case D

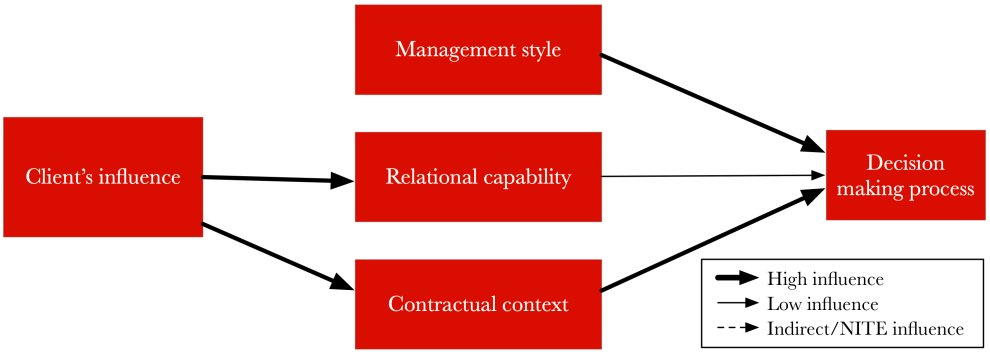


Figure 4.4: Simplified analysis of case D

4.2.2 Single case hypotheses analysis

The hypotheses are tested using various parts of data from the case findings, as explained at the beginning of this chapter. This data is summarised and presented per case. The more elaborate argumentation can be found in Appendix H.

Project A hypotheses analysis

In project A, conflict was nondestructive. The client was largely unaware of decision-making and did not oversee the decision-making process. Goal alignment scored a combined 4.75 and relationship a 4.3.

Project B hypotheses analysis

In project B, conflict was nondestructive. The client was aware and involved in decision-making. Goal alignment scored a combined 4.25 and relationship a 4.3.

Project C hypotheses analysis

In project C, conflict was destructive. The client was largely unaware of the decisions and could not oversee the process. Goal alignment scored a combined 3.75 and relationship a 3.0.

Project D hypotheses analysis

In project D, conflict was destructive. The client was aware of decision-making but could not oversee the decision-making process. The client perceived to have insufficient oversight of execution. Goal alignment scored a combined 3.75 and relationship a 2.9.

This data will be compared in the cross case analysis in the next chapter to be able to reject or confirm the hypotheses.

4.3 CROSS CASE ANALYSIS

This chapter will combine and compare the cases with two goals: to draw better supported conclusions on influence and to be able to compare consortia with MC-SCs. The subsection consists of three parts: the analysis of influence on decision-making, the analysis of client influence and the analysis of the influence of working with a consortium (i.e. the hypothesis testing). Textboxes are again used in this chapter to highlight important findings.

Before starting the analysis, two discoveries from the comparison of cases must be noted. These discoveries, though insightful, do not answer any of the research-questions and are therefore addressed here at the start of the chapter. The first discovery is that from the four MC-SC key moment, three had the exact same cause. This cause is the poor alignment and integration of sub-contractor – client interactions, all due to the subcontracting of large and complexly integrated parts of the project. The second discovery is that in both rail projects the key moments were caused by high pressure on the contractors. This pressure was caused by poor project performance which eventually contributed to poor project quality. There will be reflected on these two discoveries in the conclusion of this chapter.

In short: ***Additional discoveries***

The subcontracting of large and complexly integrated parts, combined with poor arrangements on integration and sub-contractor – client interaction, often lead to problems in the cases. Also leading to problems is the pressure which poor project performance puts on the contractors. This pressure contributed to lacking project quality in the cases.

4.3.1 Cross case analysis of influence on decision-making

This subsection will combine and compare the cases. The goal of this is to learn how decision-making is influenced by the factors that were found in literature (relational capability, managerial approach and contractual context). The subsection first discusses patterns in the relations in consortia and secondly in MC-SCs. The differences are based on Appendix G, from which a summary is presented in Table 4.9.

	Influence on decision-making process		Influenced by client	
Managerial style	**Yes** (3 of 4) Project: A, C, D	No (1 of 4) Project B	**No** (3 of 4) Project A, B, C	Yes (1 of 4) Project C
Relational capability	**Yes** (4 of 4) Project: A, B, C, D	No (0 of 4)	**Yes/No** (2 of 4; 2 of 4) Project C, D; Project A, B	
Contractual context	**Yes** (2 of 4) Project: C, D	No (2 of 4) Project A, B	**Yes**	

Table 4.9: Combined findings

Consortia: influence on decision-making

In the two consortia, all three factors[7] influenced the quality of the decision-making. Although in one case, the influence of the contractual context only showed outside the examined decisions. The contractual context, which showed a large variety, influenced the decision-making mainly through incentives. The management style was once process oriented, once mixed and both influenced the decision-making. The relational capability was 4.2 and 3.1 and twice influenced the decision-making. As additional factors, the interviewees named the following. In case A the relationship continuity and match in company (culture) had a large positive influence on decision-making. In case C higher management and lacking project performance showed a very negative influence on decision-making.

MC-SCs: influence on decision-making

In the two MC-SCs, all three factors[7] influenced the quality of the decision-making at least once. Although, in one case the management style was not found to influence

7 These factors are: the contractual context, the management style and the relational capability

decision-making and in the same case the contractual context only had an indirect influence. The management style was twice project oriented. The relational capability was 4.1 and 3.3 and twice influenced the decision-making. The contractual context showed a large variety. The contractual context influenced the decision-making mainly through incentives. As additional factors, the interviewees named the following. In case B, the involvement of the client and broadening of solution space can have a positive impact on decision-making. In case D financial pressure and differences in company culture showed a negative influence on decision-making.

Conclusion of influence on decision-making

The consortia showed a more process oriented management style, and influenced decision-making in one more case. This could not be related to the difference of organisational form. The relational capability was similar, having the highest influence. The contractual context was evenly spread, where incentives sometimes showed a negative influence. Both factors influenced the decision-making. Therefore, the influence did not show differences. Small differences were the influence of the type of contract in a MC-SC and the undetermined influence of the contractual context in a consortium. The only larger difference is the more process-oriented management style in the consortia. However, no clear differences showed in the influences.

In short: ***Influence on decision-making***

No clear differences in the influence on decision-making show between consortia and MC-SCs. All three factors showed influence, from which relational capability showed the highest influence and incentives the most surprising negative influence.

4.3.2 Cross case analysis of client influence

This subsection will combine and compare the cases. The goal of this is to find whether the client influences the factors that were found in literature (relational capability, managerial approach and contractual context). Including whether this results in influence on the decision-making. The subsection first discusses patterns in the relations per factor, based on Appendix G from which a summary is presented in Table 4.9, followed by additions influences (from the interviews per case) that the interviewees named as important. This analysis pays no attention to subfactors, as the interviews did not result in the level of detail needed for this.

Consortia: client influence

The client only had an influence on the management style and relational capability in one case. The client always influenced the contractual context. As additional factors, the interviewees named the following. In case A it was mentioned that the client did not have an influence on decision-making. In case C an influence on decision-making was mentioned through higher management commitment.

MC-SCs: client influence

The client never influenced the management style, besides once outside the examined decision. The client did influence the relational capability in one case. If it has an influence on relational capability it is through higher management commitment and solution space. The client always influenced the contractual context. The client only has a limited influence on decision-making through this, which is

mostly through the contract type and incentive. As additional factors, the interviewees named the following. In case B and D more solution space was mentioned as an influence which the client has on decision-making.

Conclusion of client influence

The client's influence shows more variety than the influence on decision-making (Table 4.9) and is lower than expected. If an influence shows, it is through incentives, broadening of solution space or higher management commitment. The only small difference between consortia and MC-SCs that showed was the influence on management style. That showed only once in the examined decisions, in a consortium. Besides that small difference, the clients influence was very similar between consortia and MC-SCs.

In short: ***Client influence***

Looking solely at the factors, no big differences in client influence show between consortia and MC-SCs. Overall, the client's influence was limited. When it showed, it was through contract type, incentives, broadened solution space and higher management commitment.

4.3.3 Cross case analysis of consortium influence (hypotheses)

This subsection will combine and compare the cases to find whether there are differences in the decision-making between consortia and MC-SCs. This is done by summarising the results of the hypothesis testing per case. More elaborate information on the hypothesis testing can be found in Appendix H. The subsection starts with a recap of the hypothesis, followed by the results from the consortia and MC-SCs and a conclusion. The hypotheses have been validated using an expert panel with three experts with experience in working with consortia and MC-SC from the clients side, more on this can be found in Chapter 5.

The following hypothesis have been gathered from literature in Chapter 2.

1. Working with a construction consortium results in a better relationship between the contractors.
2. Working with a construction consortium improves the goal alignment of the contractors.
3. Working with a construction consortium reduces the negative impact of conflicts.
4. Working with a construction consortium makes the client less involved in decision-making.

Consortia: hypotheses

The consortia scored an average of 3.65 on the questions related to the relationship and 4.25 on the questions related to goal alignment. Conflict negatively impacted Project C, while project A was not negatively impacted by the conflicts. The client was in both cases largely unaware of decision-making and does not oversee the decision-making process.

MC-SCs: hypotheses

The MC-SCs scored an average of 3.6 on the questions related to the relationship. The MC-SCs scored an average of 4.0 on the RECAP questions related to goal alignment.

Conflict negatively impacted Project D, while project B was not negatively impacted by the conflicts. The client was in both cases aware and in one involved in decision-making.

Conclusion on consortium's influence (hypotheses)

The MC-SCs scored an average of 3.6 on the questions related to relationship. The consortia scored an average of 3.65 on these questions, which is not a significant difference. Therefore the relationship is not significantly affected by the organisational form and the hypothesis "Working with a construction consortium improves goal alignment of the contractors" is rejected.

Goal alignment scored an average 4.25 in MC-SCs and the consortia scored an average of 4.0 on these questions. Therefore the relationship is not significantly affected by the organisational form and the hypothesis "Working with a construction consortium improves goal alignment" is rejected.

Conflict in the consortium cases had comparable impact as in main contractor - subcontractors. In the case study, the negative impact of conflict showed equally often in both organisational forms being in Project C and Project D. This makes that the hypothesis "Working with a construction consortium reduces the negative impact of conflicts" is rejected.

The main contractor - subcontractor cases showed more oversight of the decisions and decision-making process. Although the client was not always fully involved. In consortia, the client was unaware of the decisions being made and therefore unable to oversee decision-making. This makes that the hypothesis "Working with a construction consortium makes the client less involved in decision-making." is confirmed. It was also twice mentioned that some clients want to be involved in this and some don't, which might bias the result.

In short: ***Consortium influence***

Looking at the hypotheses, the relationship is not significantly affected by working with a consortium. The main contractor - subcontractor cases did show more client oversight and more client influence on the decision-making process.

4.3.4 Conclusion on cross-case analysis

The cross-case analysis showed that in both consortia and MC-SCs, all factors (management style, relational capability and contractual context) have influence on the quality of decision-making. The management style was more process oriented in the consortia, but no further distinction could be attributed to the organisational forms. The influence of the client was low in all cases and only showed a insignificant higher influence on management style in consortia. When the client had influence, it is through incentives, broadening solution space or higher management commitment. Working with a consortium did not affect the influence on decision-making through the factors.

The influence on the decision-making was as expected, as all factors were gathered from literature to be of influence on decision-making. The influence of the client was lower than expected, as the attention for client-contractor collaboration in the literature created high expectations. The influence of a consortium was lower and different than expected. Literature showed that working with a consortium would improve the relation between partners, which it did not. Although the literature showed that working with a consortium lowers the clients involvement in decision-making, this expectation did not show in practice, making the finding unexpected.

These conclusions combine to six main findings that can be validated as propositions in the next chapter. Firstly, out of scope of the research questions, are two insightful findings regarding the issues in the case-study: (1) it is found that many problems in MC-SCs are a result of poor sub-contractor – client interaction, which should be clearly aligned or otherwise blocked. This prevents problems that often results from back-to-back contracts. Also, (2) it is found that poor project performance often leads to poor project quality and that the client has possibilities to prevent this. Second, regarding the influence on decision-making: (3) it is found that the relational capability has a high influence on the decision-making. Also, (4) it is found that incentives can negatively impact project quality and that the contractor can foresee this. Lastly, regarding the influence of the organisational form and client: (5) it is found that working with a consortium lowers influence, which can be broadened again through the use of an integrated contract and incentives. Also, by broadening the solution space and by maintaining in contact with the higher management. (6) In relation to this, it is proposed that the contractor can proactively use the client's influence, by asking for a broader solution space.

5 EXPERT PANEL

The hypotheses as they are rejected or accepted in this research (Appendix H) and propositions based on the six main findings from the analysis (Section 4.3.4) are validated using an expert panel. This chapter explains how the expert panel is built up and what the results are.

5.1 EXPERT PANEL DESIGN

The design of the expert panel was a structured feedback session. Each hypothesis or proposition was presented, followed by one minute of written individual feedback and a four minute group discussion. The written individual feedback ensures that the participants share their own feedback, even after hearing that of others. The expert panel lasted one hour, consisting of a 10 minute presentation of the context, 20 minute validation of the hypotheses and 30 minute validation of the findings. The seven propositions are all based on the following six findings from the analysis:

- It is found that many problems in main contractor – sub-contractors (MC-SCs) are a result of poor sub-contractor – client interaction, which should be clearly aligned or otherwise blocked. This prevents problems that often results from back-to-back contracts.
- It is found that poor project performance often leads to poor project quality and that the client has possibilities to prevent this.
- It is found that the relational capability has a high influence on the decision-making.
- It is found that incentives can negatively impact project quality and that the contractor can foresee this.
- It is found that working with a consortium lowers influence, which can be broadened again through the use of an integrated contract and incentives. Also, by broadening the solution space and by maintaining in contact with the higher management.
- In relation to the previous finding, it is proposed that the contractor can proactively use the client's influence, by asking for a broader solution space.

The hypotheses and propositions, including the design of the session are shown in Table 5.1.

The expert panel consisted of three participants. Each of them is currently employed at TwynstraGudde and has experience working at the client's side. This can result in a bias. The experience of the participants is a follows:

PARTICIPANT 1 25 years experience in project management with a focus on tendering and procurement. An example of relevant experience is being Tender Manager for the A15 Maasvlakte-Vaanplein, a project performed by a consortium.

Statement	Minutes
Hypotheses	***20***
Working with a construction consortium results in a better relationship between the contractors. (rejected)	5
Working with a construction consortium improves goal alignment of the contractors. (rejected)	5
Working with a construction consortium reduces the negative impact of conflicts. (rejected)	5
Working with a construction consortium makes the client less involved in decision-making. (confirmed)	5
Propositions	***30***
The sub-contractor – client interaction should be clearly aligned or blocked, to prevent problems with the main contractor	5
The client should prevent the problems stated in previous proposition by blocking back-to-back contracting	5
The client should compensate for poor project performance, to prevent poor project quality.	5
Contractors should stay aware of their relational capability.	5
The contractor should warn the client of incentives which negatively impact project quality.	5
The client can use the contract type, incentives, solution space and higher management commitment to increase its limited influence on consortia.	5
The contractor should use the client's influence when needed, by asking for a broader solution space.	5

Table 5.1: Design of the expert panel

Rank	Term	Description
1	Agrees	The statement is recognised
2	Agrees with remarks	The statement is recognised, but not in every situation
3	Remarks	Parts of the statements are recognised and other parts are not
4	Disagrees with remarks	The statement is not recognised, but could be correct in some situations.
5	Disagrees	The statement is not recognised.

Table 5.2: Scale of the feedback

PARTICIPANT 2 Seven years experience in project management with a focus on tendering and procurement.

PARTICIPANT 3 Three years experience in project management with a focus on contract management. An example of relevant experience is being Contract Manager for the RijnlandRoute, a project performed by a consortium.

The goal of the expert panel is judging the hypothesis testing on its reliability and the propositions on its effectiveness and feasibility. The reliability depends on the experts experience: is the hypothesis in line with what he or she saw in practice. The effectiveness is based on a combination of experience and knowledge: would he or she expect it to work. The feasibility is based on the experts knowledge: are the propositions possible with legal and practical boundaries? The feedback by the experts is summarised and scored on a five point scale as described in Table 5.2.

5.2 EXPERT PANEL RESULTS

The results of the expert panel are presented per statement and per participant, including a conclusion for the hypotheses. Starting with the hypotheses and ending with the propositions. The hypothesis are presented including whether they were confirmed or rejected by the data from this research. This was indicated in the expert panel as well. The (dis)agreement with the hypotheses indicates a (dis)agreement with the rejection or confirmation of the hypothesis, not the hypothesis itself. For example, the disagreement with a rejected hypothesis indicated that the participant argued that the hypothesis should be confirmed

1. The hypothesis "Working with a construction consortium results in a better relationship between the contractors" is rejected by the data from this research.

   PARTICIPANT 1 Agrees. The amount of aspects influencing collaboration is very diverse, making the form of collaboration of less influence.

   PARTICIPANT 2 Agrees. There are many other factors with a bigger influence.

   PARTICIPANT 3 Agrees, with remarks. This depends largely on the involved personalities. Also, it can be different when looking at collaboration on contractual level instead of personal level.

   CONCLUSION Agreed, as all participants did, with the argument that relationships are too complex and influenced by too many factors to improve solely by changing the organisational form.

2. The hypothesis "Working with a construction consortium improves goal alignment of the contractors" is rejected by the data from this research.

   PARTICIPANT 1 Remarks. The hypothesis is true if project performance results to profit. When the project does not, the goal alignment can be even further apart.

   PARTICIPANT 2 Remarks. I would imagine that working together as one contractor would create common goals, but I do not have any specific example or experience to back that up.

   PARTICIPANT 3 Disagrees, with remarks. I recognise that, when working in a consortium, the scope of your responsibilities does not end at the scope of your work. However, the stakes of your parent company will always put a pressure on this by the data from this research.

   CONCLUSION Mostly remarks, with the argument that this seems to apply mainly to cases of poor project performance. The hypothesis could be confirmed for projects with good performance.

3. The hypothesis "Working with a construction consortium reduces the negative impact of conflicts" is rejected by the data from this research.

   PARTICIPANT 1 Agrees, with remarks. Completely depends on the interests. For example, a consortium of a public and a private company can have a much larger impact. It is mainly about the many relational factors than this strictly legal one.

   PARTICIPANT 2 Disagrees. I would expect an equal relation to be better when in conflict, making for example that the subcontractor is not misused. Surprising that this was not found.

   PARTICIPANT 3 Agrees, with remarks. When project performance is below expectations and conflicts appear, the parent-company stakes start playing a role and companies will start blaming each-other.

   CONCLUSION Mostly agreed, with the remarks that an equal relation could have benefits in conflicts. However, the interests can still be far apart.

4. The hypothesis "Working with a construction consortium makes the client less involved in decision-making" is confirmed by the data from this research.

   PARTICIPANT 1 Disagrees, with remarks. Surprising and not recognised. I do recognise that it can mean that the client only has contact with the subcontractors. Because the main contractor has a managing role and is not able to answer technical questions. If the client is not willing to establish this direct contact it could make the client less involved, but that is not necessarily the case.

   PARTICIPANT 2 Remarks. Surprising, I wonder whether this is a causality or a random correlation.

   PARTICIPANT 3 Disagrees, with remarks. Surprising and not recognised. You need to find various causalities to find this effect, which can all be caused by external effects. Did you find a correlation or a causality?

   CONCLUSION Mostly disagreed, with the argument that is not recognised an can be an accidental correlation instead of a causality.

Propositions

1. The sub-contractor – client interaction should be clearly aligned or blocked, to prevent problems with the main contractor.

   PARTICIPANT 1 Agrees, with remarks. Very recognisable, though the question is whether this is a problem. This contact is often established because

the subcontractor has more knowledge. It does need to be a consistent and clear strategy to which everyone agrees.

PARTICIPANT 2 Agrees. I see this as a very logical step and if this is not agreed on, then this should be. Both at the client as at the contractor side.

PARTICIPANT 3 Remarks. Is this a problem? Even if you make arrangement, the main contractor could still be unaware of problems for which he is responsible.

2. The client should prevent the problems stated in previous recommendation by blocking back-to-back contracting.

   PARTICIPANT 1 Disagrees, with remarks. The market is designed to contain specialist companies, so this is sometimes needed. Changing this could work against you in the long term.

   PARTICIPANT 2 Disagrees, with remarks. I expect the negative effects of prescribing this to be larger than the positive effects.

   PARTICIPANT 3 Disagrees, with remarks. There will definitely be possibilities to makes this difficult or even impossible. However, designing this is the primary responsibility of the contractor. Does the market want the client to take this responsibility and should the client want this?

3. Contractors should stay aware of their management style and relational capability.

   PARTICIPANT 1 Disagrees, with remarks. This too abstract to recommend to a contractor. Can you link this to something more concrete that you found?

   PARTICIPANT 2 Disagrees, with remarks. This is too vague .

   PARTICIPANT 3 Disagrees, with remarks. This too abstract to recommend to a contractor.

4. The client should compensate for poor project performance, to prevent poor project quality.

   PARTICIPANT 1 Agrees, with remarks. I definitely agree. However, it is of importance whether the contractor works in a consortium. In a consortium, the compensation will be evenly shared, while with an MC-SC the compensation could all go the main contractor or all to the subcontractor. It is definitely possible to give such compensation and the feasibility depends on the relation, how you negotiate and what it will cost the client in terms of money and reputation.

   PARTICIPANT 2 Remarks. This depends on whether the client has the room to compensate and there will always be the question whether you are not fooled by the contractor.

   PARTICIPANT 3 Remarks. The client does not have a direct relationship with a subcontractor. Making it difficult to compensate him. However, it is certainly feasible to do so. It helps if the relationship is still good at this point or if the solution is a win for both parties.

5. The contractor should warn the client of incentives which negatively impact project quality.

   PARTICIPANT 1 Agrees. This already happens, especially with DBFM contracts or other projects with many risks. The dialogue phase of the tender is suited for this, but feasbility largely depends on the relation between contractors and client.

   PARTICIPANT 2 Indifferent

PARTICIPANT 3 Agrees, with remarks. Is an effective and feasible measure, although this becomes more difficult after the tender. However, even then it should be discussed. The client has a responsibility, but should also do this to protect itself.

6. The client can use the contract type, incentives, solution space and higher management commitment to increase its limited influence on consortia.

   PARTICIPANT 1 Remarks. This combination of measures make this a very abstract recommendation for practice, can it be more specific and concise?

   PARTICIPANT 2 Agrees, with remarks. The contract type is a known, effective and feasible measure for this. The incentives (penalties or bonuses) will make it more likely to meet the schedule, but often have a negative effect on collaboration. Less 'demanding' forms of this might be better, such as a MEAT-criterion[1] for a robust planning or extra milestones and testing moments in the planning. The broadening of solution space is something that should be done very cautious. In a good contract, the requirements are minimum-requirements and broadening them can result in a product that does not function. Also, it affects the level playing field as during tendering the other contractors did not knew about this broadened specification. However, a client can be cooperative, as long as it stays balanced and does not result in the contractor asking for help for the smallest issues. The higher management commitment will probably not give the highest influence, as these often only discuss escalated issues. The steering committee meeting (SCM) exists in most projects, but vary largely in intensity, also making their influence varied.

   PARTICIPANT 3 Agrees, with remarks. The contract type and incentives are definitely known and feasible ways to gather more influence on the project. However, does more influence on the project equal more influence on decision-making? Also, do note that these aspects can not be adapted once the project is in execution. Solution space and higher management commitment could be operationalised in the contract[2]. This is legally possible, but a relevant question is to which degree you want to demand this using the contract. In the end, it is all about the implementation and client's attitude in practice. Also, the client often prefers to keep the contractual relationship, but a supportive attitude is certainly possible.

7. The contractor should use the client's influence when needed, by asking for a broader solution space.

   PARTICIPANT 1 Disagrees, with remarks. Needs to be more concrete to be and could also be a useful recommendation for a client.

   PARTICIPANT 2 Agrees, with remarks. Logical, but the contractor is probably scared that the client says that it is his problem.

   PARTICIPANT 3 Agrees. It is always better if the contractor is transparent in the problems he has with other contractors. The client will notice them anyways. It becomes even better if there is also an option for the client to help with the problem. That is definitely feasible, especially now that the market becomes more tight the client should understand such problems.

1 Most Economically Advantageous Tender

2 The 'Management Specifications' of DBF(M) contracts and the 'Tender Specfication Process' (vraagspecificatie proces in Dutch) of UAV-GC contracts are suitable for this

5.3 CONCLUSIONS FROM EXPERT PANEL

The hypotheses resulted in predominantly negative reactions on the acceptance of hypothesis four. Especially the causality is questioned. This will therefore be recommended for further research, but the hypothesis remains accepted within the boundaries of this research. Proposition two and four got predominantly negative feedback. Proposition two will therefore not be further recommended and proposition four is strongly adapted before turning it into a recommendation. Also proposition five is strongly adapted to be more in line with the main question. Other propositions have been slightly adapted based on the feedback. This results in the following recommendations, which are further elaborated in Section 6.3 of the Recommendations:

1. Knowing that most MC-SC decisions were caused by problems with the subcontractor-client interaction, it is recommended to make clear agreements on this before execution starts.
2. Knowing that relational capability influences decision-making and that this can be measured, it is recommend to contractors to regularly assess and improve this.
3. Knowing that bad project performance can have a negative impact on decision-making, it is recommend to the client to check whether this effect can be offset.
4. Knowing that incentives can have negative impact on decision-making, it is recommended to contractors to warn the client of such incentives.
5. Knowing that working with a consortium reduces the client's influence and knowing that the contractual context, broadening of solution space and improving higher management commitment are possibilities for the client to influence decision-making, it is recommend to the client to use a combination of these if a larger influence is wished.

6 RESULTS

This chapter will presents the main conclusions of this research, discuss them and provide recommendations.

6.1 CONCLUSIONS

The research originates in the under-performance of construction projects due to their complexity and uncertainty. Good collaboration is seen as a possible solution for this, but information is lacking on the client's and consortium's influence on collaboration. This problem indeed showed in the research, which confirms the research question *"How does the client's influence, on decision-making by contractors in key moments, differ when working with a consortium instead of a main contractor with subcontractor?"*.

The literature study resulted in the identification of a definition of a consortium[1], identification of the factors (relational capability, management style and contractual context) that might influence decision-making and resulted in the following research sub-questions and hypotheses to answer the research question:

1. How do the **factors** that were found in literature (relational capability, management style and contractual context) **influence the decision-making in practice**?
2. Are the **factors** (relational capability, management style and contractual context), and therefore the decisions, **influenced by the client** in practice?
3. Are there **differences** in the decision-making **between consortia and main contractor – sub-contractors (MC-SCs)**?

   This last sub-question is answered using the following hypotheses:

   a) Working with a construction consortium results in a better relationship between contractors.

   b) Working with a construction consortium improves goal alignment of the contractors.

   c) Working with a construction consortium reduces the negative impact of conflicts.

   d) Working with a construction consortium makes the client less involved in decision-making.

We have seen that, though the contractual context's influence is more often indirect and undetermined, all factors (management style, relational capability and contractual context) influence decision-making. Relational capability had the highest influence, especially through project performance and relational attitudes. The speed of decision-making (part of the management style) also had an impact. Lastly, the contract type and incentives (part of contractual context) influenced the decision-making indirectly. A match in company culture, higher management commitment and lacking project performance were several times named by the interviewees as

1 A legal entity with its own cash flow formed by firms, contributing a largely equal share of risk capital or payment for temporary operation, who, after termination, retrieve a largely equal share of profits

influential for decision-making. The client's influence varied more than the influence on decision-making and was lower. The contractual context is always influenced by the client, but has a low influence on decision-making. The other factors were even less influenced by the client. Broadening the solution space and improving higher management commitment were several times named as options for the client to influence decision-making. The overall relationship between contractors does not improve when working in a consortium. Conflict in consortia is just as destructive as in MC-SC relations and the goal alignment between contractors did not change significantly. In the main contractor - subcontractor cases, the client had more oversight over the decision-making process.

In conclusion, the differences of working with a consortium are that the influence of the client is lower, since the client is less involved in decision-making. In addition to this, the factors which the client influences show the least influence on the decision-making, making the influence of the client even lower. Also, the overall relationship, goal alignment and negative impact of conflicts is not improved by working in a consortium. These conclusions are projected onto the original research framework (introduced in Chapter 3) in Figure 6.1.

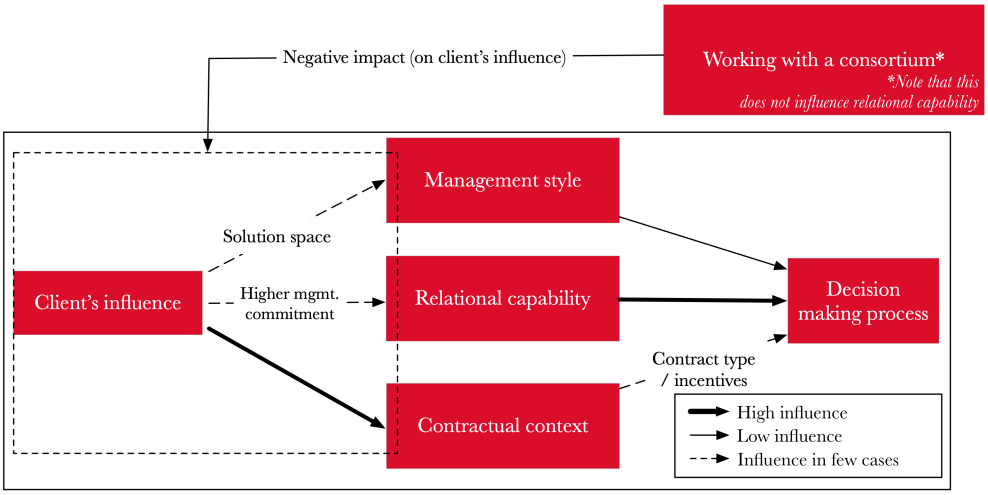


Figure 6.1: Conclusions projected on research framework

6.2 DISCUSSION

The results are first per sub-question discussed regarding their expectations, alternative explanations and how this relates to existing literature. This is followed by an overall discussion of the research': validity; limitations and scientific contribution. Lastly, a reflection on the original problem of this research is added.

6.2.1 Discussing the answers of the research sub-question

The influence of all factors on the decision-making was as expected, as these came from literature as being of influence. Those direct relations were found and clearly discussed in all interviews, leaving few room for alternative explanations. The framework of factors and the analysis of decision-making adds to literature an interesting and practicable way to research collaboration. Especially when combined with the unanticipated-key-moment approach: analysing conflict and measuring it's impact.

The influence of the client on the decision-making was expected to be larger. The current focus on client-contractor collaboration in literature made that a larger client

influence was expected (Rijkswaterstaat et al., 2016). However, all interviewed contractors agreed that the client's influence on decision-making is very limited. Also unexpected was the lower influence on management style than on relational capability, as the management style is per definition more adaptable than the relational capability. An alternative cause for the client's limited influence on relational capability is the preference of the client. Some clients prefer a more distant role and some a more involved role, as noticed by Ruijter (2019). This desire also seems to depend on the state of collaboration between the contractors, where a bad relationship results in a larger preference of the client to be involved.

Working in a consortium does not improve the relations between contractors. An explanation for the unchanged goal alignment and conflict impact is that different goals apply. These can be just as far apart, which is more destructive for the project when working in a consortium. An alternative explanation for this is the complexity of collaboration. There are so many variables influencing a contractor's relation (e.g. personality). Maybe, changing the organisational form does not affect the collaboration because many of the other important variables stay constant. The conclusion contradicts the current understanding in literature. inter-organisational collaboration (IOC) is expected to benefit the partnering firms and only the single article by (Gruneberg and Hughes, 2006) has raised doubts on working with a consortium which this research confirms. Empirical research on the client's perspective and influence on contractor-contractor relations is a relatively new and an understated part of literature, This research' contribution to this part of literature is therefore a desired addition.

The conclusion is different than the current understanding in literature. However, this research was conducted using interviews at four projects, making the reliability limited. Upon repetition of this research with different cases, different results could appear. Four projects are not representative for the whole construction sector in the Netherlands, as construction projects are complex, with many uncertain factors that can influence the results. This research only focused on finding whether there are differences, not fully deducing what caused the difference. The validity of the research is also affected by the involvement of different clients, who can have different preferences for their involvement.

6.2.2 Discussing the validity and scientific contribution of the overall research

The overall validity of this research consists of internal validity, external validity, construct validity and reliability (Yin, 2009). The internal validity, or causal relationships between factors and influences, is limited as the research was observational. Therefore, the evidence is predictive and does not verify causal relations. The external validity concerns the generalisation, where the sample of four projects is the most evident limitation. The complexity of projects makes that this is not a broad coverage of the Dutch construction sector. The construct validity, checking, shows less limitations as there are multiple interviewees per projects, the gave examples and an expert panel checked the findings. The reliability, whether the research is repeatable, is limited mostly due to the anonymity of the projects and interviewees. Besides the validity, the biggest limitation was the duration of the interviews and the time used for this research. The amount of questions and information to be gathered during an interview was large. The overall scientific contribution lies mostly in the examined contractor-contractor relation, which is underexposed in literature. Especially the influence of the client on this relation was not yet examined. The segregation in the sector and struggle of the client to find it's role in this proves the importance as a scientific contribution. Therefore, the subject should be examined in more research, which is further discussed in Section 6.3.

6.2.3 Returning to the problem

In hindsight, the problem leading to the objective *Improving collaboration in construction consortia in the Netherlands by gaining insight in (client and contractor related) factors, which influence unanticipated key moments* has more facets than originally thought. This research focused on the problem that consortia are formed by competitors and how (or if) the client could address this. The findings of the research indicate that the real, broader, problem is the lack of integration in the construction sector, combined with the now evident fact that the client's influence is very limited. Those contractors who manage to integrate their project team, disciplines and (sub-)contractors will succeed. Those who don't, will fail miserably. The client must be pro-active and, especially in the case of poor integration, must take every chance to cooperate with the contractor and increase it's influence. Otherwise, it won't be able to improve the integration and will be standing on the sideline waiting for the project to fail. When placing this in the broader context of procurement and public commissioning in the Dutch construction sector, an interesting dilemma evolves. Especially the infrastructure project are about *integrating* parts of the country, which will not succeed without *integrated* projects. Recently, the public commissioning of such projects started to involve more than the construction task alone. A broader societal context, with more factors and more stakeholders got a role. Combine this with a shift towards commercialisation, leaving more tasks to the private sector that was catalysed by the construction fraud. What results is a complex playing field of public commissioning, with the client on the sideline. This complex paradox is the broader context in which integration plays a role. That role is double, where integration is on one hand a cause that puts the client on the sideline and on the other hand a result of the complexity. That role shows how difficult it is to permanently solve the lack of integration in the sector: the complexity of factors and societal context require a market with various specialists. Though, a recent development of mergers and acquisitions of smaller contractors, resulted in a more centralised sector. This centralisation did not solve the integration issue. Moreover, there is not yet a definitive answer on how to remove the segregation and finding a solution might even be impossible. What is clear for now is that the integration must be managed and that this will require both a change of attitude and flexibility. Flexibility and change proved hard for the sector. Change starts with awareness and knowledge and this research provides just that. By linking a framework of how decisions are made and influenced to two different forms of integration, this research provides all ingredients to assess integration. Though, the case-study showed an increasing interest in the relation of integration and collaboration on project performance, solving segregation stays a long-term process requiring more insight, solutions and flexibility of the sector.

6.3 RECOMMENDATIONS

This study can be used in practice in various ways, but it can also be expanded with further research. The recommendations are therefore twofold: the recommendations for practice and the recommendations for further research. The recommendations for further research also entails a reflection on the process of this graduation research.

6.3.1 Recommendations for practice

Five recommendations for practice were drawn up, based on the conclusions and discussion of this chapter. These are presented per research question from main

question to sub-question. The first recommendation relates to the main question: whether working with a consortium affects the client's influence on decision-making:

1. Knowing that working with a consortium reduces the client's influence and knowing that the contractual context, broadening of solution space and improving higher management commitment are possibilities for the client to influence decision-making, it is recommend to the client to use a combination of these if a larger influence is wished. Completely avoiding consortia in the tender phase is given the current procurement law not a feasible recommendation. The contractual context can be used in two ways: use less integrated contracts and more incentives. Less integrated contracts increase the client's influence, but also demand a more active role from the client. Adding more incentives[2] can increase the client's possibilities to steer on time and therefore increase it's influence. The broadening of solution space (i.e. giving the contractor more options when dealing with issues) can make the contractor aware of the benefits of involving the client in decision-making. Improving higher management commitment has similar effects as broadening solution space, but mainly relates to issues which are likely to be escalated to the client's higher management.

The following two recommendations relate to results on the client's influence on decision-making:

2. Knowing that incentives can have negative impact on decision-making, it is recommended to contractors to warn the client of such incentives. The incentives can put the quality of the project under pressure, which will be noticed by the contractor during tendering. At this point, the contractor can notify the client so that the client can address this problem.

3. Knowing that bad project performance can have a negative impact on decision-making, it is recommend to the client to check whether this effect can be offset. If the project performance is under pressure, this can result in worse relationships between the contractors, more conflict and worse overall quality. Offsetting the effect can be done in various ways such as: handling requirements less strict (i.e. improving solution space), giving more room in the planning or even with financial support. The client should judge whether the measures provide more benefits than the possible damage to project quality. The contractor can also actively ask the client whether such options exist, even when the project performance is not yet under pressure. The legitimacy and feasibility of this recommendation does depend largely on how the poor project performance came about.

The fourth recommendation relates to the question which factors influence decision-making:

4. Knowing that relational capability influences decision-making and that this can be measured, it is recommended to contractors to regularly assess and improve this. Since a match in company culture, higher management commitment and lacking project performance have been named by the interviewees as being of great importance, it is especially recommended to stay aware of the status of these factors. relational capabilities assessment (RECAP) can be used to assess this.

The last recommendation is an insight from the case-study that is out of scope of all research questions:

2 In this research, the sub-factor 'incentives' as part of the contractual context, does not differentiate between positive and negative incentives. However, in practice either one will deliver different effects.

5. Knowing that most MC-SC decisions were caused by problems with the sub-contractor – client interaction, it is recommended to make clear agreements on this before execution starts. Examples of such agreements are: which meetings are attended by which subcontractor; which requirements a subcontractor can discuss directly with the client; how the main contractor is updated of results of sub-contractor – client interactions; what is expected from each party in the accreditation process of work plans or delivery files.

All recommendations for practice are projected onto research framework in Figure 6.2. Two recommendation are not part of the research, they relate to the cause of conflict. These two are shown in Figure 6.3. The figures also show whether the recommendation relates to the tender, execution or conflict phase; and whether it applies to the client or contractor.

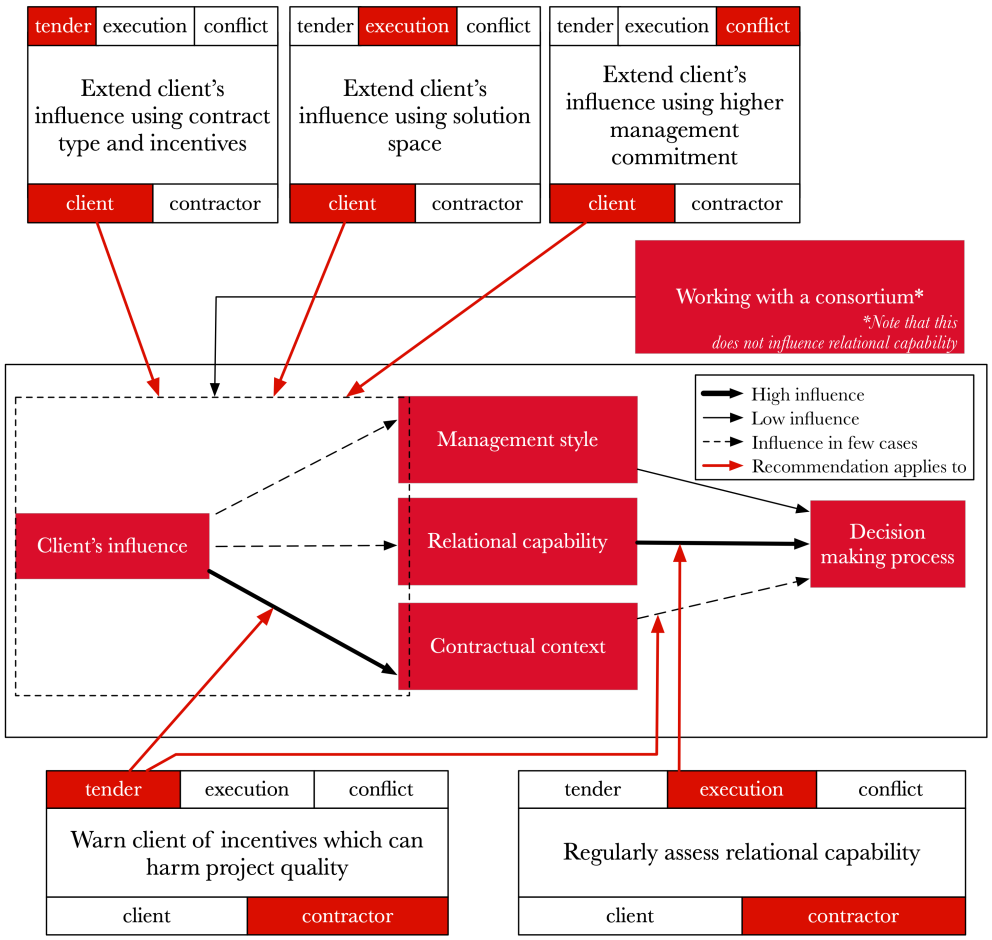


Figure 6.2: Recommendations placed onto research framework

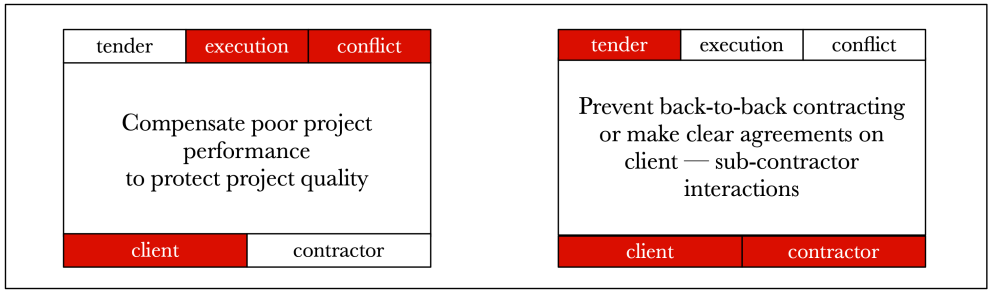


Figure 6.3: Recommendations that are not part of the research framework

6.3.2 Recommendations for further research

As named in the previous section, this research is one of few that raises doubts regarding the benefits of consortia. However, it only covers the first steps of the empirical cycle that captures reality in concrete findings. The research raised a broader question: how do consortia address the fragmentation of contractors and what role plays (and prefers) the client in this? To improve this research, it could be extended with a larger amount of cases. It is recommended to broaden the sectors and factors as well. Including the question *why* factors show influence, instead of the current question *if* there is influence. Unfortunately, it already proved difficult to examine many abstract (sub-)factors in the available time. Therefore, the factors should be recognisable and well defined. Before the case study starts, an extensive literature review and expert panel can ensure this recognition and clarity. During the case study planning multiple interviews can ensure enough time for all factors. When broadening the factors, it is recommended to add personal culture, more info on higher management commitment and the exact legal relationship between contractors. Contractual context needs elaboration, as the current operationalisation did not distinguish between cases. Eventually, when more qualitative info on the factors is known, a next step towards concrete findings could be taken. This step could be the focusing on important factors and using a survey to generate quantitative results.

Besides improving this research, it is recommended to analyse whether a bad collaboration between contractors has a larger negative effect on a project when working in a consortium. Additional research could also focus on the question when a consortium would be a better choice for either client or contractor.

In the context of a graduation research, the process that delivered this research is highly recommendable. When reflecting, three things were paramount for a smooth and effective process. The combination of: (1) a well-scoped subject of personal interest, (2) an aligned committee that gives concrete and feasible feedback and (3) a graduation company that helps in data gathering and links the research to practice. Additional recommendations regarding the process are: maintaining a sense of risk management, by giving priority to those aspects most critical for the planning. In this research, most critical was the data gathering (i.e. interviews). Lastly, it is recommended to keep an open line of communication with the committee and seeing them as guides and advisers instead of critics and graders. On a more critical note, the process had a high focus on time, which can harm the quality and meticulousness of the research.

In summary, this research gave the unexpected new insights that working in a consortium is not a guarantee to improve contractor relations, while it does reduce the client's influence and (though it needs further elaboration) the findings already have many practical applications for client's wanting to keep an influence on their projects.

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A ASSESSING THE MANAGEMENT STYLE

This chapter will give a more elaborate distinction between project and process management as discussed in the literature chapter. The first distinction is a more general one combined by Op de Woert (2013) shown in Table A.1. The second distinction is specific for conflict management and comes from De Wit (2010) shown in Table A.2. Together, the two tables can be used to score the management approach used to address the unexpected key moments on project and process management.

Process-oriented	**Project-oriented**
Assumption principles	
Project is a unique event	Project is a complex system
Accepted problem definition	Problem perception by stakeholders
Objective, robust, analysable and undisputed information	Subjective, actor dependant, negotiable and contested information
Static project environment	Dynamic project environment
Few distinct professions	Multi-competences and experts
Hierarchical project structure	Integrated network structure
Clearly detached project stages	Iterative project stages
Managerial principles	
Hierarchical steering	Network coordinating
Coordinated interface management	Shared interface management
Focus on performance	Focus on satisfaction
Control tools for time, costs and quality	Create acceptance, feasibility and support
Clearly define roles and responsibilities	Bundle and unbundle roles
Demarcate to one issue and limit parties	Broaden to multiple issues and involve parties
Blueprint terms of reference	Functional terms of reference
Work based incentives	System output based incentives
Predict accurately and limit change	Prepare flexible and facilitate change
Standardized information exchange	Unstructured information exchange
Impose a strict project planning	Impose process agreements on planning
Only inform stakeholders when necessary	Create a transparent communication network
Start with main problems and conflicts	Postpone problems and conflicts

Table A.1: General distinction between project and process management (van Boggelen, 2011)

Subject	**Process-oriented**	**Project-oriented**
Speed	Search for consensus in careful decision-making processes	Focus on rapid decision- making and decisiveness
Planning of conflict	Organize conflict deep in the process, try to postpone conflicts	Start with focus on main problems and conflicts, organize conflicts
Framing of conflict	Frame conflicts as solvable dilemma's, exploit opportunities	Emphasize substantial differences, try to diminish losses
Position of conflict	Move conflict to outside of process, offer extra forums for negotiation	Organize central discussion with project direction
Remove conflict by	Searching for underlying interests behind stakeholders positions	Focusing on actual position of stakeholder
Deadlock	Start new process of discussion and negotiation	Explain the merits of the plan
Commitment	Offer stakeholders possibility to postpone commitment to decisions	Ask for commitment on all major decisions
Aftercare	Invest in management of losers	Focus on cooperation with winners

Table A.2: Specific distinction between project and process management related to conflict management (De Wit, 2010)

B CASE SELECTION

This appendix explains how the longlist and shortlist of cases is made. As a starting point, all projects that are currently performed by TwynstraGudde's C&RM department are gathered. From this selection of 30 projects, there were fifteen projects currently in construction or recently delivered. This resulted in six consortia and nine main contractors – subcontractors. This was estimated as sufficient to find two suitable pairs of consortia and main contractor – subcontractor. These fifteen projects were categorised in six categories to create pairs: real estate, civil structure, flood control, road, rail infrastructure and other (e.g. wind farms, land reclamation). Three of these categories resulted in a pair: real estate, flood control and rail infrastructure. The pairing was based on keeping as many factors stable as possible: project size, client and contractors.

Table B.1 shows these fifteen cases and the way the short list of consortia projects has been made. The step from shortlist to cases is elaborated in the main text in Chapter 3.

Sector	Project	Reason not to proceed
Consortium		
Real estate	Erasmus MC	None, moved to shortlist with Paleis 't Loo
flood control	Project A	None, moved to shortlist with Project B
rail infrastructure	Project Charlie	None, moved to shortlist with Project D
flood control	Project B	No counterpart
Road	Rijnland Route	No counterpart
Road	Container Exchange Route	No counterpart
Main contractor - subcontractor		
Real estate	Paleis Het Loo	None, moved to shortlist with Erasmus MC
flood control	Project B [1]	None, moved to shortlist with Project A
rail infrastructure	Project D	None, moved to shortlist with Project C
Real estate	Redevelopment Campus TU/e Atlas	Not the most suitable counterpart [2]
Civil structure	Wieringermeer	No counterpart
Civil structure	Stuwensemble Nederrijn-Lek	No counterpart
Other	Middeneiland Ijburg	No counterpart
Other	Stormpolderdijk (EMK-terrein)	No counterpart
Other	De Entree	No counterpart

[1] The IJsseldelta is performed by a consortium, but each of the contractors has a separate work package for which it uses subcontractors. This makes it possible to see parts of the project as a main contractor - subcontractor relation. This creates a counterpart for the Houtribdijk project.
[2] Paleis het Loo is more suited as counterpart for Erasmus MC, since the size of these projects are more comparable.

Table B.1: Long list of projects based on current construction projects by TwynstraGudde's C&RM department.

C INTERVIEW PROTOCOL

The goal of this set of interviews is to gather empirical data that helps to find out whether the client has an influence on the collaboration in a consortium. The interviews will discuss multiple factors that might have had an influence and give a general idea about decision making and collaboration in the projects. These factors are the contract (on which the details are largely known beforehand), the management approach and the relational capability. The causal mechanisms between these factors and the resulting decision-making are analysed. In addition to this, a storyline or process trace of the decision-making process is constructed, including the involved people, some general opinion on collaboration and some general information regarding the interviewee is registered.

The interview protocol consists of three parts: the questions to be asked beforehand by phone, the interview itself and a questionnaire to be performed afterwards.

C.1 PROCESS BEFORE INTERVIEW

1. You have received some information in the interview invite, are there any more question regarding the context of the interview?
2. The interview will be recorded and arrangement regarding the confidentiality are made with the project organisation, do you have questions regarding this?
3. After the interview a summary of the decisions is sent to be fact checked, including a questionnaire to gather some more specific data regarding collaboration, taking approximately 20 minutes.
4. I would also like to discuss some background information regarding the project:
   a) What is your full name?
   b) What is your function at the contractor/client?
   c) What is your function at the project?
   d) Can you give a short summary of other relevant experience?

C.2 THE INTERVIEW ITSELF

Introduction (5 min)

1. Do you have any questions regarding the purpose of this research before we start with the content?
2. Please note that preferably all of your answers should reflect your personal opinion and not necessarily your companies and that it should reflect your experience regarding this project, not your career in general.

Decisions (2x 15 min) I would like to start with the descriptive part of each of the decisions.

1. Can you shortly describe the decision according to your viewpoint?

   a) What was your role?
   b) Which stakes were involved in this?
2. Can we construct a small timeline of the decision?
   a) What was the cause of the decision?
   b) Can you place it in any of the following categories:
      i. changes made by client
      ii. changes made by contractors
      iii. misalignment of contractors
      iv. abrupt stakeholder movement
      v. changes made by other external factors
   c) When did you get involved in this decision?
   d) Did the decision every lead to noticeable tension?
   e) Did anyone try to contain this tension?
   f) When did the client get involved?
3. Where there any interventions (like meetings or emails) regarding this and how are these best described:
   a) Quick and decisive OR careful and with as much consensus as possible?
   b) Discussed centrally OR as much separated from other processes as possible?
   c) Was commitment demanded directly OR was this postponed?
   d) as after the decision more attention for compensation of the losers OR for cooperation with the winners?
4. How did this all influence the project?
   a) On the project in: time, cost and quality?
   b) On the process in: satisfaction and relationships?

Decision 2

1. Can you shortly describe the decision according to your viewpoint?
   a) What was your role?
   b) Which stakes were involved in this?
2. Can we construct a small timeline of the decision?
   a) What was the cause of the decision?
   b) Can you place it in any of the following categories:
      i. changes made by client
      ii. changes made by contractors
      iii. misalignment of contractors
      iv. abrupt stakeholder movement
      v. changes made by other external factors
   c) When did you get involved in this decision?
   d) Did the decision every lead to noticeable tension?
   e) Did anyone try to contain this tension?
   f) When did the client get involved?
3. Where there any interventions (like meetings or emails) regarding this and how are these best described:

   a) Quick and decisive OR careful and with as much consensus as possible?
   b) Discussed centrally OR as much separated from other processes as possible?
   c) Was commitment demanded directly OR was this postponed?
   d) as after the decision more attention for compensation of the losers OR for cooperation with the winners?

4. How did this all influence the project?
   a) On the project in: time, cost and quality?
   b) On the process in: satisfaction and relationships?

Contractual context (10 min)

1. Did you experience that the type of contract with the client has influenced the way the decision was taken and in what way?
2. Did you experience that other characteristics of the contract (the way risk is shared, incentives are put in the contract or performance is assessed) have influenced the way the decision was taken and in what way?

Collaboration in general (10 min)

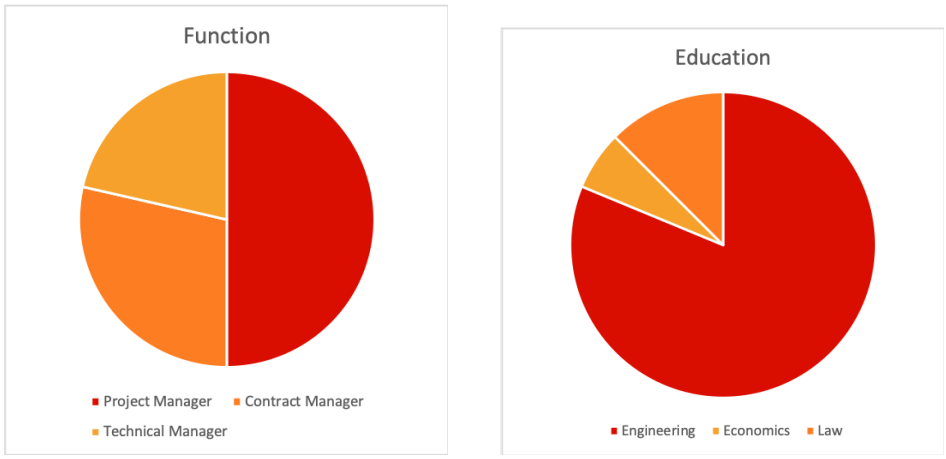
1. What is your vision on collaboration?
2. How is the collaboration between the contractors?
3. Was this influenced by any of the following:
   a) The teamworking quality
   b) Attempts to improve the collaboration
   c) Company culture in general
   d) Senior management of the contractors
4. Did you ever notice differences between working a consortium and main contractor-subcontractor?
5. Did you ever notice that the contract, relational capabilities or management approach has an influence on this?
6. Did you ever notice that the client has an influence on this?

Closing (5 min)

1. Do you think that we should discuss any other decision or other influential factor?
2. Thank you for your time, as previously agreed I will afterwards send a summary of the decisions to be checked and a survey to address some more specific points (taking 20 minutes).

D INTERVIEWEE DATA

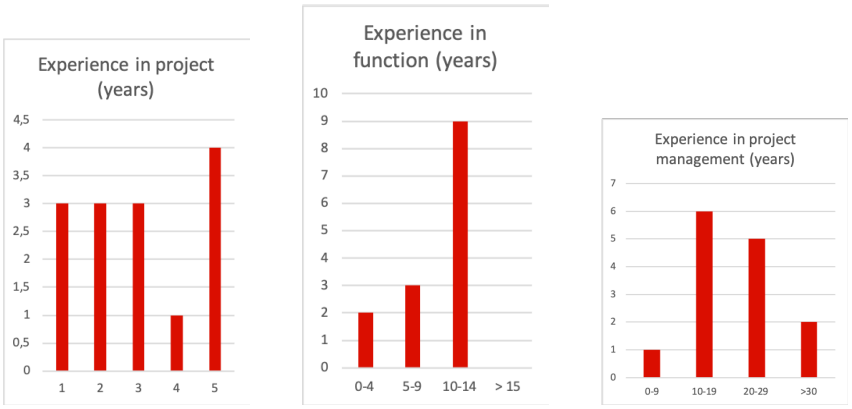
This chapter presents various data on the function, gender, background and experience of the interviewees. Table D.1 shows the data. Figure D.1 and Figure D.2 show a more graphical representation of the data.



(a) Score levels per criterion

(b) Score levels per sub-criterion

Figure D.1: Function and background of interviewees



(a) Score levels per criterion

(b) Score levels per sub-criterion

(c) Score levels per sub-criterion

Figure D.2: Years of experience of interviewees

	Function	Company	Gender	Education	Experience	Experience	Experience	Other
Project A					**in project**	**in function**	**in project management**	
1	Project Manager	Contractor A	Male	Engineering	5 years	10 years	25 years	
2	Technical Manager	Contractor B	Male	Engineering	5 years	5 years	17 years	
3	Technical Manager	RWS	Male	Engineering	5 years	11 years	24 years	
4	Contract Manager	RWS	Male	Engineering		1 year	2 years	5 years
Project B								
1	Contract Manager	RWS	Male	Engineering	2 years	13 years	20 years	
2	Technical Manager	RWS	Male	Engineering	1 year	11 years	19 years	Previous experience at engineering firm
3	Project Manager	Contractor C	Male	Engineering	2 years	5 years	10 years	
4	Project Manager	Subcontractor X	Male		4 years	10 years	27 years	
Project C								
1	Project Manager	Contractor D	Male	Economics	3 years	13 years	13 years	Previous experience as FIS consultant
2	Project Manager	Contractor E	Mae	Engineering; Law	3 years	3 years	18 years	Main experience in contract management
3	Contract Manager	ProRail	Male	Engineering	5 years	12 years	32 years	
Project D								
1	Project Manager	Contractor E	Male	Engineering	3 years	7 years	11 years	
2	Contract Manager	ProRail	Male	Engineering	2 years	12 years	29 years	Previous experience at contractor
3	Project Manager	Subcontractor Y	Male	Law	1 year	13 years	37 years	

Table D.1: Data on the interviewees

E | RECAP RESULTS

This chapter gives insight in the measurement of the relational capability, for which relational capabilities assessment (RECAP) is used. All contractors that have been interviewed have performed the RECAP, giving insight in their relation capability. The test is performed using an online form. This chapter first presents the used survey question and then presents the results per project.

E.1 SURVEY QUESTIONS

The survey questions are an adapted version from the original RECAP by Suprapto (2016). It is adapted as the questionnaire was send in Dutch, used to assess contractor-contractor relationship (instead of a client-contractor relationship) and overlapping questions were removed to reduce the time requested from the interviewees. This was done to increase the amount of people willing to cooperate.

1. Front-end definition
    a) The project goals, objectives, and scope are understood by the contractor team.
    b) All functional/ high level technical requirements (basic design) are reviewed together by both teams.
2. Team integration
    a) We form an integrated project team (IPT) where the owner and the contractor teams are structured and integrated as a single team with no apparent boundaries.
    b) We perform goal setting and alignment meetings with sub-contractors and suppliers.
    c) We exercise inter-team building workshops to encourage collaboration via fun and excitement.
3. Joint working processes
    a) We jointly conduct planning and perform monitoring.
    b) We jointly identify and monitor risks and formulate a necessary mitigation plan.
    c) We have mechanisms to resolve conflicts and to make joint decisions.
4. Efficiency
    a) The project is progressing in accordance with the estimated cost so far.
    b) The project is progressing in accordance with the planned schedule so far.
5. Quality
    a) So far, there are no significant reworks due to major defects regarding the project deliverables.
    b) So far, all project activities are performed or completed safely with no accidents causing severe injury.

   c) So far, the facility or product constructed is functioning according to the specified capacity.

6. satisfaction
   a) Both owner and contractor are satisfied with the project results and outcomes so far.
   b) So far, this project will be a (commercial) success to the contractor.
7. Relationship continuity
   a) Beyond this project, we will likely work with each other in future with the same partners.
   b) The relationship experience we gain so far will be useful in future project(s) even with different partners.
8. Senior management commitment
   a) Senior management of the contractor commits to provide necessary resources and support to the project teams.
   b) Senior management of both parties actively work together to resolve potential conflicts when needed.
9. Senior management trust
   a) There is an atmosphere of mutual trust between senior management of both parties.
10. Established relational norms
   a) The contractor intentionally adopts 'no blame culture' when problems arise.
   b) The contractor is intentionally open and honest in any interactions with no hidden agendas.
11. Communication
   a) Both teams communicate directly with each other.
   b) Both teams are satisfied with the usefulness of the information shared by other team.
12. Coordination
   a) The work done in the teams is closely synchronized between the teams.
   b) There is a clear linkage between the teams for their interdependent tasks.
13. Balanced contribution
   a) There is a balanced contribution of ideas between the teams.
14. Mutual support
   a) Both teams help each other as well as they could.
   b) Whenever problems occurred, they are resolved constructively.
   c) Every critical decision is made together by both teams.
15. Aligned effort
   a) Both teams put their best effort into this project.
16. Cohesion
   a) Members of both teams feel proud to be part of the project team.
   b) Members of both teams feel responsible for maintaining the relationships within the project team.

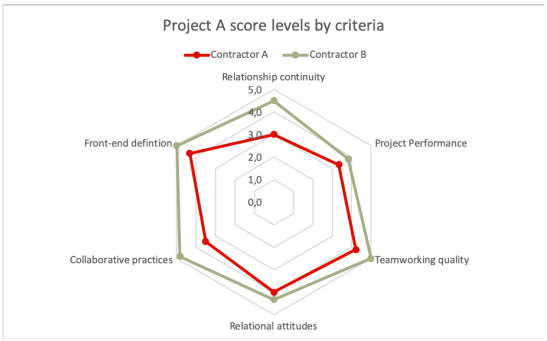
17. Affective trust
    a) Both teams are comfortable being dependent on each other.
    b) Both teams are fair to each other.

E.2 RESULTS

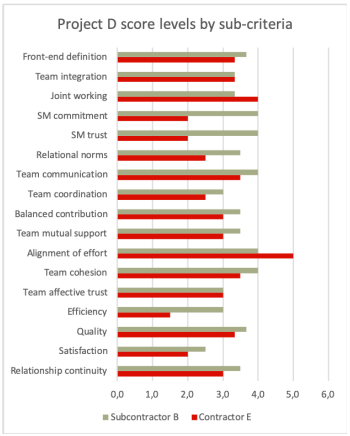
The results from RECAP are presented per project.

E.2.1 Project A

Project A's RECAP results are shown in Figure E.1, showing that Contractor A is giving lower scores overall. Relationship continuity (involving senior management) and project performance are given the lowest scores. Front end definition and teamworking quality the highest, with the biggest gap in relationship continuity. The overall score for relational capability is high.



(a) Score levels per criterion



(b) Score levels per sub-criterion

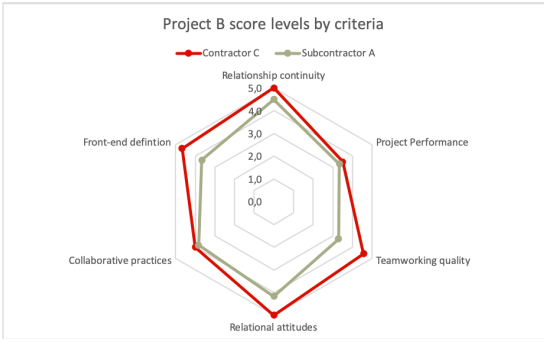
Figure E.1: RECAP scores project A

	Contractor A	Contractor B
Front End Defintion	**4,3**	**5,0**
The project goals, objectives, and scope are understood by the team of contractor 1.	5	5
The project goals, objectives, and scope are understood by the team of contractor 2.	5	5
All functional/ high level technical requirements (basic design) are reviewed together by both teams.	3	5
Collaborative practices	**3,5**	**4,8**
Team integration	***4,0***	***5,0***
We form an integrated project team (IPT) where the owner and the contractor teams are structured and integrated.	5	5
We perform goal setting and alignment meetings with sub-contractors and suppliers.	4	5
We exercise inter-team building workshops to encourage collaboration via fun and excitement.	3	5
Joint working progress	***3,0***	***4,7***
We jointly conduct planning and perform monitoring.	2	5
We jointly identify and monitor risks and formulate a necessary mitigation plan.	4	5
We have mechanisms to resolve conflicts and to make joint decisions.	3	4
Project performance	**3,3**	**3,8**
Efficiency	***3,5***	***3,5***
The project is progressing in accordance with the estimated cost so far.	3	3
The project is progressing in accordance with the planned schedule so far.	4	4
Quality	***3,0***	***4,0***
So far, there are no significant reworks due to major defects regarding the project deliverables.	3	4
So far, all project activities are performed or completed safely with no accidents causing severe injury.	2	3
So far, the facility or product constructed is functioning according to the specified capacity.	4	5
Statisfaction	***3,5***	***4,0***
Both owner and contractor are satisfied with the project results and outcomes so far.	4	5
So far, this project will be a (commercial) success to the contractor.	3	3
Relationship continuity	**3,0**	**4,5**
Beyond this project, we will likely work with each other in future with the same partners.	2	4
The relationship experience we gain so far will be useful in future project(s) even with different partners.	4	5
Relational attitudes	**4,0**	**4,3**
Senior management commitment	***4,0***	***4,3***
Senior management of the contractor commits to provide necessary resources and support to the project teams.	4	4
Senior management of both parties actively work together to resolve potential conflicts when needed.	3	4
Senior management trust	***4,0***	***4,0***
There is an atmosphere of mutual trust between senior management of both parties.	4	4
Established relation norms	***4,5***	***5,0***
The contractor intentionally adopts 'no blame culture' when problems arise.	4	5
The contractor is intentionally open and honest in any interactions with no hidden agendas.	5	5
Teamworking quality	**4,2**	**5,0**
Communication	***4,0***	***5,0***
Both teams communicate directly with each other.	4	5
Both teams are satisfied with the usefulness of the information shared by other team.	4	5
Coordination	***4,0***	***5,0***
The work done in the teams is closely synchronized between the teams.	5	5
There is a clear linkage between the teams for their interdependent tasks.	3	5
Balanced contribution	***4,5***	***5,0***
There is a balanced contribution of ideas between the teams.	4	5
Both teams help each other as well as they could.	5	5
Mutual support	***4,5***	***5,0***
Whenever problems occurred, they are resolved constructively.	5	5
Every critical decision is made together by both teams.	4	5
Aligned effort	***4,0***	***5,0***
Both teams put their best effort into this project.	4	5
Cohesion	***4,5***	***5,0***
Members of both teams feel proud to be part of the project team.	5	5
Members of both teams feel responsible for maintaining the relationships within the project team.	4	5
Affective trust	***4,0***	***5,0***
Both teams are comfortable being dependent on each other.	4	5
Both teams are fair to each other.	4	5
Total	**3,7**	**4,6**

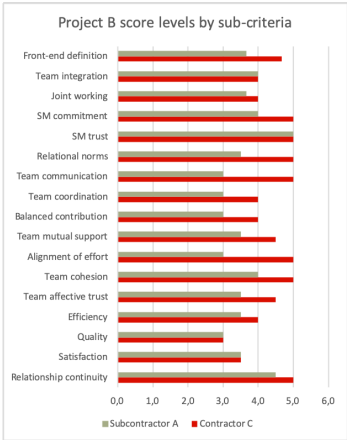
Table E.1: RECAP results Project A

E.2.2 Project B

Project B's RECAP results are shown in Figure E.2, showing that Contractor C is giving higher scores overall. Project performance is given the lowest scores. Relationship continuity and relational attitudes the highest, with the biggest gap in teamworking quality. The overall score for relational capability is high.



(a) Score levels per criterion



(b) Score levels per sub-criterion

Figure E.2: RECAP scores project B

	Contractor C	Subcontractor X
Front End Defintion	**4,7**	**3,7**
The project goals, objectives, and scope are understood by the team of contractor 1.	5	4
The project goals, objectives, and scope are understood by the team of contractor 2.	5	4
All functional/ high level technical requirements (basic design) are reviewed together by both teams.	4	3
Collaborative practices	**4,0**	**3,8**
Team integration	***4,0***	***4,0***
We form an integrated project team (IPT) where the owner and the contractor teams are structured and integrated.	4	4
We perform goal setting and alignment meetings with sub-contractors and suppliers.	4	4
We exercise inter-team building workshops to encourage collaboration via fun and excitement.	4	4
Joint working progress	***4,0***	***3,7***
We jointly conduct planning and perform monitoring.	4	4
We jointly identify and monitor risks and formulate a necessary mitigation plan.	4	4
We have mechanisms to resolve conflicts and to make joint decisions.	4	3
Project performance	**3,5**	**3,3**
Efficiency	***3,5***	***3,5***
The project is progressing in accordance with the estimated cost so far.	4	3
The project is progressing in accordance with the planned schedule so far.	4	4
Quality	***3,0***	***4,0***
So far, there are no significant reworks due to major defects regarding the project deliverables.	4	3
So far, all project activities are performed or completed safely with no accidents causing severe injury.	1	2
So far, the facility or product constructed is functioning according to the specified capacity.	4	4
Statisfaction	***3,5***	***4,0***
Both owner and contractor are satisfied with the project results and outcomes so far.	4	4
So far, this project will be a (commercial) success to the contractor.	3	3
Relationship continuity	**5,0**	**4,5**
Beyond this project, we will likely work with each other in future with the same partners.	5	5
The relationship experience we gain so far will be useful in future project(s) even with different partners.	5	4
Relational attitudes	**5,0**	**4,2**
Senior management commitment	***5,0***	***4,0***
Senior management of the contractor commits to provide necessary resources and support to the project teams.	5	4
Senior management of both parties actively work together to resolve potential conflicts when needed.	5	4
Senior management trust	***5,0***	***5,0***
There is an atmosphere of mutual trust between senior management of both parties.	5	5
Established relation norms	***5,0***	***3,5***
The contractor intentionally adopts 'no blame culture' when problems arise.	5	4
The contractor is intentionally open and honest in any interactions with no hidden agendas.	5	3
Teamworking quality	**4,6**	**3,3**
Communication	***5,0***	***3,0***
Both teams communicate directly with each other.	5	3
Both teams are satisfied with the usefulness of the information shared by other team.	5	3
Coordination	***4,0***	***3,0***
The work done in the teams is closely synchronized between the teams.	4	3
There is a clear linkage between the teams for their interdependent tasks.	4	3
Balanced contribution	***4,0***	***3,0***
There is a balanced contribution of ideas between the teams.	4	3
Both teams help each other as well as they could.	4	3
Mutual support	***4,5***	***3,5***
Whenever problems occurred, they are resolved constructively.	5	4
Every critical decision is made together by both teams.	4	3
Aligned effort	***5,0***	***3,0***
Both teams put their best effort into this project.	5	3
Cohesion	***5,0***	***4,0***
Members of both teams feel proud to be part of the project team.	5	4
Members of both teams feel responsible for maintaining the relationships within the project team.	5	4
Affective trust	***4,5***	***3,5***
Both teams are comfortable being dependent on each other.	4	4
Both teams are fair to each other.	5	3
Total	**4,5**	**3,8**

Table E.2: RECAP results Project B

E.2.3 Project C

Project C's RECAP results are shown in Figure E.3, showing that Contractor E is giving lower scores overall. Project performance is given the lowest scores. Front end definition, teamworking quality and collaborative practices the highest, with the biggest gap in relational attitudes. The overall score for relational capability is low.

(a) Score levels per criterion **(b)** Score levels per sub-criterion

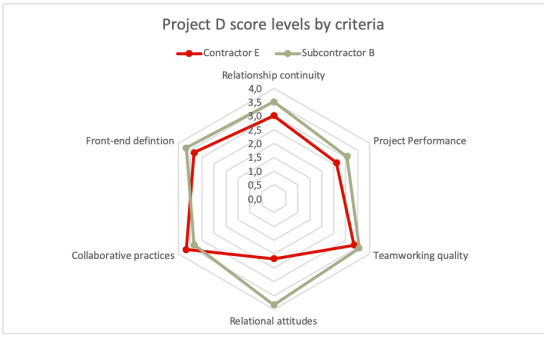
Figure E.3: RECAP scores project C

	Contractor D	Contractor E
Front End Defintion	**4,3**	**4,0**
The project goals, objectives, and scope are understood by the team of contractor 1.	4	4
The project goals, objectives, and scope are understood by the team of contractor 2.	4	4
All functional/ high level technical requirements (basic design) are reviewed together by both teams.	5	4
Collaborative practices	**4,0**	**2,7**
Team integration	***4,0***	***3,0***
We form an integrated project team (IPT) where the owner and the contractor teams are structured and integrated.	4	3
We perform goal setting and alignment meetings with sub-contractors and suppliers.	4	3
We exercise inter-team building workshops to encourage collaboration via fun and excitement.	4	3
Joint working progress	***4,0***	***2,3***
We jointly conduct planning and perform monitoring.	4	3
We jointly identify and monitor risks and formulate a necessary mitigation plan.	4	2
We have mechanisms to resolve conflicts and to make joint decisions.	4	2
Project performance	**3,1**	**1,7**
Efficiency	***2,5***	***1,0***
The project is progressing in accordance with the estimated cost so far.	2	1
The project is progressing in accordance with the planned schedule so far.	3	1
Quality	***4,7***	***2,7***
So far, there are no significant reworks due to major defects regarding the project deliverables.	4	2
So far, all project activities are performed or completed safely with no accidents causing severe injury.	5	2
So far, the facility or product constructed is functioning according to the specified capacity.	5	4
Statisfaction	***2,0***	***1,5***
Both owner and contractor are satisfied with the project results and outcomes so far.	2	2
So far, this project will be a (commercial) success to the contractor.	2	1
Relationship continuity	**3,5**	**2,0**
Beyond this project, we will likely work with each other in future with the same partners.	3	2
The relationship experience we gain so far will be useful in future project(s) even with different partners.	4	2
Relational attitudes	**3,0**	**1,8**
Senior management commitment	***3,0***	***1,8***
Senior management of the contractor commits to provide necessary resources and support to the project teams.	3	2
Senior management of both parties actively work together to resolve potential conflicts when needed.	3	1
Senior management trust	***2,0***	***2,0***
There is an atmosphere of mutual trust between senior management of both parties.	2	2
Established relation norms	***4,0***	***2,0***
The contractor intentionally adopts 'no blame culture' when problems arise.	4	2
The contractor is intentionally open and honest in any interactions with no hidden agendas.	4	2
Teamworking quality	**3,7**	**2,8**
Communication	***3,5***	***3,0***
Both teams communicate directly with each other.	4	3
Both teams are satisfied with the usefulness of the information shared by other team.	3	3
Coordination	***4,5***	***3,0***
The work done in the teams is closely synchronized between the teams.	4	3
There is a clear linkage between the teams for their interdependent tasks.	5	3
Balanced contribution	***4,0***	***3,0***
There is a balanced contribution of ideas between the teams.	4	4
Both teams help each other as well as they could.	4	2
Mutual support	***3,5***	***3,0***
Whenever problems occurred, they are resolved constructively.	4	2
Every critical decision is made together by both teams.	3	4
Aligned effort	***3,0***	***3,0***
Both teams put their best effort into this project.	3	3
Cohesion	***3,5***	***2,0***
Members of both teams feel proud to be part of the project team.	3	2
Members of both teams feel responsible for maintaining the relationships within the project team.	4	2
Affective trust	***4,0***	***2,5***
Both teams are comfortable being dependent on each other.	4	2
Both teams are fair to each other.	4	3
Total	**3,6**	**2,5**

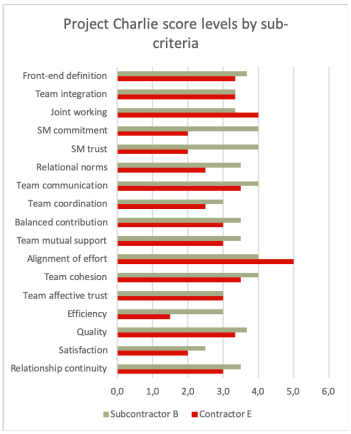
Table E.3: RECAP results Project C

E.2.4 Project D

Project D's RECAP results are shown in Figure E.4, showing that Contractor E is giving lower scores overall. Relational attitudes (involving senior management) and project performance are given the lowest scores. Front end definition and collaborative practices the highest, with the biggest gap in relationship continuity. The overall score for relational capability is relatively low.



(a) Score levels per criterion



(b) Score levels per sub-criterion

Figure E.4: RECAP scores project D

	Contractor E	Subcontractor Y
Front End Defintion	**3,3**	**3,7**
The project goals, objectives, and scope are understood by the team of contractor 1.	4	4
The project goals, objectives, and scope are understood by the team of contractor 2.	4	4
All functional/ high level technical requirements (basic design) are reviewed together by both teams.	2	3
Collaborative practices	**3,7**	**3,3**
Team integration	***3,3***	***3,3***
We form an integrated project team (IPT) where the owner and the contractor teams are structured and integrated.	3	3
We perform goal setting and alignment meetings with sub-contractors and suppliers.	4	3
We exercise inter-team building workshops to encourage collaboration via fun and excitement.	3	4
Joint working progress	***4,0***	***3,3***
We jointly conduct planning and perform monitoring.	4	3
We jointly identify and monitor risks and formulate a necessary mitigation plan.	4	4
We have mechanisms to resolve conflicts and to make joint decisions.	4	3
Project performance	**2,6**	**3,1**
Efficiency	***1,5***	***3,0***
The project is progressing in accordance with the estimated cost so far.	1	2
The project is progressing in accordance with the planned schedule so far.	2	4
Quality	***3,3***	***3,7***
So far, there are no significant reworks due to major defects regarding the project deliverables.	2	3
So far, all project activities are performed or completed safely with no accidents causing severe injury.	4	4
So far, the facility or product constructed is functioning according to the specified capacity.	4	4
Statisfaction	***3,0***	***2,5***
Both owner and contractor are satisfied with the project results and outcomes so far.	3	3
So far, this project will be a (commercial) success to the contractor.	1	2
Relationship continuity	**3,0**	**3,5**
Beyond this project, we will likely work with each other in future with the same partners.	2	3
The relationship experience we gain so far will be useful in future project(s) even with different partners.	4	4
Relational attitudes	**2,2**	**3,8**
Senior management commitment	***2,0***	***4,0***
Senior management of the contractor commits to provide necessary resources and support to the project teams.	2	4
Senior management of both parties actively work together to resolve potential conflicts when needed.	2	4
Senior management trust	***2,5***	***3,5***
There is an atmosphere of mutual trust between senior management of both parties.	2	4
Established relation norms	***2,5***	***3,5***
The contractor intentionally adopts 'no blame culture' when problems arise.	2	4
The contractor is intentionally open and honest in any interactions with no hidden agendas.	3	3
Teamworking quality	**3,4**	**3,6**
Communication	***3,5***	***4,0***
Both teams communicate directly with each other.	4	4
Both teams are satisfied with the usefulness of the information shared by other team.	3	4
Coordination	***2,5***	***3,0***
The work done in the teams is closely synchronized between the teams.	2	3
There is a clear linkage between the teams for their interdependent tasks.	3	3
Balanced contribution	***3,0***	***3,5***
There is a balanced contribution of ideas between the teams.	3	4
Both teams help each other as well as they could.	3	3
Mutual support	***3,0***	***3,5***
Whenever problems occurred, they are resolved constructively.	3	4
Every critical decision is made together by both teams.	3	3
Aligned effort	***5,0***	***4,0***
Both teams put their best effort into this project.	5	4
Cohesion	***3,5***	***4,0***
Members of both teams feel proud to be part of the project team.	3	4
Members of both teams feel responsible for maintaining the relationships within the project team.	4	4
Affective trust	***3,0***	***3,0***
Both teams are comfortable being dependent on each other.	3	3
Both teams are fair to each other.	3	3
Total	**3,0**	**3,5**

Table E.4: RECAP results Project D

F CASE FACTS AND FINDINGS

The goal of the case findings is to present the relevant findings from all projects in a way that gives insight in the deduction of conclusions. The conclusions are which influences exist. Further, the case findings show how the summarising tables and figures at the end of each case are composed.

The case findings are presented in a format of facts (the project, the interviewees and the decisions) and findings (the factors). The facts are recognisable by a bullet point (•) and are in some cases backed up by sub-facts or statements from the interviewees. The sub-facts are recognisable by an open bullet point (◦). The factors are presented as findings, starting with the data (i.e. interview statements) and moving towards sub-findings and general findings, which are emphasised by layout. The statements are recognisable by a dash () , the sub-findings by an arrow () and the general findings by a double arrow (). All interview statements contain a reference to the interview, using the function title as reference.

A reliability score and level of influence is given as explained in Chapter 4. The reliability score is the total amount of interviewees contributing to each statement that together support a status or influence. The level of influence is determined using the following scale:

NONE There is no influence possible.

NOT FOUND Though it is seen as possible, no influence was found.

NOT IN THIS EXAMPLE (NITE) The influence exists, but not in the examined decisions.

INDIRECT The influence exists, but is only partially attributed to this factor.

LOW The influence exists, but it did not impact the outcome of decision-making.

HIGH The influence exists and it did impact the outcome of decision-making.

Also explained in Chapter 4, is how the high-level findings regarding influence are determined: the findings regarding influence adopt the highest influence of all statements. This is done because this shows which level of influence is possible. For example, if one sub-factor has a low influence on decision-making and another sub-factor has a high influence, then the influence of the whole factor is high. The summarising tables at the end of each case show the status, influence on decision-making and influence of the client. The reliability is shown in brackets after each status or influence. The summarising figures show the data from the table in a more simplified way. The meaning of each arrow is explained in each figure.

F.1 PROJECT A FACTS AND FINDINGS

- Project A is a high-water protection project in the category of 50 - 100 million euros in the Netherlands. The project and interviewees will stay anonymous. Key figures and dates will be categorised, or made relative, to ensure anonymity.
- The project is commissioned by Rijkswaterstaat.

- The project is performed by a consortium of Contractor A and Contractor B, who started construction roughly half a year after they won the tender and will be completed in 2.5 years.
- Details on the scope of the project will not be disclosed.
- The contract is a Design and Construct (D&C) contract with a design component that is perceived as fairly large by the contractors.
  - The contract is a D&C contract.
  - Performance is assessed using the 'prestatiemeten' index.
  - There are few incentives in the contract (Contract Manager RWS). The contract contains only two fines: not finishing the complete project on time and not meeting the new flood protection standards on time.
  - The risks are perceived as evenly shared (Technical Manager Contractor B; Contract Manager RWS).
- Contractor A and B are both Dutch and are comparable in terms of expertise, experience and size. Some main characteristics are presented in Table F.1.

Contractor	**Revenue**	**Part of project**
Contractor A	>€2000 million	50%
Contractor B	€1000 - €2000 million	50%
Client	**Budget**	
Rijkswaterstaat	€2175 million (2017)	

Table F.1: Key indicators contractors and client Project A

F.1.1 Project A interviewees

- The project manager from Contractor A and the technical manager from Contractor B have been interviewed. The technical manager and contract manager from RWS were interviewed as well. An overview of the interviewees and their roles is presented in Table F.2

Function	**Company**
Project manager	Contractor A
Project manager	Contractor B
Contract manager	Rijkswaterstaat (RWS)
Technical manager	RWS

Table F.2: Interviewees Project A

F.1.2 Project A decisions

During the interviews five decisions were discussed for this research:

- the choice for a small dredging vessel (being either from Contractor A or Contractor B);
- the decision on payment of the large dredging vessel during vacation periods;

  - the decision on the quality management system (from Contractor A or Contractor B);
  - price and tendering of the asphalt work;
  - Each contractor's share of screen time in the promotion film.

- The decisions for a smaller dredging vessel and payment of the larger vessel were chosen for this research. The quality management system was already chosen during tendering, the asphalt work did not impose a tangible decision and the promotion film was a decision by RWS.

F.1.2.1 *Decision 1*

- The decision was whose dredging vessel to use. An extra, smaller, dredging vessel was needed, and both contractors could supply one (Contractor B's Vessel B or Contractor A's Vessel A).
- The decision was made by the contractors' project directors for the Netherlands. The decision involved other projects and was therefore made a higher management level.
- The decision-making process started six months before the vessel had to start operating.
  - It was decided to make this decision in the execution phase (instead of during tendering) as both contractors could supply a vessel and the availability is subject to change. The decision was therefore not unanticipated.
- The eventual decision was that the Vessel A from Contractor A was used, while the Vessel B is in use at a second project involving a combination of the contractors. This decision was made, because Contractor B had a larger share of other vessels in use at the project.
  - The second project performed in combination by the contractors, where Vessel B would be, used got delayed. The delay made it more urgent to find another project to keep the vessel in operation. Eventually a third project was awarded where the vessel could be used, making it less urgent.
- The perception of the contractors is that the decision did not impact money, time or quality for the project. Neither did it influence client satisfaction or the relation between the contractors. (Project Manager Contractor A; Technical Manager Contractor B)
  - The decision did involve revenue for one of the contractors but that did not influence the project expenses.
- The client did not receive a written notice of this and only heard about this decision informally. The client did not understand the full context of it.

F.1.2.2 *Decision 2*

- The decision was whether to pay the larger dredging vessel for the second week of the Christmas break.
  - Usually, vessels are paid for 24/7, even when they have to wait for another task within the same project to be completed, this is called 'forced downtime'. However, if downtime is the result of maintenance or repairs on the vessel, the vessels are not paid for by the opdrachtgever. Further, vessels are not paid for during requested time, this is called requested down time. As no work is conducted during the first week of the Christmas break due to the holidays, this is perceived as requested downtime.

  - The large vessel (Vessel C) was expected to be waiting for another ship in the second week before it could continue its work (forced downtime) but it also had some repair work to do (requested downtime), which could be done in that same week. At that point a request was made to not pay the Vessel C for the two weeks, as it would not work and not paying it is better for the project result.
  - This means that Contractor B is paid one week less than it originally expected. On the other hand, it could mean that the project had to pay for a period where no work is done, and a discussion started.
- The decision was made in the Steering Committee Consultation (SCC). It was in the SCC proposed by the project team that for the first week no vessel would be paid and that Vessel C would not be paid for the second week either.
  - This had to be checked by the Project Director from Contractor B with his direction. The next SCC Contractor B made clear that two weeks was too long, but one week was agreed. This was immediately accepted by Contractor A and the project team.
- The decision making started two weeks before the Christmas break and was unanticipated.
- The eventual decision was that one week would be paid, this was suggested by Contractor A' project manager and accepted by Contractor B's technical manager.
  - In the weeks before the vacation, the superintendent and technical manager also got aware that previous tasks were finished early and the Vessel C could have continued its work.
  - The Vessel C would still use this period to do maintenance, but it was not clear whether this would still be unpaid. While the project manager was on leave, there was decided that this would be paid, which was reversed when the project manager got back.
- The perception from the contractors is that the decision did not influence the project in terms of time or quality and neither on the process in terms of goals or relationships, according to both contractors. It did influence the project in terms of cost.
- The client never got aware of this decision

F.1.3 Project A findings

What now follows are findings build up from statements, as explained in the introduction of this chapter.

F.1.3.1 *Management style*

  - There was consensus from both contractors for both decisions (Project Manager Contractor A; Technical Manager Contractor B).
  - The project manager from contractor A perceived the first decision to be taken at the last moment (Project Manager Contractor A).

→ ***The speed of the decisions is more typed as 'a search for consensus in a careful decisions making process' than 'focus on rapid decision-making and decisiveness'.*** Reliability: 3.

  - The decision making was moved to the steering committee meeting (SCM) or escalated to project directors (Project Manager Contractor A; Technical Manager Contractor B). In these meetings, less people are involved and are therefore less central.

  - These forums are not outside the process and are all part of the regular meetings and discussion (Project Manager Contractor A).

→ ***The position of the conflict on decision could not be explicitly typed as 'Move conflict to outside of process, offer extra forums for negotiation' than 'Organize central discussion with project direction'.*** Reliability: 3.

  - When a decision is taken, everyone is expected to commit to this (Project Manager Contractor A).

→ ***The commitment for the decision is more typed as 'Ask for commitment on all major decisions' than 'Offer stakeholders possibility to postpone commitment to decisions'.*** Reliability: 1.

  - A list of revenue made from hired material is kept. This makes it possible to compensate such decisions on a later moment (Project Manager Contractor A; Technical Manager Contractor B).

→ ***The aftercare of the decision is more typed as 'Invest in management of losers' than 'Focus on cooperation with winners'.*** Reliability: 2.

→ ***This makes the two aspects more process orientated, one project orientated and one undetermined. Therefore, the management style is more process orientated.***

⇒ **The management style is process orientated.** Reliability: 9.

  - The first decision was taken at the last moment (Project Manager Contractor A). The focus on consensus influenced the timing of the decision. Influence from speed of decision-making: low.
  - The decision was very much influenced by the fact that contractor B already had more revenue from existing vessels (Project Manager Contractor A). Influence of aftermath of decision-making: high.

→ ***The process-oriented management style influenced the decision making.*** Reliability: 2. Influence: high.

  - The client does not want to influence the management style of the contractors, since the D&C contract asks for a more distant role in regard to execution (Technical Manager RWS). Influence: not found.
  - The client does have its own vision on client-contractor collaboration, but according to the contractor, this is not seen as an example for contractor-contractor collaboration (Project Manager contractor A). Influence: none.

→ ***The client had no influence on the management style.*** Reliability: 2. Influence: not found.

⇒ **The management style did not have an overall influence. It did influence the decision making, but the client did not influence the management style.**

F.1.3.2 *Relational capability*

  - Relational continuity is high (score of 3.8 (Appendix E)).
  - Project performance is high (score of 3.6 (Appendix E)).
  - Teamworking quality is high (score of 4.6 (Appendix E)).
  - Relational attitudes are high (score of 4.2 (Appendix E)).
  - Collaborative practices are high (score of 4.2 (Appendix E)).
  - Front-end definition is high (score of 4.7 (Appendix E)).

⇒ **Relational capability according to RECAP is high (4.2 (Appendix E))**

  - The high relation capability is by both contractors and the client named to have a large and positive influence on the project in general and on the specific decision making (Project Manager Contractor A; Technical Manager Contractor B; Technical Manager RWS; Contract Manager RWS). Influence: low.
  - The first decision was escalated to higher management resulting in a decision with consensus, but no other specific examples for a link between relational capability and the examined decisions are found (Project Manager Contractor A; Technical Manager Contractor B). Influence of relational attitudes: low.

→ ***The relational capability influences the decision making.*** Reliability: 6. Influence: low.

  - The client highly appreciates the high relational capability, but they have no influence on it and do not wish to have this influence. Neither during execution nor during tendering. (Technical Manager RWS; Contract Manager RWS). Influence: none.

→ ***The client does not influence the relational capability*** Reliability: 2. Influence: none.

⇒ **The relational capability did not have an overall influence. It did influence the decision making, but the client did not influence the relational capability.**

F.1.3.3 *Contractual context*

The contractual context is an D&C with fair risk sharing and low incentives.

  - According to both contractors, the contract does not have an influence on decision making (Project Manager Contractor A; Technical Manager Contractor B). Influence of all factors: none.
  - An indirect influence appears from the design scope on the decision-making through the mastered disciplines of the contractors. An example is the asphalt work in the scope, which resulted in lower trust and affecting collaboration (Technical Manager Contractor B). Influence: not in this example (NITE).
    - Contractor A has more experience with asphalt work.
    - Contractor B had less insight and knowledge on (the financial aspects of) the design of the asphalt work.
    - In the tendering this resulted in less trust regarding the asphalt work. The lack of trust maintained itself during execution. (Technical Manager Contractor B).

→ ***The contractual context did not directly influence the decision making between contractors.*** Reliability: 3. Influence: NITE.

  - The client decides on the contractual context and therefore has an influence on it.

→ ***RWS influenced the contractual context.***

⇒ **The contractual context did not have an overall influence. It is influenced by RWS, but the contractual context did not influence the decision making.**

F.1.4 Summarising table and figure Project A

All findings regarding project A are summarised in Table F.3 and Figure F.1.

Factor	Found (sub)factors	Status	Influence on decision	Influence of client
Management style		Process orientated (9)	*High (2)*	*Not found (2)*
	Speed	Careful (3)	Low	
	Position	Mixed (3)	-	-
	Commitment	Demanded (1)	-	
	Aftercare	Compensate (2)	High	
Relational capability			*Low (6)*	*None (2)w*
	Relationship continuity	3.8	-	
	Project performance	3.6	-	
	Teamworking quality	4.6	-	
	Relational attitudes	4.2	Low	
	Collaborative practices	4.2	-	
	Front-end definition	4.7	-	
Contractual context			*NITE (3)*	*High*
	Type	D&C	NITE (1)	
	Risks	Even	None (2)	
	Performance measurement	'Prestatiemeten'	None(2)	
	Incentives	Low	None (2)	

Table F.3: Summarised findings of project A

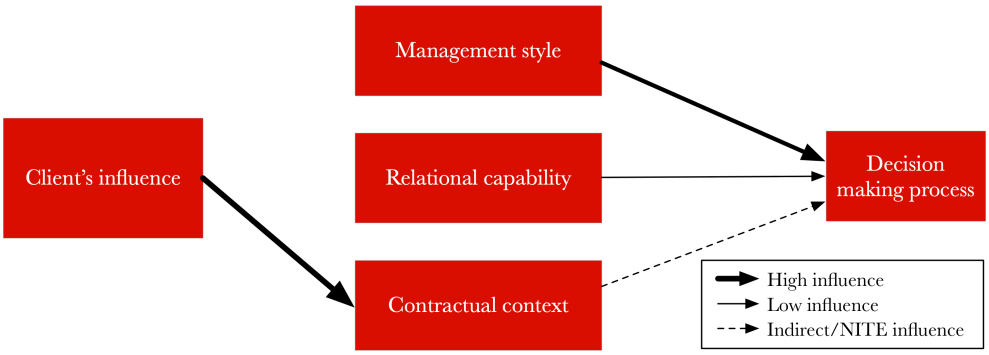


Figure F.1: Simplified findings of case A

F.2 PROJECT B FACTS AND FINDINGS

- Project B is a high-water protection project in the category of 100 – 300 million euros in the Netherlands.
- The project is commissioned by Rijkswaterstaat.
- The project is performed by a consortium of Contractor A (as in Project A) and Contractor C, who started construction one year after they won the tender. The project is expected to be completed in seven years.
- This research focuses on the strictly separated civil work by contractor C (in the category of 50 – 100 million) and their subcontractor (subcontractor A). This subcontracted work started two years after execution of the overarching project started and is expected to be finished in three years. The subcontract entails design and construction work.
- The contractual context is a D&C with fair risk sharing and average incentives.
  - The contract is a D&C contract, with a design component that is perceived as fairly large (Project Manager Contractor C; Contract Manager RWS).
  - Performance is assessed using the 'prestatiemeten' index.
  - The incentives consist of deadlines and penalties, which are perceived as average for such a contract (Contract Manager RWS; Project Manager Contractor C).
  - The risks are perceived as evenly shared (Contract Manager RWS; Project Manager Contractor C).

- The subcontracting of large parts of the scope including design was one of the reasons for the issues. The subcontracting is made possible by the D&C type of contract.

- Constructor C is a Dutch civil construction company working internationally. Subcontractor X is a Dutch steel constructor working mainly but not exclusively in the Netherlands. The companies are comparable in size, but Contractor C has more experience and masters different disciplines. Some main characteristics are presented in table Table F.4.

Contractor	**Revenue**	**Part of project**
Contractor A	€100 - €300 million	50%
Contractor B	€100 - €300 million	2%
Client	**Budget**	
Rijkswaterstaat	€2175 million (2017)	

Table F.4: Key indicators contractors and client Project B

F.2.1 Project B interviewees

- The technical manager and contract manager from Rijkswaterstaat and the project managers from both Contractor C and Subcontractor X were interviewed. The project manager from Contractor C is responsible for the civil work scope, to which the subcontracting relates. An overview of the interviewees and their roles is presented in Table F.5

Function	**Company**
Project manager	Contractor C
Project manager	Subcontractor X
Contract manager	RWS
Technical manager	RWS

Table F.5: Interviewees Project B

F.2.2 Project B decisions

During the interviews five decisions were discussed for this research:

- The decision on how to improve rejected delivery files of a lock.
- The decision on how to deal with failures in the sheet piling.
- The decision on how to deal with leaks in the gearbox
- The decision on how to deal with operating failures of the lock doors.

- The decisions on how to improve rejected delivery files of a lock and how to deal with operating failures of the lock doors. The decision on how to deal with failures in the sheet piling is an insurance matter and cannot be discussed openly. The leaks in the gearbox were relatively easily fixed by sending them back to the manufacturer. Therefore, the decision was less indicative for the collaboration. This makes the last two decisions less suitable for the research.

F.2.2.1 *Decision 1: rejected delivery files of lock*

- The decision was how to deal with the rejection by RWS of the delivery files of a small lock.
  - The project consists of many civil structures, a small recreational lock being one of them. A delivery file has to be presented to RWS for approval, but these files got rejected.
- The decision was made by Contractor C and Subcontractor A, as they together had to decide how to get the delivery files updated and approved.
- The decision-making started when the delivery files got rejected, three months into execution of the subcontract. The rejection follows after a three-week assessment period of RWS. After rejection, a discussion started, which lasted two weeks. After the two weeks, a decision was made.
  - The decision was perceived as unanticipated by the contractor (Project Manager Contractor C). RWS did not perceive this as unanticipated, as they already noticed a lack of quality in the earlier deadlines for the delivery files (Technical Manager RWS).
- The eventual decision was that the delivery files would be upgraded within three months Contractor C would take responsibility, as they saw themselves as responsible for the expectation management of the client. This also included carrying the cost for extra manpower.
- The perception of the contractors is that the decision did not impact time, quality or the relation between the contractors. There was an impact on cost, due to the need for extra manpower and a penalty. Contractor C also perceived an impact on satisfaction, as not being able to deliver damaged his reputation (Project Manager Contractor C).
  - From a week after rejection until the day the delivery files were approved a daily fine is given by RWS.
- The client rejected the delivery files and was therefore formally aware of the issue. They also received a written notice of the eventual decision.

F.2.2.2 *Decision 2: operating failures lock doors*

- The decision was how to deal with operating failures of the lock doors. The lock doors creaked and opened in bumps instead of a continuous smooth motion.
  - Plastic bearings in the lock door hinge moved over a plastic surface. The plastic-on-plastic movement created a type of friction which resulted in the inconsistent and noisy movement of the lock doors.
- The decision was made by Subcontractor X and put up for approval of Contractor C, as Subcontract A is technically involved while Contractor C is eventually responsible.
- The decision-making started when the lock doors were first operated, four years into the subcontract. After three weeks, a decision was made.
- The eventual decision was that the hinges would be regularly lubricated. It was not known what the problem was, but Subcontractor X found the problem and formulated the lubrication solution.
- The perception of the contractors is that the decision did not impact cost, time, quality or the satisfaction of the client. There was a positive impact on the relation between the contractors, as the subcontractor was able to show that it was proactive in solving problems (Project Manager Subcontractor A).

- The client noticed the noise and was made aware of the problem by Subcontractor A, who kept them updated throughout the decision-making process.

F.2.3 Project B findings

What now follows are findings build up from statements, as explained in the introduction of this chapter.

F.2.3.1 *Management style*

  - The decisions were taken in two to three weeks. Contractor C perceived this as quick (Project Manager Contractor C).
  - The decision-making was perceived as decisive and focused on speed by the contractors (Project Manager Contractor C; Project Manager Subcontractor A).
  - The decision was perceived to be taken with consensus, through the mutual agreement and positive attitude during decision-making (Project Manager Contractor C; Project Manager Subcontractor A).

→ ***The speed of the decisions is a balanced mix of 'focus on rapid decision-making and decisiveness' and 'a search for consensus in a careful decisions making process'.*** Reliability: 5.

  - Contractor C never saw a need to discuss the decision elsewhere than in the central and regular meetings with everyone involved (Project Manager Contractor C). The subcontractor agreed that this was handled in regular meetings (Project Manager Subcontractor A).

→ ***The position of the conflict on is more typed as 'Organize central discussion with project direction' than 'Move conflict to outside of process, offer extra forums for negotiation.*** Reliability: 2.

  - All decisions were taken with consensus (Project Manager Contractor C; Project Manager Subcontractor A), therefore commitment was not relevant and could not be typed.

→ ***The commitment for the decision is could not explicitly be typed as 'Ask for commitment on all major decisions' than 'Offer stakeholders possibility to postpone commitment to decisions'.*** Reliability: 2.

  - Contractor C perceived no attention for compensation afterwards. However, none of the contractors saw this as necessary (Project Manager Contractor C; Project Manager Subcontractor A).

→ ***The aftercare of the decision is more typed as 'Focus on cooperation with winners' than 'Invest in management of losers'.*** Reliability: 1.

→ ***This makes the two aspects more project orientated and two could not be typed as project or process orientated. Therefore, the management style is more project orientated.***

⇒ **The management style is project orientated.** Reliability: 6.

  - The only way the management style can be linked in this case is project-oriented management style to the speed of decision making. No involved contractor perceived the project-oriented management style as responsible for the quick decision making (Project Manager Contractor C; Project Manager Subcontractor A). Influence: not found.

→ ***The project-oriented management style did not clearly influence the decision making.*** Reliability: 2. Influence: not found.

- According to the contract manager from RWS, the client does not perceive a direct influence to the management style of the contractors. RWS has a preference for open and flexible decision making with consensus. RWS prefers to be involved to allow new solutions and broaden the solution space. (Contract Manager RWS). Influence: not found.
- Handing new solutions can influence the management style and decision making but was not applied in the two decisions (Contract Manager RWS). Influence: NITE

→ ***The client had no influence on the management style.*** Reliability: 2. Influence: NITE.

⇒ **The management style did not have an overall influence. It did influence the decision making, but the client did not influence the management style.**

F.2.3.2 *Relational capability*

- Relational continuity is high (score of 4.8 (Appendix E)).
- Project performance is high (score of 3.4 (Appendix E)).
- Teamworking quality is high (score of 3.9 (Appendix E)).
- Relational attitudes are low (score of 4.6 (Appendix E)).
- Collaborative practices are high (score of 3.9 (Appendix E)).
- Front-end definition is high (score of 4.2 (Appendix E)).

⇒ **Relational capability according to RECAP is high (4.1 (Appendix E))**

- The aligned effort and mutual trust (relational attitude) are perceived by the contractors C to make quick decision making possible in the two decisions (Project Manager Contractor C; Project Manager Subcontractor A). Influence of relation attitudes: low.
- The client named that an influence from higher management is often perceived to influence the decision making, but not in these two decisions (Contract Manager RWS, Project Manager Subcontractor B). Influence of relational attitudes: NITE.

→ ***The relational capability influenced the decision-making.*** Reliability: 4. Influence: low.

- Both the contract manager and the technical manager do not perceive an influence on the relational capability, neither do the contractors (Contract Manager RWS; Technical Manager RWS; Project Manager Contractor C; Project Manager Subcontractor A). Influence: none.

→ ***The client does not influence the relational capability.*** Reliability: 4 Influence: none.

⇒ **The relational capability did not have an overall influence. It did influence the decision making, but the client did not influence the relational capability.**

F.2.3.3 *Contractual context*

The contractual context is an D&C with fair risk sharing and average incentives.

- None of the contractors named an example or perceived a direct influence from the contractual context to the decision making (Project Manager Contractor C; Project Manager Subcontractor A). Influence of all factors: not found.

– The client did perceive a lack of attention from the contractors for quality control and integration of the subcontracted parts (Technical Manager RWS). The integrated subcontracting, made possible by the D&C, was an important cause for the issues at the base of the decisions (Technical Manager RWS; Project Manager Contractor C). Influence of contract type: indirect.

→ ***The contractual context did not directly influence the decision making between contractors.*** Reliability: 4. Influence: indirect.

– The client decides on the contractual context and therefore has an influence on it.

→ *RWS influenced the contractual context.*

⇒ **The contractual context did not have an overall influence. It is influenced by RWS, but the contractual context did not influence the decision making.**

F.2.4 Summarising table and figure Project B

All findings regarding project B are summarised in Table F.6 and Figure F.2.

Factor	Found (sub)factors	Status	Influence on decision	Influence of client
Management style			*Not found (2)*	*NITE (2)*
	Speed	Mixed (5)	-	
	Position	Central (2)	-	
	Commitment	Undetermined (2)	-	
	Aftercare	None (1)	-	
Relational capability			*Low (4)*	*None (4)*
	Relationship continuity	4.8	-	
	Project performance	3.4	-	
	Teamworking quality	3.9	-	
	Relational attitudes	4.6	Low	
	Collaborative practices	3.9	-	
	Front-end definition	4.2	-	
Contractual context			*Indirect (4)*	*High*
	Type	D&C	Indirect (2)	
	Risks	Even	Not found (2)	
	Performance measurement	'Prestatiemeten'	Not found (2)	
	Incentives	Average	Not found (2)	

Table F.6: Summarised findings of project B

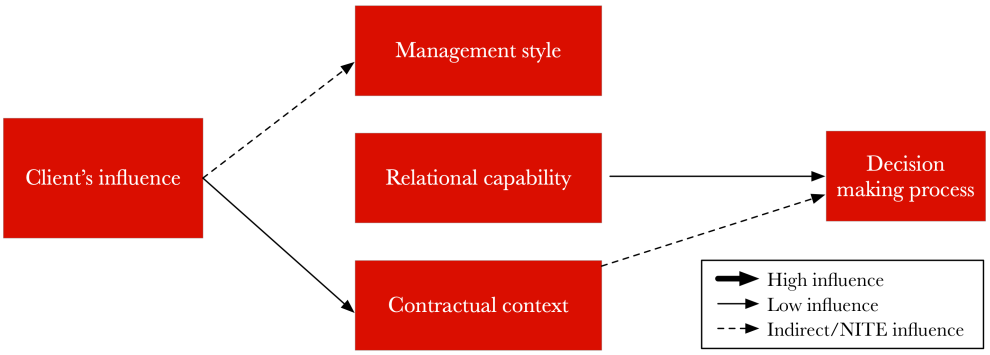


Figure F.2: Simplified findings of case B

F.3 PROJECT C FACTS AND FINDINGS

- Project C is a rail infrastructure project in the category of 100-300 million euros in the Netherlands. The project and interviewees will stay anonymous. Key figures and dates will be categorised, or made relative, to ensure anonymity.
- The project is commissioned by ProRail.
- The project is performed by a consortium of two contractors (Contractor D and Contractor E). Construction started roughly one year after the tender was won and is completed in five years.
- Details on the scope of the project will not be disclosed.
- The contractual context is an Engineering and Construct (E&C) with fair risk sharing and high incentives.
  - The contract is an E&C contract.
  - Performance is assessed using the 'prestatiemeten' system.
  - The penalties for not meeting deadlines were high, as usual for rail infrastructure projects. Not being able to use the infrastructure is highly penalized in rail projects (Project Manager Contractor D).
  - There were relatively high and unusual bonuses to meet milestones (Project Manager Contractor D).
  - The risks are perceived as evenly shared between client and contractor (Project Manager Contractor D; Project Manager E).
- Key figures of the contractors are shown in table ¡..¿. Both parties are Dutch and are comparable in terms of expertise, experience and size. Some main characteristics are presented in table Table F.7.

Contractor	**Revenue**	**Part of project**
Contractor D	€100 - €300 million	50%
Contractor E	€100 - €300 million	50%
Client	**Budget**	
ProRail	€1286 million (2017)	

Table F.7: Key indicators contractors and client Project C

F.3.1 Project C interviewees

- The contract manager from ProRail and two project managers, one from each contractor, are interviewed. An overview of the interviewees and their roles is presented in table Table F.8.
  - During the execution of the project, two project managers from the contractor side have been involved. The first one during tendering and a large part of the execution (from Contractor D). The second one in the last phases of the project (from Contractor E).

F.3.2 Project C decisions

During the interviews four decisions were discussed for this research:

Function	Company
Project manager	Contractor D
Project manager	Contractor E
Contract manager	ProRail

Table F.8: Interviewees Project C

  - The decision on whether to implement a new financial information system (FIS);
  - The decision on how to phase out the project team;
  - The decision on how to deal with contractual disagreements with the client;
  - The decision on which price structure to use in the tendering.

- The decisions on whether to implement a new FIS and how to phase out the project team are chosen for this research. The decisions on how to deal with contractual disagreements is not only a decision of the contractors, but also of the client. The decision on which price structure to use had already been made in the tendering phase. This makes the latter two decisions less suitable for the research.

F.3.2.1 *Decision 1: FIS implementation*

- Contractor E implemented a new FIS (company-wide) during execution and there had to be decided whether to change the system for the project as well.
  - The initial decision on whose FIS to use was made in the tender phase. The 'old' FIS by Contractor E was already in use in the project when this decision arose.

- The decision was made by the higher management of Contractor E. The project team from both contractors discussed the consequences of this and wanted to be included in the decision-making. The higher management of Contractor E eventually demanded commitment for their decision.

- The decision-making started a few months after execution started. During tendering, Contractor E had been developing the new FIS and it got introduced companywide during execution of the project.

- The eventual decision was that the new system was implemented without approval from the project team. The higher management made known to the project team and their directors that the support for the old FIS would stop and that they expected the project to switch to the new system.

- The perception of the contractors is that the decision did not directly impact time, money or quality. The contractors did perceive an impact on satisfaction and the relation between the contractors.
  - The inability to foresee and explain financial problems resulted in tensions in the project team (Project Manager Contractor D), although Contractor E attributes this to a lack of insight in scope, cost and budget (Project Manager Contractor E). Examples of the resulting tensions are blaming Contractor E for bad project results and hiding behind the FIS problems when project results are bad (Project Manager Contractor D). This tension was tried to be minimised by the project manager (Project Manager Contractor D).

- The client never got aware of the decision-making. ProRail did in hindsight notice the consequence (i.e. FIS problems) in badly substantiated requests for change (Contract Manager ProRail). The contractors attribute the badly substantiated requests for change to their lack of knowledge of the contract (Project Manager Contractor E).

F.3.2.2 *Decision 2: Phasing out of project team*

- The decision was how to phase out the project team: who would be available for other projects, and when.
  - Both contractors prefer to have their most crucial employees available as soon as possible for other projects, making the company interests conflict with the project interests.
  - There were doubts whether the remaining people could integrally manage the project and had enough knowledge of the remaining work (Project Manager Contractor E).
- The decision is supposed to be made by the project management team, but was not always discussed with all the involved. It can differ per team member who was involved in the decision-making, but often people were just 'taken' by the contractors.
- The decision-making started in the first quarter of year three, when the phasing out of the project team started. The phasing out sped up in the last quarter of year three.
  - The last quarter was the moment the second project manager (from Contractor E) started, it then immediately got clear that this phasing out caused problems (Project Manager Contractor E).
  - The concerns were at that point also discussed with higher management, but this did not result in a constructive dialogue and did not solve the problems (Project Manager Contractor E).
- The eventual decision was that the process stays unchanged, and each contractor takes their employees back without consultation or consensus.
- The perception from the contractors is that the decision did not have a direct influence on cost. It is perceived to have a big influence on time and quality of the end product and therefore also on the satisfaction of the client (Project Manager Contractor D). The relation between the contractors was impacted and that a new collaboration between the contractors is unlikely (Project Manager Contractor E).
  - The project delivery got delayed, which is said to be caused by the harsh phasing out of the project team, underestimation of the remaing work (Contract Manager ProRail) and underestimation of the project in general (Project Manager Contractor D; Project Manager Contractor E). This delay indirectly leads to extra cost (Project Manager Contractor E).
- The client was aware of these problems and it resulted in frustrations at the client's side (Contract Manager ProRail).

F.3.3 Project C findings

What now follows are findings build up from statements, as explained in the introduction of this chapter.

F.3.3.1 *Management style*

- Both decisions are described as taken 'quick and dirty' (Project Manager Contractor E).

→ ***The speed of the decisions is more typed as 'focus on rapid decision-making and decisiveness' than 'a search for consensus in a careful decisions making process'.*** Reliability: 1.

- Certain discussions were held in separate phone calls or meetings, whilst some were held in central discussions (Project Manager Contractor D; Project Manager Contractor E).

→ ***The position of the conflict could not be explicitly typed as 'Organize central discussion with project direction' or 'Move conflict to outside of process, offer extra forums for negotiation.*** Reliability: 2.

- Both decisions were taken in isolation after which commitment was demanded (Project Manager Contractor E)..

→ ***The commitment for the decision is more typed as 'Ask for commitment on all major decisions' than 'Offer stakeholders possibility to postpone commitment to decisions'.*** Reliability: 1.

- When dealing with the aftermath of the decision, there was much room given for a 'decent retreat' (Project Manager Contractor E).

→ ***The aftercare of the decision is more typed as 'Invest in management of losers' than 'Focus on cooperation with winners'.*** Reliability: 1.

→ ***This makes two aspects more project orientated, one aspect more process orientated and one could not be typed as project or process orientated. Therefore, the management style is more project orientated.***

⇒ **The management style is more project orientated.** Reliability: 5.

- The lack of consensus did influence the decision making, since this has led to blaming, distrust and therefore tensions in the decision making process (Project Manager Contractor D; Project Manager Contractor E). Influence of speed of decision-making: high.

→ ***The project orientated management style influenced the decision making.*** Reliability: 1. Influence: high.

- ProRail was involved in this process to either give some extra space or help out. Examples are having a friendly message send on higher management level or by explicitly not interfering (Project Manager Contractor E). Influence: low.
- ProRail helped to improve relations to create more support for decisions and make a more process orientated management style possible (Project Manager Contractor E). Influence: low.

→ ***ProRail had an influence on the management style.*** Reliability: 2. Influence: low.

⇒ **The management style did have an overall influence. It did influence the decision making and ProRail did influence the management style.**

F.3.3.2 *Relational capability*

- Relational continuity is low (score of 2.8 (Appendix E)).
- Project performance is low (score of 2.4 (Appendix E)).
- Teamworking quality is low (score of 3.3 (Appendix E)).
- Relational attitudes are low (score of 2.4 (Appendix E)).

  - Collaborative practices are low (score of 3.3 (Appendix E)).
  - Front-end definition is high (score of 4.2 (Appendix E)).

⇒ **Relational capability according to RECAP is low (3.1 (Appendix E))**

  - Project performance and higher management commitment influenced the decision-making (Project Manager Contractor D; Project Manager Contractor E). The higher management commitment of the contractors blocked the decision-making, as the higher management had much tensions (Project Manager Contractor E). The teamwork was of good quality, but lowered throughout the project and resulting in the cultures growing apart (Project Manager Contractor D). Decision-making was not only influenced by poor project performance of this project, but also of by poor project results from parent companies (Project Manager Contractor E). Influence of project performance and relational attitudes: high.

→ ***The relational capability influenced the decision-making*** Reliability: 5. Influence: high.

  - The contractor perceived that senior management commitment was tried to be improved by the client (Project Manager Contractor E). Influence of relational attitudes: low.

→ ***The client has an influence on the relational capability***. Reliability: 1. Influence: low.

⇒ **The relational capability did have an overall influence. It did influence the decision making and the client did influence the relational capability.**

F.3.3.3 *Contractual context*

The contractual context is an E&C with fair risk sharing and high incentives.

  - The incentives influenced the decision-making. They gave a high focus on milestones leaving less room for focus on the relations but also less attention for the scope, the quality and scope changes (Project Manager Contractor E; Contract Manager ProRail). Influence of incentives: low.
  - The contract was not of sufficient quality, resulting in a sometimes difficult relation with the client (Project Manager Contractor E). This was due to (1) the contract's lack of space to deal with a bad project result and (2) the contractors' not contract-oriented project team. These causes are not linked to the examined sub-factors of contractual context. Influence: not found.
  - However, it was not impossible with the contract to create a good project result and good collaboration (Project Manager Contractor E). Influence: none.

→ ***The contractual context influenced the decision making.*** Reliability: 3. Influence: low.

  - ProRail decides on the contractual context and therefore has an influence on it.

→ ***ProRail has an influence on the contractual context.***

⇒ **The contractual context did have an overall influence. It did influence the decision making and ProRail did influence the contractual context.**

F.3.4 Summarising table and figure Project C

All findings regarding project C are summarised in Table F.9 and Figure F.3.

Factor	Found (sub)factors	Status	Influence on decision	Influence of client
Management style			*High (1)*	*Low (2)*
	Speed	Quick (1)	High	
	Position	Mixed (2)	-	
	Commitment	Demanded (1)	-	
	Aftercare	Compensated (1)	-	
Relational capability			*High (5)*	*Low (1)*
	Relationship continuity	2.8	-	
	Project performance	2.4	High	
	Teamworking quality	3.3	-	
	Relational attitudes	2.4	High	
	Collaborative practices	3.3	-	
	Front-end definition	4.2	-	
Contractual context			*Low (3)*	*High*
	Type	E&C	-	
	Risks	Even	-	
	Performance measurement	'Prestatiemeten'	-	
	Incentives	High	Low	

Table F.9: Summarised findings of project C

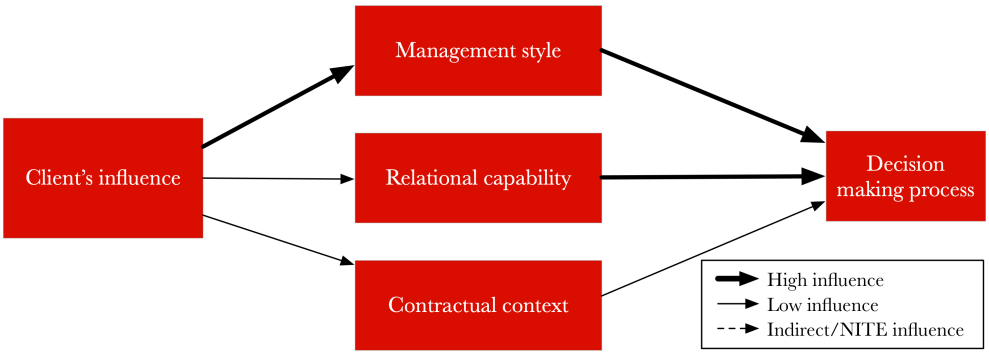


Figure F.3: Simplified findings of case C

F.4 PROJECT D FACTS AND FINDINGS

- Project D is a rail infrastructure project in the category of 0-50 million euros in the Netherlands. The project and interviewees will stay anonymous. Key figures and dates will be categorised or made relative, to increase anonymity.
- The project is commissioned by ProRail.
- The project is performed by a main contractor with several subcontractors. Contractor E (Contractor E) and the largest subcontractor (Subcontractor B) will be examined. The subcontract entailed design and construction of civil work for a price of 30% of the complete contract. Construction started a few months after the tender was won and is completed in a little under a year.
- Details on the scope of the project will not be disclosed.
- The contractual context is an E&C with high risks for the contractor and high incentives (as usual in rail infrastructure projects).
  - The contract is an E&C contract.
  - Performance is assessed using the 'prestatiemeten' index.
  - The incentives in the contract are high, which is common for rail infrastructure projects since not being able to use the infrastructure is highly penalised in the sector (Project Manager Contractor E).
  - The risks are perceived as borne by the contractor, although ProRail disagrees.

  - Not many risks were made known by ProRail, so many were carried by the contractors (Project Manager Contractor E).
  - Risks were fairly shared (Contract Manager ProRail).

- Both contractors are Dutch and are comparable in terms of expertise, experience and size. Some main characteristics are presented in table Table F.10.

Contractor	**Revenue**	**Part of project**
Contractor E	€100 - €300 million	100%
Subcontractor Y	€100 - €300 million	30%
Client	**Budget**	
ProRail	€1286 million (2017)	

Table F.10: Key indicators contractors and client Project D

F.4.1 Project D interviewees

- The contract manager from ProRail and two project managers, one from each contractor, are interviewed. An overview of the interviewees and their roles is presented in table Table F.11
  - The two project managers were simultaneously involved, one on behalf of Contractor E for the full scope of the project and one on behalf of Subcontractor Y for their scope of the project

Function	**Company**
Project manager	Contractor E
Project manager	Subcontractor Y
Contract manager	ProRail

Table F.11: Interviewees Project D

F.4.2 Project D decisions

During the interviews three decisions were discussed for this research:

- The decision on whether to take Subcontractor Y to meetings with ProRail;
- The decision on how to handle work plans
- The decision on how to handle delays in certain work packages.

The decisions on whether to take Subcontractor Y to meetings with ProRail and how to handle work plans are chosen for this research. The decision on how to handle delays was more issue management than decision making. This makes the last decision less suitable for this research.

F.4.2.1 *Decision 1: Subcontractor at client meetings*

- Subcontractor Y was present at many meetings with ProRail. Contractor E perceived that this could be disadvantageous for the relationship with ProRail and wanted to decide whether to continue with this.
  - Subcontractor Y was present because he had a work package of significant size with large influence on the success of the project.

    - During the execution, doubts regarding the quality of the work started to form by ProRail. ProRail clearly announced this and it eventually resulted in a payment stop for Subcontractor B. Therefore, Subcontractor B's stakes were high and he felt disadvantaged, which could lead to less constructive meetings with ProRail.

- The decision was made by Contractor E and was discussed with Subcontractor B.
- The decision-making started seven months after the start of execution, being the moment that Contractor E noticed that the presence of Subcontractor Y might result in less constructive meetings.
    - Contractor E saw this problem coming, since ProRail had been transparent regarding their opinion on the quality of the delivered work.
    - One month later a payment stop was set by ProRail, which escalated the tensions, emotions and stakes. The escalation made the decision more critical. The payment-stop resulted in financial problems for Subcontractor Y and the tensions got personal. Contractor E tried to keep those tension minimal by maintaining an open dialogue with Subcontractor B.
    - The tensions remained until and after delivery of the work, four months after the payment-stop.
- The eventual decision was that Subcontractor Y was less involved in client meetings. This decision was not supported by Subcontractor B, especially from the payment-stop onwards, since it made it harder to convey its problems with the payment stop.
- The perception from the contractors is that the decision had an impact on time, money and quality. The contractors perceived an impact on the quality of the end product and satisfaction of ProRail. The relation was impacted in such a way that a new collaboration between the contractors is unlikely.
- ProRail was aware of this issue and the decisions being made. They noticed the tensions, but also needed to stay in contact with Subcontractor Y to be able to manage the project.

F.4.2.2 *Decision 2: Handling work plans*

- The decision was how to handle work plans: the approval process and level of detail.
    - Work plans contain an overview of how and when to execute parts of the scope but can vary largely in format, size and accreditation process. All these aspects are specified in the contract.
    - Contractor E must be able to prove the quality of delivered work, while Subcontractor Y feels less need for an elaborate work plan.
    - Deadlines during execution were strict. Especially for parts of Subcontractor B's scope that affect Train Free Periods (TFPs; periods where the infrastructure is closed for rail operators to make construction work possible). Not being able to finish within the TFPs - and having to adjust rail-operators' schedules to finish the work - is highly penalised.
    - This time pressure is in conflict with the accreditation process of Contractor E and ProRail. Both have extensive processes to guarantee safety and quality of the work plans. Under time pressure a subcontractor can save time on the elaborateness of work plans, or even start execution before a work plan is fully accepted.

- The decision is made by Contractor E and subcontractor. Together they decide on how to handle the work plans. ProRail sets requirements for Contractor E and Contractor E sets requirements for Subcontractor B.
- The decision-making started a few months after execution started.
  - A few months after tendering it got clear that Subcontractor Y had difficulties drafting work plans according to requirements.
  - Contractor E hired their own specialist to help Subcontractor B. The specialist returned the function after six weeks, saying the difficulties could not be solved. It became the responsibility of Contractor E's project manager to help Subcontractor Y deliver sufficient work plans.
  - The work plans were often stuck in the accreditation process, at all parties.
  - Four months later Subcontractor Y started execution without an accepted work plan. Contractor E heard this from ProRail.
- The eventual decision is that: execution cannot be started without a work plan; work plans are send to ProRail as early as possible; ProRail reviews work plans even in draft version.
- This decision-making process and the issues with work plans had a direct impact on cost and time, but also on the quality and the satisfaction of ProRail (Project Manager Contractor E; Contract Manager ProRail). The relation was impacted in such a way that a new collaboration between the contractors is unlikely (Project Manager Contractor E).
- ProRail was aware of these problems and it resulted in frustrations at ProRail's side (Contract Manager ProRail).

F.4.3 Project D findings

What now follows are findings build up from statements, as explained in the introduction of this chapter.

F.4.3.1 *Management style*

  - Both decisions were taken without consensus (Project Manager Contractor E).

→ ***The speed of the decisions is more typed as 'focus on rapid decision-making and decisiveness' than 'a search for consensus in a careful decisions making process'.*** Reliability: 1.

  - Both decisions were taken separated from other meetings (Project Manager Contractor E).

→ ***The position of the conflict is more typed as 'Move conflict to outside of process, offer extra forums for negotiation' than 'Organize central discussion with project direction'.*** Reliability: 1.

  - For both decisions, Contractor E demanded commitment from Subcontractor Y (Project Manager Contractor E).

→ ***The commitment for the decision is more typed as 'Ask for commitment on all major decisions' than 'Offer stakeholders possibility to postpone commitment to decisions'.*** Reliability: 1.

  - None of the contractors could name a form of compensation and did not recognize the need for it (Contractor E; Subcontractor B).

→ ***The aftercare of the decision is more typed as 'Focus on cooperation with winners' than 'Invest in management of losers'.*** Reliability: 2.

→ ***This makes two aspects more project orientated, one aspect more process orientated and one could not be typed as project or process orientated. Therefore, the management style is more project orientated.***

⇒ **The management style is more project orientated.** Reliability: 5.

- The focus on rapid decision-making made that both decisions were made in a short time (Project Manager Contractor E). Influence of speed of decision-making: high.
- The lack of consensus for the second decision made that Subcontractor Y did not honour the decision (Project Manager Contractor E). Influence of speed of decision-making: high.

→ ***The project orientated management style influenced the decision making*** Reliability: 2. Influence: high.

- None of the contractors nor ProRail could name an example of influence from ProRail on the management style (Project Manager Contractor E; Project Manager Subcontractor B; Contract Manager ProRail). Influence: not found.

→ ***ProRail had no influence on the management style.*** Reliability: 3. Influence: not found.

⇒ **The management style did not have an overall influence. It did influence the decision making, but ProRail did not influence the management style.**

F.4.3.2 *Relational capability*

- Relational continuity is low (score of 3.3 (Appendix E)).
- Project performance is low (score of 2.8 (Appendix E)).
- Teamworking quality is low (score of 3.5 (Appendix E)).
- Relational attitudes are low (score of 3.0 (Appendix E)).
- Collaborative practices are low (score of 3.5 (Appendix E)).
- Front-end definition is low (score of 3.5 (Appendix E)).

→ ***Relational capability according to RECAP is low***

⇒ **Relational capability is low**

- The lacking project performance made that the client put extra pressure on decision-making, as all issues got more urgent (Project Manager Contractor E; Project Manager Subcontractor B). Reliability: 2. Influence of project performance: low.
- The lack of front-end definition is seen as a cause for both issues. During front-end definition, the handling of work plans and the client-contractor interaction, resulting in less urgent decision-making (Project Manager Contractor E). Reliability: 1. Influence of front-end definition: low.

→ ***The low relational capability influenced the decision making*** Reliability: 3. Influence: low.

- ProRail influenced the relational capability through project performance. The payment which they introduced directly affected the contractor's project performance. (Project Manager Contractor E; Project Manager Subcontractor B; Contract Manager ProRail). Reliability: 3. Influence: high.

→ ***ProRail had an influence on the relational capability.*** Reliability: 3. Influence: high.

⇒ **The relational capability did have an overall influence. It did influence the decision making and ProRail did not influence the relational capability.**

F.4.3.3 *Contractual context*

The contractual context is an E&C with high risks for the contractor and high incentives (as usual in rail infrastructure projects).

- The incentives put very high pressure on the work to be done by Subcontractor B, resulting in a lack of quality (Project Manager Contractor E), which resulted in a payment stop (Contract Manager ProRail), which resulted in more emotions in the decision-making process (Project Manager Contractor E). Influence: high.

→ ***The contractual context influenced the decision making.*** Reliability: 2. Influence: high.

- ProRail decides on the contractual context and therefore has an influence on it.

→ ***ProRail has an influence on the contractual context.***

⇒ **The contractual context did have an overall influence. It did influence the decision making and ProRail did influence the contractual context.**

F.4.4 Summarising table and figure Project D

All findings regarding project D are summarised in Table F.12 and Figure F.4.

Factor	Found (sub)factors	Status	Influence on decision	Influence of client
Management style			***High (2)***	***Not found (3)***
	Speed	Quick (1)	High	
	Position	Separated (1)	-	
	Commitment	Demanded (1)	-	
	Aftercare	None (2)	-	
Relational capability			***Low (3)***	***High (3)***
	Relationship continuity	3.3	-	
	Project performance	2.8	Low	
	Teamworking quality	3.5	-	
	Relational attitudes	3.0	-	
	Collaborative practices	3.5	-	
	Front-end definition	3.5	Low	
Contractual context			***High (2)***	***High***
	Type	E&C	-	
	Risks	Even	-	
	Performance measurement	'Prestatiemeten'	-	
	Incentives	High	High	

Table F.12: Summarised findings of project D

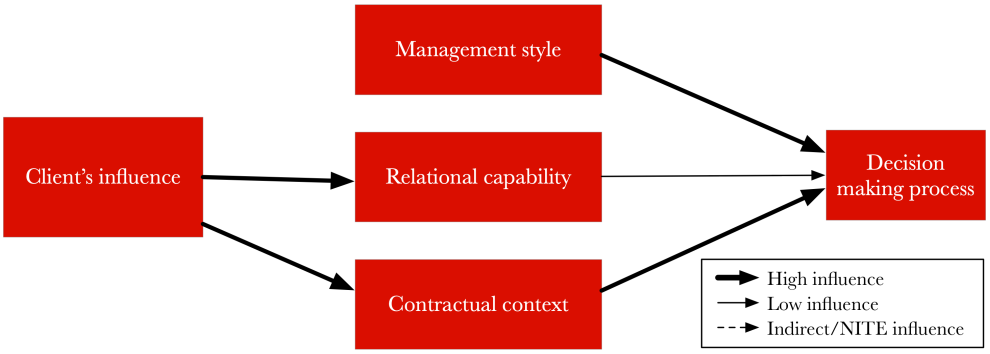


Figure F.4: Simplified findings of case D

G | CASES OVERALL ANALYSIS

This chapter provides more detailed insight in the analysis behind the findings in Section 4.3. Figure G.1 shows the data as gathered in Appendix F in a tabular form. Figure G.2 shows how this data is spread when accumulated. In the accumulation, the percentages shown for sub-factors are relative to the amount of available values of sub-factors. For example, 100% of cases showing influence from project performance on decision-making, means that two out of two cases showed this and not four of four.

Project	**Project A**					**Project B**					**Project C**					**Project D**				
Organisation	Consortium					Main contractor - subcontractor					Consortium					Main contractor - subcontractor				
Sector	Flood control					Flood control					Rail engineering					Rail engineering				
		Influence on decision		**Client influence**			**Influence on decision**		**Client influence**			**Influence on decision**		**Client influence**			**Influence on decision**		**Client influence**	
	Status	Influence	Rel	Influence	Rel	**Status**	Influence	Rel	Influence	Rel	**Status**	Influence	Rel	Influence	Rel	**Status**	Influence	Rel	Influence	Rel
Management style	***Process***	***Yes***		***Not found***		***Project***	***Not found***	***2***	***NITE***	***2***	***Mixed***	***High***		***Low***	***2***	***Project***	***High***	***2***	***Not found***	***3***
Speed	Careful	Low	1			Mixed	-				Quick	High				Quick	High			
Centralisation	Mixed	-				Central	-				Mixed	-				Separated	-			
Commitment	Demanded	-				Inexplicit	-				Demanded	-				Demanded	-			
Compensation	Compensated	High	1			None	-				Compensated	-				None	-			
Relational capability	***High***	***Low***	***6***	***None***	***2***	***High***	***Low***	***4***	***None***	***4***	***Low***	***High***	***5***	***Low***	***1***	***Low***	***Low***	***3***	***High***	***3***
Relationship continuity	3.8	-				4.8	-				2.8	-				3.3	-			
Project performance	3.6	-				3.4	-				2.4	High	2			2.8	Low	2		
Teamworking quality	4.6	-				3.9	-				3.3	-				3.5	-			
Relational attitudes	4.2	Low	6			4.6	Low	4			2.4	High	3			3.0	-			
Collaborative practices	4.2	-				3.9	-				3.3	-				3.5	-			
Front-end definition	4.7	-				4.2	-				4.2	-				3.5	Low	1		
Contractual context		***NITE***	***3***	***High***			***Indirect***	***4***	***High***			***Low***	***3***	***High***			***High***	***2***	***High***	
Type	D&C	NITE	1			D&C	Indirect	2			E&C	-				E&C	-			
Risks	Even	None	2			Even	None	2			Even	-				To contractor	-			
Performance measurement	Prestatiemeten	None	2			Prestatiemeten	None	2			Prestatiemeten	-				Prestatiemeten	-			
Incentives	Low	None	2			Average	None	2			High	Low	3			High	High	2		

Figure G.1: Overall case data

		Status				Influence on decision			Client influence		
		Status	Amount	Amount	Status	Yes		No	Yes	No	
Management style	**Overall**	**Process**	**1**		**2 Project**	**75%**		**25%**	**25%**		**75%**
	Speed	Quick	2		1 Careful	100%		0%			
	Centralisation	Central	1		1 Separated	0%		0%			
	Commitment	Demanded	3		0 Postponed	0%		0%			
	Compensation	Compensation	0		2 None	100%		0%			
Relational capability	**Overall**	**Low**	2		2 **High**	**100%**		**0%**	**50%**		**50%**
	Relationship continuity	Low	2		2 High	0%		0%			
	Project performance	Low	3		1 High	100%		0%			
	Teamworking quality	Low	2		2 High	0%		0%			
	Relational attitudes	Low	2		2 High	100%		0%			
	Collaborative practices	Low	2		2 High	0%		0%			
	Front-end definition	Low	1		3 High	100%		0%			
Contractual context	**Overall**					**50%**		**50%**	**100%**		**0%**
	Type	E&C	2		2 D&C	0%		100%			
	Risks	To client	0		1 To contracto	0%		100%			
	Performance measurement					0%		100%			
	Incentives	Low	2		3 High	50%		50%			

Figure G.2: Overall case data accumulated

H | HYPOTHESIS TESTING

This chapter presents in more detail how the case findings (Appendix F) reject or conform the hypotheses. Per hypothesis, the relevant findings are discussed. Firstly for project B and D (the main contractors with subcontractors) and secondly for project A and C (the consortia). A conclusion is presented at the end of each hypothesis. The hypotheses are:

1. Working with a construction consortium results in a better relationship between the contractors.
2. Working with a construction consortium improves goal alignment of the contractors.
3. Working with a construction consortium reduces the negative impact of conflicts.
4. Working with a construction consortium makes the client less involved in decision making.

H.1 BETTER RELATIONSHIP BETWEEN CONTRACTORS

The hypothesis "Working with/in a construction consortium does not result in a better relationship between underlying partners" is tested using the information from the RECAP survey. Specifically the statements:

- Beyond this project, we will likely work with each other in future with the same partners.
- The contractor intentionally adopts 'no blame culture' when problems arise.
- The contractor is intentionally open and honest in any interactions with no hidden agendas.
- Both teams are comfortable being dependent on each other.
- Both teams are fair to each other.

The main contractor – sub-contractors (MC-SCs) scored an average of 3.6 on these questions. The consortia scored an average of 3.65 on these questions, which is not a significant difference. Therefore the hypothesis "Working with a construction consortium improves goal alignment of the contractors" is rejected.

H.2 IMPROVED GOAL ALIGNMENT

The hypothesis "Working with/in a construction consortium improves collaborative working by improving the goal alignment of contractors" is tested using the information from the RECAP survey. Specifically the statements:

- The project goals, objectives, and scope are understood by the contractor team.

- We perform goal setting and alignment meetings with sub-contractors and suppliers.

The MC-SCs scored an average of 4.25 and the consortia scored an average of 4.25 on these questions. Therefore, the hypothesis "Working with a construction consortium improves goal alignment" is rejected.

H.3 REDUCED NEGATIVE IMPACT OF CONFLICTS

The hypothesis "Working with/in a construction consortium results in less destructive conflict" is tested using information from the case findings on the impact of the decision-making on the project.

H.3.1 Main contractors with subcontractors

The conflict in Project B was nondestructive. Both decisions had a negative impact on only cost and client satisfaction (REF to paragraph). This was also mentioned to be caused by the 'best for project' mentality of all involved (REF to paragraph). The conflict in Project D was destructive. Both decisions had a negative impact on cost, time, quality, relationships and satisfaction (REF to paragraphs). This was mentioned to be caused by the lack of main contractor behaviour at Contractor E, contractors culture match, organisations at the client, openness of Subcontractor B and financial trouble (REF).

H.3.2 Consortia

The conflict in Project A was nondestructive. The decisions did not negatively impact money, time or quality for the project and neither did it impact satisfaction or the relation. One decision did impact revenue for one of the contractors and another had a positive impact on project cost (REF). This was sometimes mentioned to be caused by the 'best for project' mentality of aligned consortium goals and the relationship continuity. The conflict in Project C was destructive. None of the decisions had a direct influence on cost, but both influenced the relation making a new collaboration unlikely. One decision had a negative impact on time, quality and client satisfaction (REF). This was mentioned to be caused by the financial problems, different company cultures and lack of senior management commitment. These three made conflicting interests of project and parent company escalate quickly. This was mentioned to be caused by the financial problems, different company cultures and lack of senior management commitment. These three made conflicting interests of project and parent company escalate quickly. So, the hypothesis "Working with a construction consortium reduces the negative impact of conflicts." is rejected.

H.3.3 Conclusion

Conflict in consortia can be just as destructive as in main contractor - subcontractors. In the case study, destructive conflict showed equally often in both organisational forms. It was twice mentioned that a 'best for project' mentally reduces destructive conflict, and that a lack of company culture and financial problems improves destructive conflict.

H.4 CLIENT LESS INVOLVED IN DECISION-MAKING

The hypothesis "Working with/in a construction consortium makes it more difficult for the client to oversee execution" is tested using the information whether the decisions were known by the client and information on the oversight of decision-making. This makes the testing of the hypothesis focused on the decision-making part of execution.

H.4.1 Main contractor - subcontractor

In Project B, the client was aware and involved in the decisions being made. In one decision the client rejected the delivery files and was therefore formally aware of the issue. They also received a written notice of the eventual decision. In another decision, RWS was aware and partly involved in the decision-making process. RWS wants to be involved in the process, especially when problems arise

In Project D, the client was aware of the issues and a decision being made, but ProRail could not oversee the decision-making process. In one decision, the client was aware of the issue and the decisions being made. They noticed the tensions, but also needed to stay in contact with the subcontractor to be able to manage the project. In another decision, the client was aware of these problems and it resulted in frustrations at the client's side (Contract Manager ProRail). The client ..

H.4.2 Consortia

In Project A, the client is largely unaware of the decisions and does not oversee the decision-making. In one decision the client only heard about the decision informally, without knowing the full context nor receiving a written notice of it. In another decision, the client never got aware of the decision. RWS named that it does not need to oversee internal processes of the contractor. Since an integrated contract asks for a more distant role of the client.

In Project C, the client was largely unaware of the decisions and does not oversee decision-making. In one decision, the client never got aware of the decision being made. Thus not overseeing the decision-making process. In another decision, the client was aware of the problem, but not of the decisions nor overseeing the process. The client ..

H.4.3 Conclusion

The main contractor - subcontractor cases showed more oversight of the decisions and decision-making process. Although the client was not always fully involved. In consortia, the client was unaware of the decisions being made and therefore unable to oversee decision-making. In consortia, the client is less able to oversee decision-making. However, this research will only test the hypothesis in regard to decision-making an not overall execution. It was also twice mentioned that the some clients want to be involved in this and some don't, which might play a role. So, the hypothesis "Working with a construction consortium makes the client less involved in decision making" is approved.

COLOPHON

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