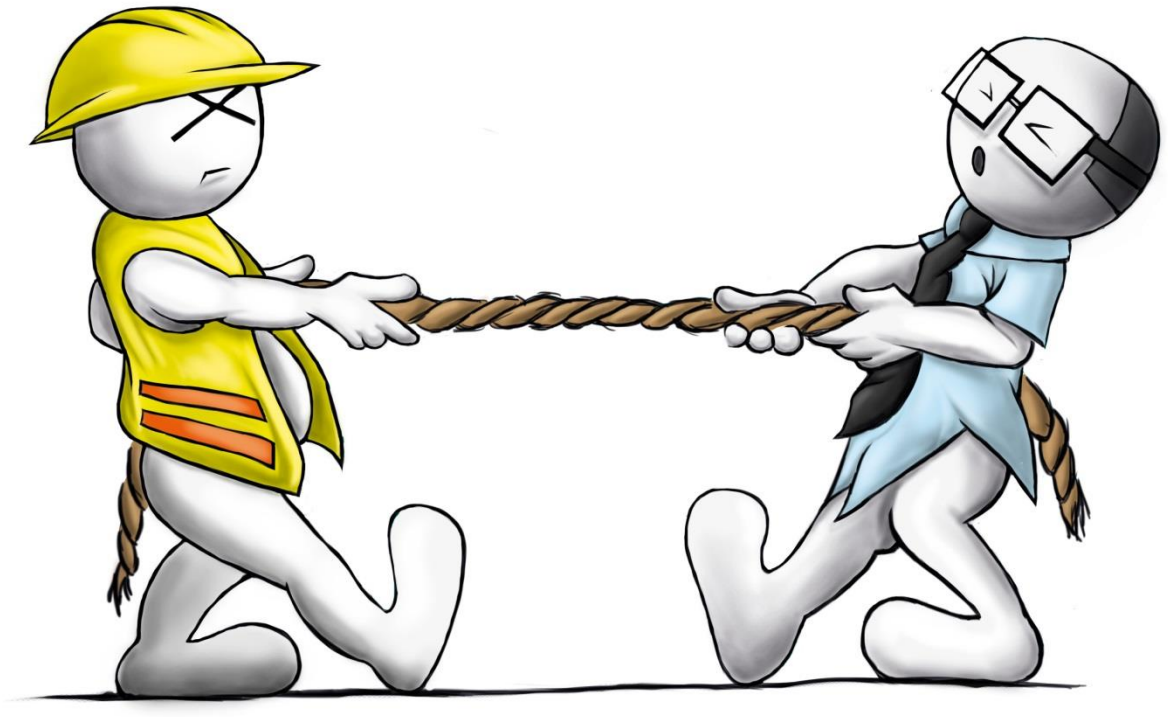
Disputes in infrastructure projects

A research into the prevention of disputes between contractors and public clients in Dutch infrastructure projects



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DURA VERMEER
Waarmaken van ambities

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Preface

This thesis was written to complete the 3TU Master's program in Construction Management and Engineering at Delft University of Technology. The research was conducted at Dura Vermeer Beton en Waterbouw BV.

This thesis is about conflicts and disputes between public clients and contractors in Dutch infrastructure projects. For a long time, various problems have plagued the construction sector, one of which is the large number of disputes. Several attempts have been made to solve these problems within the sector, but the situation has not significantly improved. This fact can be explained by the following quote:

"*We cannot solve our problems with the same thinking we used when we created them.*"
– Albert Einstein.

Einstein suggests that a problem cannot be solved by people who are part of the problem. Therefore, the question arises: can contractors come up with a solution to the problem, or is an objective view needed to determine the solution?

Several independent parties have attempted to solve the problem by arguing for radical changes in the construction industry, but this approach has not yet led to success. Therefore, this study focuses on the existing situation and tries to find a solution to the problem by looking at how people act and how the contractor thinks they can improve the situation. This is of importance, because the current situation must be clear before a solution can be found that actually leads to major change in the construction industry.

I would like to thank several people for their help and contribution to my thesis. First I want to thank my supervisors - Hennes de Ridder, Leentje Volker and André Dorée - for their guidance and advice. I also want to thank my mentors of Dura Vermeer - Kees Oosterhof and Joost van Bezooijen - for their practical guidance and for the opportunity to conduct my research for this organization. I also want to thank all respondents for their participation and for their openness in the interviews. Finally, I want to thank my family and friends, and especially my girlfriend, Madelon, for the support they showed as I wrote my thesis.

Wester Regelink
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Summary

Introduction

Times are changing in the construction industry, and the future grows increasingly important. Therefore, the industry is looking to make improvements. A very important problem to be solved is the current interaction between contractors and clients. This problem is reflected in the number of disputes that occur in the construction industry. Disputes emerge in different ways and are related to different subjects. A dispute can have negative consequences. An important distinction is marked by the terms *conflict* and *dispute*. A *conflict* is a disagreement. When a conflict becomes a specific problem that must be solved it is called a *dispute*. Conflicts and disputes are related to each other. If a conflict is not resolved, it will develop into a dispute. Disputes tend to arise particularly in infrastructure projects. To prevent future infrastructure projects from all the negative consequences of disputes, something must change. Therefore, the objective of this research is to *reduce the number of disputes between contractors and public clients in Dutch infrastructure projects.* To reach this objective, the following research question is drafted: *What are the most important actions for contractors in trying to prevent conflicts with public clients in Dutch infrastructure projects from becoming disputes?*

Methodology

The research question is answered with a combination of desk and field research. A literature survey is used to find existing information. The aim is to form a theoretical framework that can be used as the basis for the field research. Toward this end, qualitative field research was conducted in the form of a comparative case study. 10 specific cases were chosen that concern Dutch infrastructure projects commissioned by public clients. The projects are a selection of the recently finished or ongoing projects of Dura Vermeer. To study the cases, both document studies and interviews were used. Two respondents were interviewed per case. Semi-structured interviews were held that used an interview guide. The theoretical framework was used to determine more specific topics for this guide. Transcriptions were written, and the interviews were coded to identify the important insights.

Theoretical framework

Conflicts and disputes comprise the topic of this research. Conflicts cannot be entirely avoided because of the opposing interests of the contractor and client. Disputes do not emerge because of these opposing interests; rather, they emerge because of the interaction of both parties when there is a conflict. The client and contractor can exert influence on this process; therefore, it is possible to avoid a dispute. There is a distinction between the sources and causes of conflicts and disputes. The source is the trigger of the problem, and the cause is the reason why it is a problem. The source and cause combined together make a conflict or dispute. Based on literature, it may be concluded that conflicts can have multiple sources and that the causes of conflicts are different interests. Organizations can use different techniques to manage conflicts. These techniques combined are called conflict management. In the case of the process from conflict to dispute, it can be stated that a conflict is the source of a dispute. The literature identifies six different aspects as important for causing disputes: agreements, expectations, communication, relationships, transparency and trust. When a dispute has emerged, a process to resolve disputes - dispute resolution - is needed by the parties.

Research results

Research shows that conflicts in Dutch infrastructure projects have different sources and causes. The interviews suggest that the source of conflict can be related to the requirements that are stated in the contract or to changes in the situation of the project. In addition, it can be concluded that the cause of conflict has to do with a disagreement about the requirements or money. Essentially, then, the cause is always a difference of opinion by self-interest. The process from conflict to dispute is described on the basis of the six most important aspects that influence this process. Within the process from conflict to dispute, it is important to make agreements, to share expectations and to communicate in the right way. It is also important to build a good relationship between contractor and client whereby transparency and trust play a major role. For each aspect, different actions can have a positive or negative influence on the prevention of disputes. Research shows that disputes can have different consequences and that these consequences are always negative. A dispute may have consequences in the form of extra time. This leads to extra work and extra costs. Also, a dispute leads to negative emotions. A dispute can also have negative consequences for the previously mentioned aspects that are important for causing disputes and thereby increase the risk of new disputes. The interviewees also indicate what is most important to prevent conflicts from becoming disputes.

Conclusion

Based on the research results, is concluded that there are two distinct ways to prevent disputes. The first and the most obvious is to avoid conflicts so that there are fewer discussions that can end in specific problems. However, in the situation of infrastructural projects, conflicts can only be prevented until a certain level because there are conflicting interests. So conflicts between the contractor and the client will always emerge. The second and also the most important way is to prevent conflicts from ending in disputes. The research shows that this requires three important actions.

First, clients and contractors must make agreements before conflicts arise. There will always be conflicts, and both parties must be prepared for them; so there should be agreements to fall back on. It is easier to make agreements when there are no issues in play and both parties are still neutral. Agreements need to be made about the aligning of the organizations, the mandate, how to deal with changes, treatment times, verification moments, purposes of several meetings, deadlines for solving a conflict, escalation and de-escalation. Also, the agreements must be reviewed with respect to workability. Second, more attention should be paid to human interaction. Eventually, conflicts are about the people; therefore, the human interaction needs more attention. Greater priority should be given to the following improvements: sharing expectations, wishes and interests, working on one location, reporting problems or unforeseen issues on time, isolating the problem from the primary process, tackling the conflict with a small team, empathy for the other party and the exchange of persons within the organization. There are also specific tools to focus on human interaction. Third, learn as an organization of previous projects. At the moment, there is often a large difference in approach between the different projects. There is a lot of knowledge within the organization, but this is not shared sufficiently, so the organization makes similar mistakes, because a new project is not totally built on previous knowledge and experience. An organization can learn from each project, since in many cases the essential aspects of projects are the same. Therefore, the aim should be to become better after every project.

Recommendations

Based on the conclusions, recommendations have been made for further research and for Dura Vermeer about the implementation of the conclusions in their organization. It is recommended to conduct further research into the emergence of disputes in projects of multiple contractors, study from the perspectives of both client and contractor, conduct quantitative research and study the financial consequences of disputes. The recommendations for Dura Vermeer are divided into quick wins and long-term success.

The quick win concerning agreements is a project-management plan that includes agreements with the client that are made in advance. In this way, the project-management plan is a two-sided document for which both the contractor and the client stand. It is a document that can be fallen back upon during the project. In addition, the first quick win for the human interaction concerns a toolkit that can be used to pay more attention to human interaction in projects and thereby improve them. This toolkit should be added to the project-management-plan template. In this way, the employees are pointed at all the opportunities that exist to improve human interaction during the set-up of the project. The toolkit can be discussed with the client and agreements can be made about the tools that will be used. The second quick win is to separate formal and informal meetings. The third quick win is to pay attention to the composition of people in a project.

The recommendation for long-term success concerns using knowledge and experience of previous projects in the approach of following projects such that the organization learns of each project and secures continuous improvement. This must be achieved with a cyclic process. This is called the Deming Cycle, which consists of several steps: plan, do, check and act. Dura Vermeer faces difficulty with the last step: act. It is therefore advised that Dura Vermeer arrange the improvement process differently so that all improvements can be directly integrated into the approach of the entire organization. This can be achieved by formulating a general basis for the complete project-management plan and by expanding and improving this standard continuously.

Table of contents

1. Introduction

This first chapter introduces the subject of this thesis: the prevention of disputes between contractors and public clients in Dutch infrastructure projects. The chapter opens by presenting general background information about the construction industry. Then the main problem is analysed. After that, the research objective and the research questions are described and a reading guide is given.

1.1. Background

Although the construction industry is known as a conservative sector, several large changes have occurred in recent years. Two of the most important changes are related to contracting and tendering.

In the beginning of the 21th century, the desire arose to integrate design and construction activities so as to better align the different phases and to better control the increasing complexity of projects (UAV-GC, 2015). In reaction to this, the Dutch government started to change its traditional procurement policy. Politicians wanted a flexible and compact government that could maintain a high production volume. Therefore, the public parties responsible for the infrastructure increasingly needed the market to achieve their production targets. The performance of tasks was left to the market as much as possible; therefore, new organizational forms were needed (Rijkswaterstaat, 2015). This has resulted in a shift from build-only forms to integrated organizational forms with contracts such as Design & Construct; Engineering & Construct; and Design, Build, Finance and Maintain (PIANOo, 2015 b). This movement stimulated the market to come up with innovative solutions. However, it also caused most of the risks to shift from government agencies to contractors (CROW, 2015). This development resulted in much confusion among the parties involved. Therefore, several studies were initiated to determine how integrated organizational forms can best be deployed. For example, CROW, an independent research organization, has written guidelines for contracting and risk distribution.

Another change relates to the selection method used in tendering. This change is thought to be caused by the construction fraud (Dreschler, 2009). Until 1992, the winner of a tender payed a certain amount of money to the other bidders to compensate them the costs for making the bid. After 1992, this was illegal, but it still happened. In 2002, a research committee appointed by the government concluded that there had been widespread fraud in the construction sector. Construction companies made price-fixing agreements and divided the work. Thus, there was no competition, which is completely against the European rules (Parlement & Politiek, 2015). In response to the construction fraud, governmental agencies started to take quality more into consideration. This led to the more frequent use of Economically Most Advantageous Tender (EMAT). Since the tendering law of 2012, governmental agencies are required to use EMAT (PIANOo, 2015 a). Next to that, Best Value Procurement (BVP) was also developed. BVP is, in theory, not comparable to EMAT because it is not only about selecting the right contractor; it is more of an overall philosophy. However, part of the BVP philosophy is also about selecting the right parties. Therefore, some clients use it as a substitution for EMAT (Best Value Experts, 2015).

Both EMAT and BVP require much more work than a selection based on lowest cost; therefore, tender cost is high for construction companies. Moreover, both EMAT and BVP are applied in many different ways. This development has led to much confusion, and there have already been several initiatives to solve this problem (Bouwend Nederland, 2015 a).

The financial crisis had a huge impact on the construction sector. Total production decreased by 18% from 2008 until 2012 (Bouwend Nederland, 2015 b). In the same period, the number of bankruptcies increased by about 132% (CBS, 2014). Construction companies were eager to take any job. Some tried to survive by bidding below the cost price. In this way, they shifted the problem to the future. As a result of the crisis, companies not only bid low but also accepted projects with huge risks (CROW, 2015). The effects of these low bids and high risks are showing, as one third of the fifty largest construction companies have financial problems (Doodeman, 2014).

However, the construction sector seems to have reached a turning point. In 2014, production showed a slight growth. It is expected that this growth will increase in coming years (EIB, 2015). Times are changing, and the future becomes more important. Therefore, the construction industry is looking to improve. A very important problem to be solved is in the interaction between contractors and clients.

The importance of this issue is shown by the attention that is being paid to it in journals (such as *Cobouw*) and by the fact that large organizations are focused on it. Rijkswaterstaat, responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands, has developed a new procurement strategy to solve disputes. This new procurement strategy is developed in collaboration with the market, knowledge institutions and other government agencies (Rijkswaterstaat, 2015). Likewise, Bouwend Nederland, the largest employers' organization in the construction industry, is also trying to improve the interaction between contractor and client by focusing on equivalence and sound business management (Bouwend Nederland, 2015 a). Also, the Dutch institute for construction organizes a congress about new collaboration forms in the construction industry (NIB, 2015).

1.2. Problem analysis

The problematic interaction between contractors and clients is particularly reflected in the number of disputes in the construction industry (Raad van Arbitrage voor de Bouw, 2015). Disputes emerge in different ways and are related to different subjects. A dispute can have enormous negative consequences, both psychological and financial. Disputes are time consuming, expensive and unpleasant. They can destroy client-contractor relationships that have been painstakingly built up over long periods of time. Disputes can add substantially to the cost of a project; they can even make a project unsuccessful or unfeasible. This is the case for both contractors and clients. Therefore, disputes must be avoided (Kamminga, 2009).

An important distinction is to be made between the terms *conflict* and *dispute*. A *conflict* is a disagreement. When a conflict becomes a specific problem that must be solved, we speak of a *dispute*. Conflicts and disputes are related to each other. If a conflict is not resolved, it will develop into a dispute. However, little is known about the process from conflict to dispute.

Conflicts will always exist. Because of the opposing interests of contractors and clients, conflicts cannot be entirely avoided. Disputes do not emerge because of these opposing interests; they emerge because of the interaction of both parties when there is a conflict. The client and contractor can exert influence on this process, and it is therefore possible to avoid a dispute (Fenn, Lowe & Speck, 1997).

Disputes tend to arise frequently between contractors and clients in infrastructure projects (Kamminga, 2009). Three aspects related to infrastructure encourage the emergence of disputes. First, the client-contractor relationship is by definition not equivalent. Financial flows run from the client to the contractor; therefore, the client has more power. Second, most infrastructure projects are commissioned by public clients, so the projects are vulnerable to the unpredictability of politics, which can produce unexpected changes. Third, infrastructure projects are often complex and unpredictable. In the Netherlands, there is no large construction project where no unforeseen events have occurred. Because such events are unexpected, it is not possible to take them into consideration in a contract (De Man et al, 2015).

The many disputes in infrastructure projects are a problem for contractors because disputes increase the chance that they will make little profit or suffer a loss. It is a problem for public clients because disputes can lead to exceeding the budget. Moreover, it is also a social problem. Because of these disputes, public money is not spent effectively. It is not effective, since the money can be better spent on the construction itself than on resolving disputes. In addition, contractors and clients can focus less on the future because they are particularly concerned with solving disputes. This leads to less innovation in the industry.

To prevent future projects from all of the negative consequences of disputes, something must change. Many new projects are expected in the coming years. The delta decisions have been made, the Flood-Protection Program is running, and fifty locks must be replaced. Also the many highways that were built shortly after the Second World War must be renewed (Rijkswaterstaat, 2015). Contractors try to protect themselves from large losses and disputes by focusing on smaller projects with fewer risks (Zwaga, 2015). This tendency could lead to less competition for the new projects and thereby strengthens the need for a solution for disputes.

There are different visions of how to prevent disputes in the construction industry. The largest movement, which considers the problem largely from a client perspective, argues that the parties concerned should collaborate to achieve a common objective (Rijkswaterstaat, 2015). However, critics argue that this form of collaboration is not possible because the parties have very different interests (De Ridder, 2015). To define the best solution for the problem, it is of great importance to investigate what the problem really is. Since the solution of the problem has already been examined from the perspective of the client, it is interesting to view the problem from the perspective of the contractor.

1.3. Research objective

The current problem concerning the interaction between clients and contractors is that disputes arise frequently in infrastructure projects. The objective of this research is to *reduce the number of disputes between contractors and public clients in Dutch infrastructure projects*. By gaining more insight into the emergence of conflicts and disputes and into possible improvements for the current situation, a conclusion can be drawn about what actions contractors can take to prevent conflicts from becoming disputes.

1.4. Research questions

To reach this objective, the following research question is drafted: *What are the most important actions for contractors in trying to prevent conflicts with public clients in Dutch infrastructure projects from becoming disputes?*

To answer the main question, the following sub-questions must be answered:

1. *What theoretical insights are available concerning conflicts and disputes in general and in the construction sector in particular?*
2. *What are the sources and causes of the conflicts in Dutch infrastructure projects?*
3. *What is the process from conflict to dispute in Dutch infrastructure projects?*
4. *What are the consequences of the disputes for Dutch infrastructure projects?*
5. *What can be done by contractors to prevent disputes in Dutch infrastructure projects?*

The formulation of this question limits the scope of the research. First, this research is focused on the disputes that emerge after signing the contract. Everything that precedes, the tender phase, will not be taken into consideration. Second, there is chosen to limit this research to disputes between public clients and contractors, because most infrastructure projects are commissioned by public clients and because the difference between public and private clients is considered to be large. This study focuses on interactions between the contractor and the client rather than on interactions between the main contractor and subcontractors. There are also disputes between the latter parties. However, the disputes with subcontractors and the impact on the interaction between contractor and client has not been included in this study. Third, this study is aimed at ways for contractors to prevent disputes. It does not focus on the perspective of public clients. The above choices have been made to increase the practicability of the study and to reach the most interesting results.

The added value of this study is that it focuses on a knowledge gap. Existing literature gives insight into factors that cause conflicts and disputes, but it does not consider the process from conflict to dispute, and focus on the practical applicability of the insights for contractors is missing. This study will zoom in on the emergence of disputes between public clients and contractors in Dutch infrastructure projects and on ways in which contractors might prevent these disputes. However, it not only gives contractors better knowledge of the problem and possible solutions, it is also makes the perspective of contractors more understandable for clients. This study aims to contribute to the improvement of the interaction between the two main parties in construction to thereby benefit the construction industry as a whole.

1.5. Reading guide

The structure of the thesis can be explained as follows. Chapter 2 describes the methodology of the study and justifies the method used. Chapter 3 outlines the theoretical framework and provides information about conflicts and disputes in general and about the construction industry in particular. Chapter 4 presents the results of the study and gives insight into the emergence of conflicts and disputes and into the consequences of these disputes. Also, ways to prevent disputes will be described. Chapter 5 answers the main question of the study by combining the literature and field research. Chapter 6 offers recommendations that are drawn from the conclusion of the research. This includes both general recommendations and specific recommendations for Dura Vermeer.

2. Methodology

This chapter describes the research method that is used in this study. The main question will be answered on the basis of five sub-questions, as described in Chapter 1. To answer the sub-questions, a combination of desk and field research is used.

2.1. Desk research

Sub-question 1 is answered by using desk research: a literature survey, to be precise (see the theoretical framework in chapter 3). A literature survey is used to find existing, useful information that can answer the research question (Verhoeven, 2011). The aim was to form a theoretical framework to use as the basis for the field research. The resources for the literature survey consist mainly of information gathered from scientific papers and books. The information is assessed by place of publication, author, date and verification in other resources.

2.2. Field research

Field research is used to answer sub-questions 2 to 5. This is empirical research in which the researcher goes into the field in person to observe and gather or generate relevant material (Verschuren & Doorewaard, 2010). Furthermore, qualitative research is used. This is an open and flexible method that focuses on the background of the collected data and does not collect numbers (Verhoeven, 2011). Within qualitative research, a case study is used. This is a research strategy in which the researcher tries to gain profound insight into one or several objects or processes that are confined in time and space. A case study is characterised by a small number of research units, intensive data generation and more depth than breadth (Verschuren & Doorewaard, 2010). A case study can combine several methods of data collection, such as interviews and document studies (Verhoeven, 2011). Several variants can be distinguished within case studies. For this research, a comparative case study is chosen in which several interrelated cases are compared. Within the comparative case study, the hierarchic method is chosen. In this kind of case study, the cases are studied independently from each other. A possible disadvantage of a case study is that the external validity of the results is often under pressure. The fewer cases studied, the harder it is to apply the results to a broad population or to similar cases. However, the most important advantage of a case study is that the results are accepted more easily by the people in the field. Acceptance from all stakeholders is often a condition for making real contribution to the process of change (Verschuren & Doorewaard, 2010). The aim of a case study is to analyse a specific problem and identify needed changes and renewals to solve the problem (Verhoeven, 2011).

2.2.1. Case selection

Ten cases are chosen for this research. These cases are all Dutch infrastructure projects commissioned by public clients and are chosen because the cases must be homogeneous enough to make it possible to compare them and to draw conclusions from them (Verschuren & Doorewaard, 2010). The projects are selected from the recently finished or still ongoing projects of Dura Vermeer. This does not mean that the results are not relevant for contractors other than Dura Vermeer. The approach of Dura Vermeer is very similar to

the approach of other Dutch contractors, as confirmed by multiple employees of Dura Vermeer who have worked for different contractors. So the projects of Dura Vermeer are a realistic reflection of the problems of all contractors.

The cases are selected on substantive grounds. Selection is made partly on the basis of evaluations, partly on the experience of directors and other employees of Dura Vermeer. The following criteria are taken into consideration: complexity and size, presence of disputes, availability of information, and the possibility to conduct interviews. All of these criteria are important to the success of this study. Table 1 gives an overview of the selected projects with the following characteristics: type of project, type of contract, type of client and rounded contract price. Due to the confidential nature of the information, the names of the projects are not disclosed and only a brief characterization of the project is given.

Table 1. Overview of the projects.

No.	Type of project	Type of contract	Type of client	Rounded contract price (€)
1	Road	RAW	Province	20 m
2	Road	D&C	Rijkswaterstaat	80 m
3	Road	D&C	Municipality	20 m
4	Road	D&C	Municipality	20 m
5	Road	DBM	Rijkswaterstaat	70 m
6	Water	E&C	Water board	30 m
7	Water	E&C	Municipality	140 m
8	Water	D&C	Combination	10 m
9	Rail	D&C	ProRail	10 m
10	Parking garage	DBM	Municipality	30 m

Though the selection is based on substantive grounds, the different types of projects, contracts, clients and rounded contract prices represent a realistic distribution of all of the infrastructure projects of Dura Vermeer. A broader vision of the emergence of disputes is created by taking more variables into consideration.

The ten cases mentioned above are not only projects with multiple disputes. Projects with no disputes are also used to form a control group. These projects can be studied for insight into what goes right and what works to prevent disputes. In addition, a number of projects have passed a major change in behaviour of the people involved. This is very interesting, because it is possible to compare the behaviours that had positive or negative influences on the development of disputes.

In this study, a parking garage (project no. 10) is seen as an infrastructure project, since the following definition of infrastructure is used: "*the basic systems and services, such as transport and power supplies, that a country or organization uses in order to work effectively*" (Cambridge dictionary, 2015). This specific project also complies with the requirement of public clients and is therefore included in the selection.

2.2.2. Data collection

Several methods of data collection can be used for a case study. This research uses both document studies and interviews. The document studies were conducted to obtain general information about the project, which is used as background information for the interviews. This provided an overall idea of what the project includes so that it was possible to understand what the conflicts and disputes are about. Evaluations of the projects that are available were studied. This provided a first impression of the interaction between the parties. However, it was not possible to study documents about the conflicts or disputes that have occurred, mainly because this sensitive information is not recorded in documents. What information is available appears in email traffic or in the minutes of meetings. It is not interesting to delve into such information for this study, because it describes the content rather than the causes, process or consequences of the disputes. The information needed for this research is mainly obtained from interviews. An interview is a conversation that focusses on the experience of the interviewee. It aims to gather information about a particular topic. The most important disadvantage of interviews is that no general conclusions can be drawn for the entire target group because the results are not statistically representative (Verhoeven, 2011). However, the most important advantage of this research method is that, after standard questions have been asked about key aspects, it is possible to go into further detail (Emans, 2002). This research uses semi-structured interviews.

The sample of qualitative interviews is designed in such a way that the results are representative in a qualitative manner. *Representativeness* has a completely different meaning within qualitative research than in quantitative research. In quantitative research, *representativeness* is defined in terms of (large) numbers of respondents. Qualitative research is small-scaled and does not depend on quantities of respondents. The results are qualitatively representative if the sample is constructed in such a way that all relevant changes in beliefs, opinions, feelings and motivations are represented in the sample. To determine the sample, the population should be classified into categories such that all relevant research variables are considered. Based on the number of categories, the number of interviewees is determined. The general rule is that three to five interviews per category are required to identify all relevant variations within the population. This is the ideal sample design, which does not take practical constraints into consideration (Groenland, 2001).

The population of this research is limited to contractors and is divided into 10 categories based on the 10 cases. There is chosen to interview two respondents per case to investigate all ten cases in the time available. Because the goal of this study is to gain insight into the emergence rather than into the subjects of conflicts and disputes, it is preferable to choose ten projects with two interviews instead of two projects with ten interviews. In this way, the widest possible insight into the emergence of disputes can be obtained. Finally, 19 persons were interviewed because one person was interviewed about two different projects. For the remaining projects, both of the individuals involved were interviewed at once, because interactions between them are of added value. The interactions can be used to draw one conclusion from multiple respondents. If the respondents disagree, they can discuss it to come to agreement (Verhoeven, 2011).

The respondents were recruited through the network of Dura Vermeer and selected based on the importance of their work on the project and relevance for the subject. All respondents had direct interaction with the public client during the project. This means that they were project leaders, project managers, project directors, contract managers, process manager and process coordinators. This is called a purposive sample: the respondents are selected for specific characteristics to obtain the information where it is available (Verhoeven, 2011).

As mentioned above, semi-structured interviews were conducted for this study. This means that an interview guide was used. An interview guide is a list of topics that functions as a starting point in the interviews. There is also space for the contribution of the interviewer. The interview guide is designed to answer the sub-questions of this research. The theoretical framework (see chapter 3) is used to determine more specific topics for the interview guide. The interview starts with an introduction and with the definitions of the most important terms that are used in this research. After that, the interviewees were asked general questions about the project, conflicts and disputes. Then the interviews focused on several subjects that were identified in the literature study as important to the process of conflict to dispute (agreements, expectations, communication, relationships, transparency and trust). The interviews closed with improvements for contractors to prevent disputes. The interview guide is included in appendix I. The usefulness of every response was evaluated before another question was asked. In order to ensure objectivity, the aim of the interviewer was to standardize the situation and to maintain a neutral position in the interviews (Emans, 2002). After all the interviews were held, clean verbatim transcriptions of the interviews were produced from audio recordings. Clean verbatim transcriptions were used to analyse exactly what the respondents said without being distracted by stuttering and slips.

2.2.3. Analysis

The analysis of the data is divided into different steps: creating a theory, coding, summarizing the quotes per code and describing the results per code, illustrated with quotes. The information obtained from the interviews is qualitative and therefore less accurate than quantitative data. However, qualitative research remains closer to the original data and focuses more on the interpretation of the results obtained from the analysis. It is important to keep the problem and the characteristics of a case study constantly in mind during both the interpretation and the analysis of the data itself. Considering the selection of cases and the number of interviewees, it is especially important not to focus on the frequency of occurrence (Swanborn, 2008).

A theory is formed on the basis of literature and on the initial findings of the interviews (see table 2). This theory was kept in mind while coding the interviews. Using this theory, the data is analysed with a certain expectation. The experience of others is used to form the theory in order to strengthen it.

Table 2. Theory used for coding.

In infrastructure projects, conflicts will always emerge, because of the situation of a contract between a contractor and client with different interests. *The emergence of conflicts is depends especially on the contract. If the contract is not put together well, is not worked out well, is open to different interpretations or does not say anything about managing changes, the risk of conflict increases. The emergence of disputes, however, does not depend on the contract; it depends instead on the interaction of the people involved. So for a successful project, people and their interactions are more important than the contract, processes and tools. I assume that a successful project is characterized by the absence of disputes, because a project with disputes cannot be successful. Disputes, arbitration, lawsuits or long-term claims are no good for anyone, because in the end there are always two losers. In addition, it costs both parties unbudgeted resources, the focus is no longer on the construction and the mindset of the people is negative and non-constructive.* *The following aspects are important for interactions between the contractor and client: agreements, expectations, communication, relationships, transparency and trust. This means, for example, that surprises can be prevented by communicating on time and conflicts can be solved by communicating informally.*

The coding of the interviews is performed by using the program Atlas.ti. This is a Computer Assisted Qualitative Data Analysis Software (CAQDAS) program that helps to organize, manage and analyse qualitative information (Atlas.ti, 2015). The most important and relevant quotes are selected from the transcriptions, and to each quote a code is attached to divide it into categories. The selected quotes usually consist of a few sentences rather than longer pieces of text. The quotes are selected with the above theory in mind with a view toward behaviour (acts) rather than to the subjective perceptions of the respondents. Two different approaches to coding can be defined. The codes can be generated inductively based on important aspects that are identified in the data; or they can be generated deductively based on predefined areas of interest (Lewis & Silver, 2007). For this study, a deductive approach is used to test existing expectations (see theory) with the data collected from the interviews. The codes are derived from the interview guide. The main structure of the codes is emergence of conflicts, process from conflict to dispute, consequences of disputes and improvements. The study focuses on the process from conflict to dispute, so this process was discussed in more detail than the other three main topics. Within the process of conflict to dispute, the following aspects were analysed: agreements, expectations, communication, relationships, transparency and trust.

A summary was written based on the list of citations by code. This is translated into a description of the key findings in chapter 4. The structure of the codes is also used for the structure of the research results in chapter 4. The findings are supported by the most illustrating quotes from the respondents. Within the results, no distinction is made in the different projects. The characteristics of the projects and the functions of the respondents are not included in the analysis because there is neither enough variation in characteristics nor enough cases to draw accurate conclusions. In addition, this research describes a process model rather than a factor model in which cause-effect relationships of factors within a project are examined.

2.2.4. Quality criteria

Two criteria are used to ensure the quality of the research:

Reliability

Reliability is the degree to which the research is free of random errors. To test the reliability, the research must be repeatable. In this study, repeatability is ensured by the use of ten cases that are investigated independently of each other. By comparing the results of these cases, the reliability is tested and guaranteed (Verhoeven, 2010).

Validity

Validity means that the study measures what needs to be measured. Validity is divided into internal and external validity. The internal validity is the degree to which the researcher is able to ask the right questions in order to obtain the correct answers. The internal validity of this case study is assured by the flexibility of the method. The interviewer keeps asking questions to ensure understanding. In this way, the right conclusions can be drafted. External validity is the degree to which the sample reflects the population (representativeness) and the degree to which the results can be applied to the whole population (generalization). Qualitative representativeness is secured in this research by using criteria to select the respondents and by using the ideal sample design to assure that all relevant variations in beliefs, opinions, feelings and motivations are represented in the sample. For this qualitative study, a limited number of cases were chosen for which interviews were held with a limited number of respondents. The results cannot be generalized to the complete population due to the small numbers investigated. However, the results do provide insight into the emergence of conflicts and disputes and into ways that contractors might prevent disputes. It can therefore be regarded as relevant (Verhoeven, 2010)

2.2.5. Limitations

The chosen research method has limitations. The field research is done by qualitative research and the data is obtained through semi-structured interviews. Unlike quantitative research, the results of qualitative research cannot be generalized. However, the results do provide a good indication of what is going on. Qualitative research is the right method to use to investigate deeper opinions, feelings and motivations, because it is possible to ask about the core of the problem, which is not possible with quantitative research. Another limitation concerns the decision to investigate only projects of Dura Vermeer and no projects of other contractors. Ten projects were examined, and two persons were interviewed from each project. It is questionable whether this provides enough variation in opinions to draw the right conclusions about the entire project. However, both persons were interviewed at the same time because of the expectation that this would facilitate the discovery of the right insights. For two projects, the persons were interviewed separately from each other for practical reasons. This difference in method made it possible to compare these two methods of interviewing. It appears that the two respondents were able to continue and elaborate on what the other person says, that the respondents were able to reflect together on issues and to discuss things with each other when they initially had a different opinion. This made it possible to get to the core of the problem and to achieve a unilateral output.

2.3. Overview of methodology

The described methodology is summarised in an infographic (see figure 1).

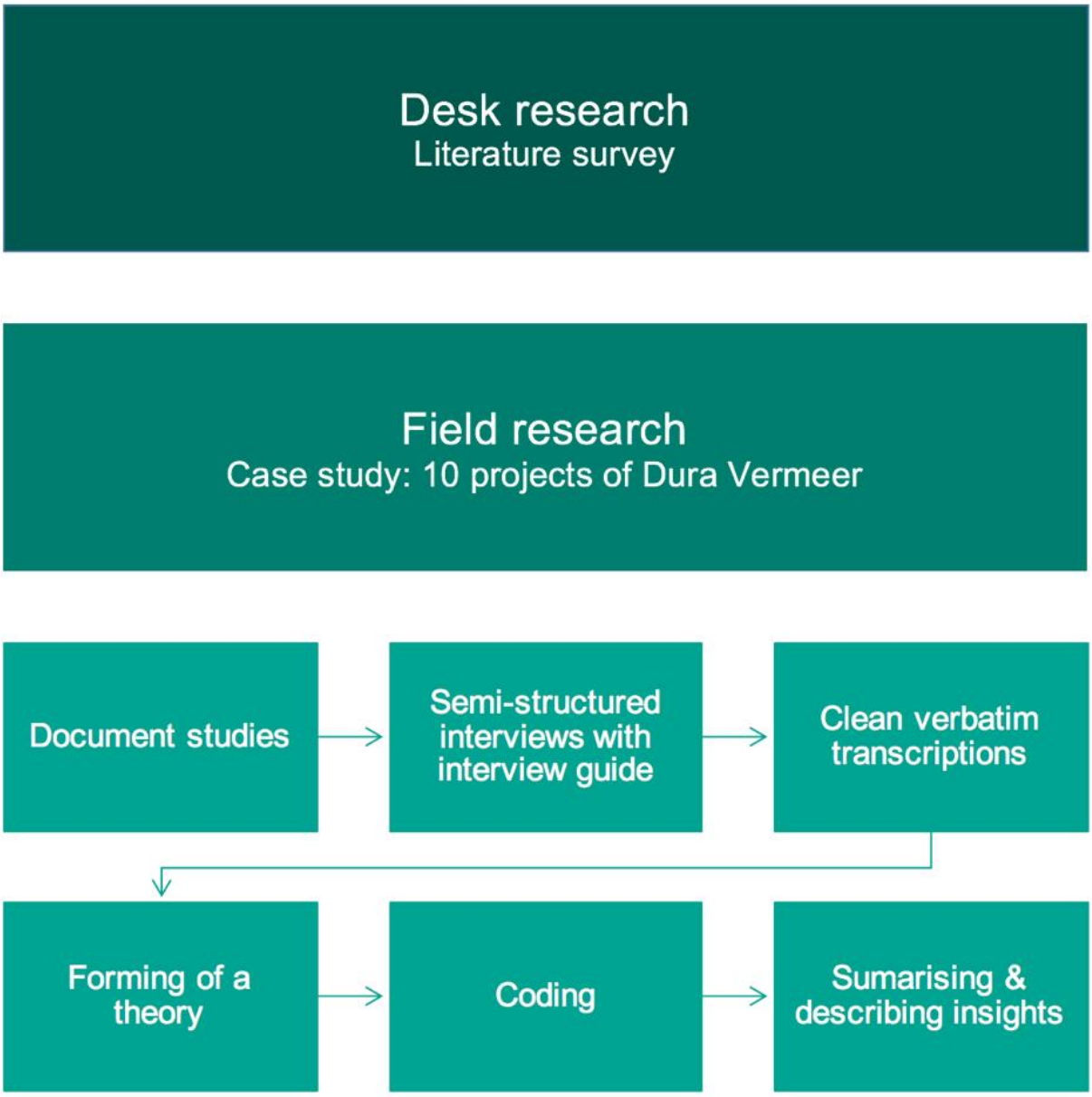

Figure 1. Overview of methodology.

3. Theoretical framework

This chapter starts with a general description of conflicts and disputes. It then zooms in on conflicts and disputes in construction. The sources, causes and methods of resolving conflicts and disputes are described. Finally, an overview of the most important terms and components is given, including the relations.

3.1. Conflicts and disputes in general

In order to investigate the topic of conflict and disputes in more detail, it is necessary to define these terms. A *dispute* is a social phenomenon rather than a thing. Disputes take various shapes, and are reflected by how the concept is defined by the observer. Furthermore, a large part of any dispute exists only in the minds of one of the parties involved. To study a dispute is to study a social process of perceptions and responses (Wright & Cuzzo, 2004). To better understand the meaning of disputes, they should be considered in comparison with conflicts. Although there is still no generally accepted definition of *conflict* in the literature, most definitions involve the following three themes: interdependence between parties, perception of incompatibility among the parties' concerns and some form of interaction (Thomas, 1992).

There are different opinions about whether the terms *conflict* and *dispute* are interchangeable or not. Based on the descriptions above, the difference is still rather vague. The distinction made by Costintino and Merchant (1996) is more clarifying. They define *conflict* as, "the fundamental disagreement between two parties, of which a dispute is one possible outcome". Other outcomes are conciliation, conflict avoidance and capitulation. Yarn (1999) makes a similar distinction: a *conflict* is a state and a *dispute* is a process. He argues that, "people who have opposing interests, values, or needs are in a state of conflict which may be manifest, in which case it is brought forward in the form of a dispute". So you can have a conflict without a dispute, but never a dispute without a conflict.

This difference between conflicts and disputes makes sense of the generally accepted phrases, *conflict management* and *dispute resolution*. *Conflict management* involves designing and implementing strategies to minimize the negative aspects of conflict and to enhance the positive aspects of conflicts. *Dispute resolution* is the process of resolving disputes between parties (Rahim, 2002). The main difference between these two concepts can be explained with reference to the terms *proactive* and *reactive*. Conflict management is proactive by preventing conflict from getting out of hand (becoming a dispute), whereas dispute resolution is more reactive and tries to find a solution when there is already a real problem (Estreicher & Sherwyn, 2004).

3.2. Conflicts and disputes in construction

Also in the construction industry, the difference between conflicts and disputes is made by several authors, who explain this as follows. Fenn, Lowe and Speck (1997) state that wherever there is incompatibility of interest, conflict exists. Latent conflict is an inevitable element of the construction trade. Disparities in the contract stimulate the exploitation of these contractual imperfections, because the unbalanced client-construction company relationship stimulates opportunistic behaviour. This causes latent conflict to transform into a manifest problem (Dorée, 1994). Therefore, a conflict is pandemic and should be managed to prevent it from becoming a dispute. Disputes can be connected with clearly justiciable issues. They require a solution and lend themselves to intervention by a third party. Also, in the context of construction, it can be noticed that any conflict has both positive and negative aspects. The positive aspects have to do with commercial risk-taking, the basis of free enterprise and competition. In contrast to conflict, disputes have only a negative impact on the construction industry and its performance. It is considered to be more interesting to study disputes and to gain insight into the causes and treatments of disputes than to study conflict, which is unavoidable in organizational life (Fenn, Lowe & Speck, 1997).

In literature a vague, inconsistent difference can be found between the source and cause of conflicts and disputes. The distinction can be clarified by the following definitions of the Cambridge Dictionary:

- Source (noun) - *The place something comes from or starts at.*
- Cause (noun) -*The reason why something, especially something bad, happens.*

The *source* is the trigger of the problem and the *cause* is the reason why it is a problem. The source and cause combine together make a conflict or dispute. A simple example can illustrate these two terms. The source of conflict is a collision between two cars, and the cause of the conflict is a disagreement about who is to blame for the collision.

To dive deeper into the subject and combine different resources for this theoretical framework, it is necessary to manage the differences and inconsistencies in the literature. This is done by using the above distinctions to sort the literature. This involves both the distinction between a conflict and a dispute as well as the distinction between the source and the cause.

3.1.1. Conflicts

The literature describes many different sources of conflicts in construction. Kumaraswamy (1996) gives an overview of the literature that deals with the sources of conflicts:

- Conlin et al. (1996) - Payment, performance, delay, negligence, quality and administration.
- Heath et al. (1994) - Contract terms, payment, variations, time, nomination, renomination and information.
- Hewit (1991) - Change of scope, change conditions, delay, disruption, acceleration and termination.
- Semple et al. (1994) - Acceleration, access, weather and changes.

A more practical view on the sources of conflicts is made by Arcadis (2014). This global design and consultancy firm investigated projects in Continental Europe in 2013 and identified the following sources of conflict (in order of importance):

- Differing site conditions;
- Third party or *force majeure* events;
- Employer, contractor or subcontractor failing to understand and/ or comply with its contractual obligations;
- Employer-imposed change;
- A failure to properly administer the contract.

So differing site conditions was the number one source of conflicts in Continental Europe in 2013. Last year's most common source - failure to understand and/or comply with contractual obligations - fell to the third place this year.

Because of the unbalanced relationship of the two parties, there is a constant latent state of conflict (Dorée, 1994). When something happens (a source), the conflict becomes manifest. So the reason that problems arise (the cause) is the different interests of the parties involved.

To deal with conflicts, organizations need conflict management, which differs from conflict resolution. Conflict management does not necessarily imply avoidance, reduction or termination of conflicts; it involves, rather, the design of an effective strategy to minimize the negative impact of conflicts and to enhance the positive effects (Rahim, 2002). Conflict management entails different techniques that are used to manage the conflict. Fenn, O'Shea and Davies (2005) distinguish the binding and non-binding processes that are used to manage conflicts:

Non-binding processes:

- Dispute review boards: an independent board established to make settlement recommendations;
- Dispute review advisers: neutral third-party advising on a problem or potential dispute;
- Negotiation: the parties themselves attempt to settle their differences;
- Quality matters: including total quality management, procurement systems, co-ordinated project Information, and quality assurance or partnering.

Binding processes:

- Partnering: long-term commitment between two or more organizations.

3.1.2. Disputes

Sources can be explained as triggers of problems. In the case of the process from conflict to dispute, it can be said that the conflict is the source of the dispute.

The literature about the causes of disputes is very fragmented and each source describes different combinations of causes of disputes. An attempt is made to combine the different scientific sources of different authors into one list with the most important aspects. The following aspects are identified: agreements, expectations, communication, relationships, transparency and trust. These aspects are described below.

Agreements
Agreements have an important influence on the process from conflict to dispute. To make agreements about issues that are not necessarily legally enforceable, to specify agreements in detail, and to interpret open terms and procedures - such processes influence the emergence of disputes. Agreements about relationships and the atmosphere in which the two parties want to work also influence the process (Kamminga, 2008).

Expectations
A study performed by Martien Reniers (2007) gives insight into the dissatisfaction in the Dutch construction industry by examining the process of social interaction between the parties. This research states that most disputes emerge because of expectations. Expectations about the other party are created during the start of the project. Also, in unexpected situations, the expectations of both parties become visible. After analysing ten years of arbitration judgments, Reniers concludes that wrong perception, which arises due to a failure to manage expectations, is the source of the frustration between the two parties and has a major impact on the emergence of disputes.

Communication
Kamminga (2008) identifies several “project success mechanisms". A project can be classified as successful when the goals are reached, which implies an absence of disputes. One project success mechanism is communication. Communication is influenced by project meetings, social events and special taskforces that discuss particular subjects.

Relationships
The parties must establish a relationship that allows for adequate interactions. The construction sector has an adversarial nature; the relationships are "market-based" and “short term between independent businesses” (Dorée, 1994). Combined with the complexity of the construction process, it is difficult to establish relationships that allow for a smooth interaction.

Trust
Trust between the parties has great influence on the development of disputes. *Trust* is defined as a psychological state that includes the intention to accept vulnerability based upon positive expectations of each other's intentions or behaviour. Trust appears to be a critical success factor: lack of trust between the client and the contractor is referred to as a major cause of core problems in construction. Construction is frequently mentioned internationally as a sector that is characterized by a lack of trust (Lousberg, 2008).

Transparency
Transparency is directly linked to the importance of trust and is also important for the process from conflict to dispute. Research shows that open and honest communication is in practice an important factor for the building of trust (Wood et al, 2002). In order to create this kind of trust, it is important to make and keep interests transparent. Interests can be made visible and open to discussion by defining joint goals and planning (Lousberg, 2008).

Organizations need a process to resolve disputes that emerge between the parties, which is called dispute resolution. Dispute-resolution strategies are designed to deal with disputes at the micro-level within the existing structure and processes of an organization (Rahim, 2002). Fenn, O'Shea and Davies (2005) distinguish between the binding and non-binding processes used to resolve disputes:

Non-binding process:

- Conciliation: kind of like mediation but more like adjudication.
- Executive tribunal: one executive from each side or party in dispute and a neutral party which facilitates to negotiate a settlement.
- Mediation: independent third party helps the parties reach an agreement to settle a dispute.
- Negotiation: the parties themselves attempt to settle their differences.

Binding process:

- Adjudication: neutral third party decides what is binding on the parties in disputes unless they wish to proceed to formal arbitration or litigation.
- Arbitration: formal disputes are determined by a private tribunal of the party's choosing.
- Expert determination: the parties jointly instruct a third party to decide an issue.
- Litigation: procedure of taking a dispute to court for legal settlement.
- Negotiation: the parties themselves attempt to settle their differences.

In the Netherlands, the three most common dispute-resolving techniques are arbitration, litigation and mediation (Fenn, O'Shea & Davies, 2005). Arbitration is most often used to resolve disputes in construction because it is included in the dispute-resolution methods in the terms of the Uniform Administrative Conditions (in Dutch: UAV) or Uniform Administrative Conditions for Integrated Contract Types (in Dutch: UAV-GC) (Burgersdijk, 2013).

3.3. Overview of theoretical framework

The definitions of *conflict* and *dispute* are essential to this research. Based on the literature survey, the following explanations are used in this study: a *conflict* is a disagreement; when a conflict becomes a specific problem that must be solved then it is a *dispute*. The figure below shows the relation between these two terms and their components. A conflict can consist of different sources and causes and can be handled with conflict management. Also, a dispute has different sources (equivalent to the conflict) and causes and can be handled with dispute resolution (see figure 2).

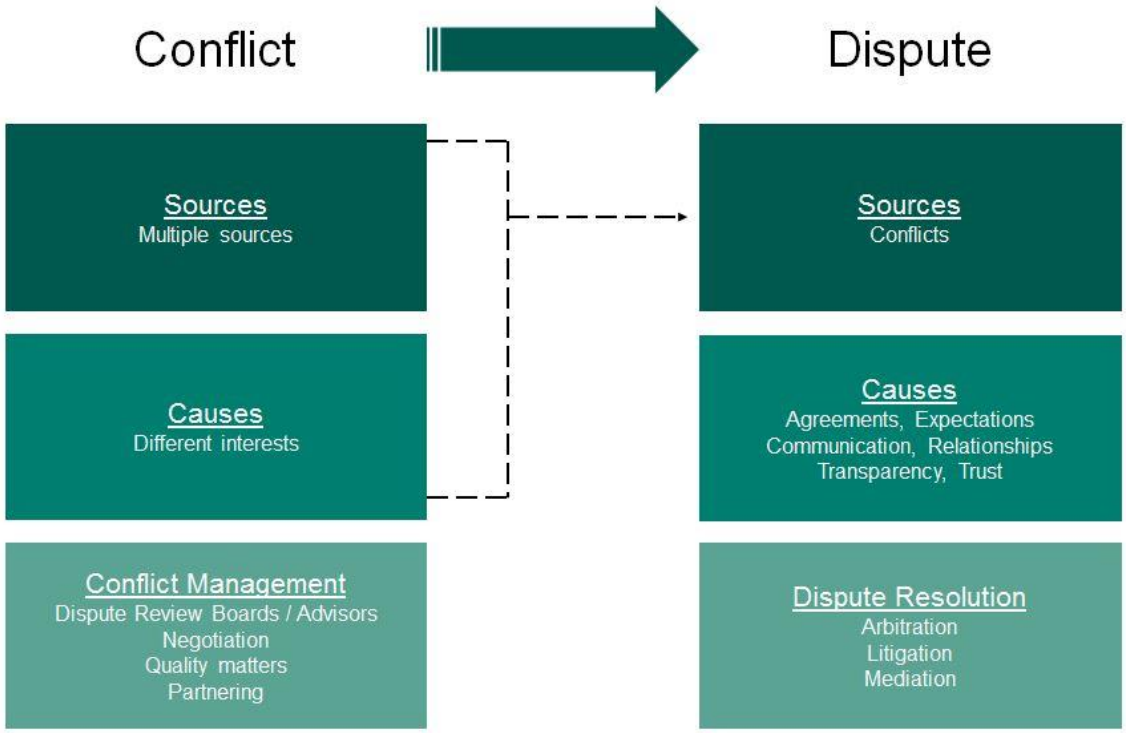

Figure 2. Overview of theoretical framework.

4. Research results

This chapter describes the results of the research. These results were obtained by quantitative field research in the form of semi-structured interviews. 19 people were interviewed who were involved in 10 different Dutch infrastructure projects. The results give an indication of what is going on, but because of the qualitative character of the research, they do not contain proven truths. Most of the results shown in this chapter were identified in multiple interviews but in the case that one or all respondents mentioned something then this is appointed separately in the text. The results are illustrated by citations from the transcripts of the interviews. These transcripts are confidential.

This chapter begins by discussing the emergence of conflicts, then considers the process from conflict to dispute, the consequences of disputes and improvements. The results described in this chapter are the basis for the conclusion in chapter 5.

4.1. Emergence of conflicts

Conflicts in Dutch infrastructure projects have different sources and causes. As explained in the theoretical framework, the source is the trigger of the conflict and the cause is the reason why it is a conflict.

It can be concluded from the interviews that the source of conflict can be related to the requirements stated in the contract or to a change in the situation of the project. Sources that are mentioned in the interviews include different interpretations of requirements by the contractor and client or contradictions in the various requirements. In addition, a change in the scope, unexpected things in the ground and delay in the planning are considered sources. The delay in the planning may result from a change of scope or from things in the ground, but it can also occur separately as a source of a conflict.

In addition, it can be concluded from the interviews that the cause of conflict relates to a disagreement about requirements or money. The causes mentioned in the interviews include different opinions about whether or not to comply with the requirements in the contract, accountability and legitimacy. Also, a discussion can arise about who will pay and what amount. This concerns not only direct costs but also indirect costs such as costs of delay.

A conflict can arise in many different ways, but essentially the cause always involves a difference of opinion due to self-interest. In addition, two conditions are mentioned during the interviews that may encourage the emergence of a conflict. First, this concerns a situation that has been created by tendering. The contractor is looking for the edges of the contract and requirements in order to win the bid. Thereby, the chance increases of discussion about whether or not the requirements have been met. Second, the budget of both parties has an influence. If the budget is low, this increases the chance of a conflict, because self-interest is stronger when you are under financial pressure. This is also why conflicts often emerge at the ends of projects.

4.2. Process from conflict to dispute

The emergence of disputes consists of the source and cause of the dispute. The source of the dispute is equivalent to the conflict. So the process from conflict to dispute focuses on the causes of disputes. The process is described in accord with the most important of the aspects that influence this process. These aspects are the following: agreements, expectations, communication, relationships, transparency and trust. Within the process from conflict to dispute, it is important to make agreements, to share expectations and to communicate in the right way. It is also important to build a relationship between contractor and client wherein transparency and trust play a major role.

The following subparagraphs discuss these six aspects given a separation between a positive and negative impact. *Positive influence* refers to the prevention of a dispute, and *negative impact* refers to causing a dispute, because disputes must be prevented. The dividing line between positive and negative is vague because cases have, for example, a positive effect but, reversed, may have a negative effect. In this case, the decision was made to adhere to the experiences of the respondents with the division of positive or negative.

4.2.1. Agreements

Positive

Almost all interviewees said that, to prevent disputes, it is important that both parties draft an escalation model together before the beginning of the project. Here they should agree on how they will escalate: who will talk with whom in what order, and when to escalate to the next level. It is better to have discussions at the project level first, because this is where the knowledge is. One respondent describes this as follows: *"Je moet wel een escalatiemodel achter de hand hebben, maar het is altijd beter als je het oplost binnen de teams omdat je dan inhoudelijk met elkaar in discussie kunt gaan." (*in English: *"You must have an escalation model to fall back upon, but it is always better to solve it within the teams because you can discuss the content of the problem.")* If a solution cannot be found at this level, then they have to shift up to the next level to prevent the discussions from becoming too intense. In addition, it is important that agreements be made about treatment times of plans and verification moments of requirements.

Clear agreements must be made about the various meetings: what meetings exist, what purpose the meetings serve and who is to be present at the meetings. It is important that people adhere to this and also discuss the right things during the right meeting. This applies not only to the formal meetings, but also to informal meetings. In addition, for informal meetings between contractor and client, it is important that people with the same functions communicate with each other.

If there is a conflict about a change, then an agreement on the price must be reached before the change is implemented to prevent this conflict from ending in a dispute. However, to prevent more conflicts from emerging, the contractor must save the client from unnecessary harm and should not stop working.

Negative
The interviews showed that failure to align the organizations can contribute to the emergence of disputes. This may happen, for example, if the organizations have different core functions. A lack of agreement about mandating can have a negative impact, for example, if it appears that the people who are involved with negotiations have insufficient authority. This is also the case with a lack of agreement on how to deal with changes of the contract. In addition, failure to test the workability of process agreements was mentioned by an interviewee. This means, for example, a tangle of meetings that does not work in practice.

Finally, escalation also appears to have an important influence. First, a written, unilateral escalation model - in which the escalation levels are described only on the side of the contractor - could have a negative influence. The lack of appropriate escalation levels is also mentioned, for example when the client must upshift immediately to the political level.

General
In each project change, conflicts and discussions will arise. Therefore, it is always better to make agreements in advance, so that both parties can fall back on them when issues and emotions arise.

4.2.2. Expectations

Positive
The interviews showed that it is of great value to clarify expectations within the organization internally, prior to the project. The next step is to determine whether the expectations of the contractor and the client agree. This can be done by discussing goals with each other and talking about the underlying wishes behind the contract. It is also important to gain insight into which accents are important in the contract and into underlying concerns that have arisen from personal experiences. Finally, prior to the project, it should be ensured that important stakeholders stand behind the contract so that there will not be discussion in the background during the project.

Concerning expectations, it is important to plan risk sessions to discuss what might go wrong and thereby to prevent surprises. These risk sessions should be held prior to new phases or components of the project. Furthermore, both the content and deadlines of documents should be discussed so that both parties know what to expect. Also, one respondent mentioned that there must be a validation session after each stage to determine whether the steps that have been taken meet the wishes of the client. These sessions should, for example, take place as completion of the preliminary design, final design and execution plans.

There may be some benefit in pointing out consequences of certain behaviours to the client prior to the project, to increase awareness. For example, the client could be told that any change disrupts the process or that the plan will not be achieved by the use of long treatment times. During the project, it is important to prepare the client during informal meetings for matters that occur or could occur. This allows the other party to empathise with and anticipate the situation. This also applies to the inability to meet demands, so that the

client does not have to test it unnecessarily. Finally, almost all interviewees said that it is important to deal immediately with a conflict to prevent it from getting worse over time. If a conflict is simmering for a long time, then it is not about facts but about experiences, because everyone creates their own truth. This is stated in one of the interviews, as follows: *"Op een gegeven moment, als het geschil eigenlijk al is ontstaan maar niemand is ooit duidelijk geweest over wat er aan de hand was, dan heeft iedereen zijn eigen waarheid aan de achterkant gecreëerd."* (In English: *"At one point, when the dispute already arose but no one has ever been clear about what was going on, everyone has created its own truth.")* If the client and the contractor immediately take a clear position, then they can work on a solution.

Negative
Different expectations resulting from the contract can affect the emergence of disputes. If the consultants who write the contract do not validate the wishes of the client, this can lead to different expectations of the contractor than the client actually has. In addition, if the persons concerned delve into the contract insufficiently, then this will undoubtedly lead to different expectations. This also applies to delving into the different types of contract insufficiently. The interviews also showed that a failure to immediately indicate the things in the contract that are missing or incorrect may increase the risk of disputes because the consequences during the project will be larger than at the beginning of the project.

The interviews showed that, when discussing design changes, failure to talk about money at the beginning can have a negative effect. The same applies to a failure to openly share expectations during informal meetings. Finally, one respondent adds that the practice of suddenly presenting a claim when a conflict has been playing for a long time could have a negative effect because the other party will be surprised.

General
Expectations should be shared both prior to and during the project. It must be ensured that both parties understand each other by summarizing the outcome, sharing expectations and checking to see whether both parties mean the same things. However, it is true that the more people are involved with the project, the harder it is to manage expectations.

4.2.3. Communication

Positive
It is important to make proper arrangements about communication in advance. These agreements cover, for example, who communicates with whom during the project and through what communication instruments. One interviewee emphasized that it is important to use written communication, such as e-mails, not to communicate but to confirm and inform. Issues should be discussed through oral communication; these can later be confirmed and secured by e-mail. Plans drafted in writing should also always be discussed face-to-face.

Almost every respondent stated that working on one location can be conductive to the prevention of disputes. If the client and contractor work at the same location, a decision can be reached faster because it is then possible to walk past each other and thus avoid discussions. This is described as follows: *"Op één locatie werken scheelt zo veel, dan haal*

*je volgens mij 80% van alle discussies eruit. Want je loopt even bij elkaar langs, je bent gewoon meer van elkaar op de hoogte." (*In English: *"Working at one location is so much better, I think it reduces discussions by 80%. Just because you walk past each other, you're better informed.")* Also, both parties will be better informed, because they come across each other regularly and can easily share things. In addition, the client can see directly what is happening on the project, so the contractor does not have to inform the client about this. If client and contractor choose not to work at one location, however, it is useful to always have a room available for the client so that it is possible to work there for a short period.

If a conflict happens during the project, then the parties should be clear and express things immediately so that the conflict can be resolved in time. Both parties must involve each other and share their concerns so that no surprises occur and the parties share responsibility. Issues should be reported to the appropriate levels and in the right order. With a conflict, the parties must take a clear position. For example, they might send a letter and then have a conversation in person. One interviewee also mentioned that it is important that the position be adjusted only after a thorough investigation.

When communicating a point of view, it is important to take the way it is described into account so that the client can also justify it to the supporters. For example, giving things different names can ensure that a problem is easier to solve. Speaking in metaphors can help to clarify or explain things during discussions. For example, one might compare the contractor with a moving train. Every change by the client forces the train to stop so that it takes longer to reach its destination.

Negative

The interviews showed that there cannot be direct communication if the project team of the client does not include people who work directly for the organization of the client and that this could have a negative impact. The respondents also suggested that it is difficult to tell how the project is running and what matters they are facing if key people on the side of the client work at another location.

The interviews also suggest that low involvement - such as failing to answer the phone, not calling back and not responding quickly - can contribute to the emergence of disputes. Furthermore, not able to honestly say what you think or have concluded could have a negative impact if honesty is perceived as a threat by the other party. Finally, it appears that conversations that are held with too much emotion can lead to more disputes.

A negative impact can be also realised by using only written communication, for example when the contractor and client send many letters back and forth or work with a contract mail system. This leads to irritation because nonverbal cues are missed and discussions cannot be resolved face-to-face. One respondent said that, in the specific case of testing, it is important that the client does not ask questions in the testing commentary but only tests the requirements and if necessary explains why a requirement is disapproved.

General
In the process from conflict to dispute, making things discussable appears to be the essence of communication. Discussing matters can put things in a completely different perspective; for example, it may turn out that requirements are not as firm as expected and are negotiable.

4.2.4. Relationships

Positive
To build a good relationship between the contractor and client, it is important that informal conversations take place at the appropriate level. One interviewee said that personal conversations about what you think is important but also about your children and hobbies ensure a very different dialogue. Informal gatherings help to build good relationships, for example, by celebrating milestones, family days and barbecues. Sometimes a good personal relationship can also be used directly to resolve conflicts. If two members of the different parties, who are not involved with the project, can get along well, then they can have a conversation with each other to reach a solution.

Both parties should be aware that disagreements are inevitable during the project. However, what matters is how the contractor and client handle them. The attitude of the parties can have much influence on the development of a conflict into a dispute. Goodwill plays a major role, and the atmosphere of the project affects how things are done.

In order to maintain a good relationship, agreements can be made about the use of different tools. For example, an agreement in principle agrees on how people deal with each other and everyone must adhere to these agreements. In addition, a project start-up (PSU) and project follow-up (PFU) are tools that can be used to talk about the interaction. Finally, reflection sessions (for example by *Stichting Bouwreflectie*) can be used to provide feedback and discuss issues. It is particularly important that both parties believe in the tools because they have to be convinced of their usefulness and necessity to use them successfully. One interviewee explains this as follows: *“Bouwreflectie heeft hier dus een toegevoegde waarde. Ook een project start-up en een project follow-up zijn tools die je kunt gebruiken. Om te vermijden dat een conflict een geschil wordt, moet je voor het ontstaan van het conflict alle tools al toepassen.” (*In English: *“Reflection sessions are therefore of added value. A project start-up and project follow-up are tools you can use. To avoid a conflict from becoming a dispute, you must already apply all the tools before a conflict emerges”.)*

Finally, it is important to avoid intense discussions at the project level by escalating them in a timely fashion to a higher level so that the relationship will not become too damaged. In order to maintain a good relationship, it is also important that the contractor not stop working. If the relationship between certain persons on the project has been seriously damaged, the choice can be made to implement organizational changes to eliminate the past and to build a new relationship. Much information can be lost in this way, but it can nevertheless prevent disputes.

Negative
Money may have a negative effect on the relationship between the contractor and client. The relationships can be put under pressure if one of the parties has no budget. The method of payment can also cause tension in the relationship if too much time passes between the execution and the payment, because the contractor must prove the execution of the work. Another situation that was mentioned in one of the interviews is that the client makes many requests for changes but then decides to withdraw. This costs the contractor extra money to figure things out, but the contractor does not get anything in return. Then the contractor does not want any additional changes at all and this puts the relationship under extra pressure.

Also, the human factor has an influence on the relationship. If something is done that goes against the nature of the other, it becomes a personal matter. Personal interests will come into play, for example when the client has to admit that a mistake was made in accepting the claim. Finally, a lack of motivation to work on the relationship can have a negative impact. If one party does not want to make any effort and, for example, does not want to be present at informal meetings, this gives a wrong signal to the other party.

General
Eventually, infrastructure projects are all about people. The human factor - emotions and personal beliefs, e.g. - can have a significant impact on the relationship and thus on the process from conflict to dispute. This can vary per project and depends on experiences and mutual relations. One respondent mentioned that the client could retain a bad feeling about the project and its contractor, because people are involved in a project with personal emotion. This respondent stated that contractors have the idea that a bad feeling on the part of the client may affect decisions in the tenders of future projects.

4.2.5. Transparency

Positive
To avoid disputes, it is important that parties inform each other about what is going on. If the client informs the contractor about what is happening in the background, then the contractor will get a better understanding of the situation, for example when something is disapproved. In addition, the contractor will create transparency with the client by opening up systems and by showing all the details in their cost estimation; thus, the client can see what components it consists of and how the price is established. Also, one interviewee added that both parties can show their vulnerability by sharing profiles of important members of the team. Finally, almost all respondents mentioned that it can have a positive influence to report problems on time, because then the client knows what is going on and they get the opportunity to anticipate on this. This prevents the client from being surprised. One of the respondents explained as follows: *“Vroegtijdig melden, transparantie en elkaar zoveel mogelijk meenemen in de stappen die je zet, dat is belangrijk.”* (In English: *“Reporting in a timely fashion, transparency and informing the other as much as possible about the steps you take, that's important.”)*

Negative
Withholding certain things from the client can have an influence on the emergence of disputes, for example not justifying a price change or the use of many different rates by the contractor. One interviewee added that reporting unexpected issues and problems too early (because the contractor has investigated it insufficiently, e.g.), leads to confusion and can therefore have a negative effect.

General
The contractor likes to be one step ahead of the client and therefore does not always share all information directly. However, it must be realised that transparency is reciprocal. If there is reciprocal transparency, more information is available and better decisions can be made by both parties. In addition, the contractor must also realise that it will be no surprise for the client that the contractor is looking for the most economical solution. So the contractor can be open about this.

4.2.6. Trust

Positive
To avoid disputes, it is essential that the starting point of the project is trust. The parties should trust each other until they have reason not to. It is mainly about personal trust and less about trusting the underlying organization. It is important to believe that the other person will do what s/he promises to earn trust.

Trust can be earned by way of a smoothly running project, such as the achievement of milestones, but it can also be earned by being transparent. By being open and explaining choices well, the contractor earns the trust and goodwill of the clients. One interviewee showed that, if the contractor has earned its credits by foreseeing a lot, truly unforeseen things will be treated fairly by the client.

Negative
The contractor sometimes experiences a lack of trust from the client already at the start of the project, because some people have the idea that all contractors are swindlers. Sometimes contractors also experience a lack of trust from the client during the project, this may have to do with insufficient use of testing and auditing by the client who is therefore not well informed. Trust can be damaged by having long discussions about how changes and mutations have disrupted the process. It can also be diminished when the parties only communicate by email or letters, because a jurist or contract manager must read every word of the letter literally.

It is proven in practice that, if the client and contractor have reached an agreement and this is signed, the signatures are not worth much if they talk about money afterwards. It is also possible that a signature is reversed by a person higher in the hierarchy. Both of these events could lead to the emergence of disputes.

General

Building trust starts with yourself; you have to earn it by working on it continuously. It takes a long time to build trust, but it may disappear quickly by a misstep. Almost all respondents mentioned this as follows during the interviews: *"Vertrouwen komt te voet en gaat te paard."* (In English: *"Trust comes by foot and goes by horse"* – which is a Dutch proverb).There is also a widespread misconception that could decrease trust: some clients think that a contractor claims as many extra work as possible to earn more money. However, this disrupts the process so much that in many cases the contractor does not earn anything, because only the direct and not the indirect costs are reimbursed.

4.2.7. Other aspects

Looking with a helicopter view at all the projects examined, it is noticeable that there is often a large difference in approach in the area of agreements, expectations, communication, relationships, transparency and trust. In many projects, several things are tried in relation to the above issues. Thus, knowledge and experience is gained with each project, but this is limited to the employees of the project and is not shared sufficiently with the rest of the organization. In addition, beyond the results described in the above six subparagraphs, the interviews revealed a number of remaining results that are related to the process from conflict to dispute. The interviews showed that often it is not one conflict but instead a sum of several conflicts that leads to the escalation of a dispute. One of the interviewees describes this as follows: *"Eén conflict wat niet zo lekker gaat is nog niet meteen een aanleiding om te gaan arbitreren, maar een optelsom van allemaal verschillende dingen wel."* (In English: *"One conflict that is not running smoothly is not immediately a reason to arbitrate, but the sum of different things is.*") It also appears that if one or more conflicts are about a large amount of money, it will soon result in a dispute. Finally, this study is about infrastructure projects with a public client, so politics play a role. Therefore, for example, bureaucratic delays and rejections because of political interests can also cause a conflict to end in a dispute.

4.3. Consequences of disputes

Disputes can have different consequences. First of all, a dispute may have consequences in the form of extra time. This concerns the planning of the project itself, which can run out significantly. In addition, dealing with disputes can be time consuming - especially in the case of arbitration or a court case in which the preparation time, legal proceedings and possibly appeal process take many time. An extreme example is a project that was completed in 2006 and still had a dispute at the end of 2015. Second, a dispute can have consequences in the form of extra work. When there is a dispute, extra employees should be deployed to try to resolve it. Finally, extra time and extra work leads to extra costs. One consequence of a dispute is that the profitability of a project can be put under pressure.

Almost all respondents stated that disputes can cause many negative emotions. This has an impact on individuals, because an ongoing dispute creates negative energy. In addition, a dispute also affects the entire team because it influences the atmosphere. A dispute will never lead to a winner. The party that bears the cost will find it too much, and the receiver will think the amount is too low or that it took too long. Finally, it is also possible that a deal is

closed high in the organization, but that the parties do not have a good feeling about this and therefore cannot close it.

Often a dispute keeps playing up with other things, for example, with new changes or discussions. Sometimes it also comes back at inconvenient times, such as during a project start-up or project follow-up. It appears from all the interviews that the consequences of a dispute are always negative. Finally, a dispute can also have negative consequences for the previously mentioned aspects that influence the process from conflict to dispute: expectations, communication, relationships, transparency and trust. Hereby, the risk of new disputes can increase.

4.4. Improvements

The respondents were asked what is really important according to them to prevent that a conflict ends in a dispute. This subparagraph describes the improvements that the respondents have mentioned. These improvements apply both before and during the emergence of conflicts.

4.4.1. Before conflicts

Prior to the project, it is important that a contractor does not take on a project for or below the cost price. This also applies to the budget of the client. If this is very tight, the risk of disputes increases. The contractor must also realise beforehand that it is important to be able to deliver what is promised and to not create unrealistic expectations. This is, for example, related to what is offered in Economically Most Advantageous Tender (EMAT) plans. One respondent said that, in the context of EMAT, it is important to discuss after the tender in which aspect the EMAT plans were better than the contract and in which parts the contract must be followed.

The contract itself must be complete and accurate. It must be ensured that the scope of the project is well defined and that it does not contain mistakes. Careful definition of the scope creates clarity; therefore, the client should pay sufficient attention to this. Currently, there are often many inaccuracies and uncertainties in the contract, so it is of great value to have a phase between the tender and the final award. By adding this phase, optimisations can be implemented in advance with limited impact. Also, things can be explained and uncertainties can be cleared to avoid problems. The attitude, point of view and approach of the project leaders or project managers and how they transfer it to the team also relate to the start of the project. It is important that the project is set-up based on the real question in the contract and that the contractor does not infer requirements in the way this is only positive for them. Advance agreements must be made about conflicts and how they are handled.

Already before the emergence of conflict, the right commitment should be shown to ultimately prevent disputes. Clear agreements about escalation are very important. Identifying the expectations of both parties in advance could prevent disputes. Ideas, requirements and interpretations should be discussed. Speaking about this will remove confusion. Underlying interests should also be shared and made discussable. If a contractor has a very tight budget and if every extra bit of paint already leads to a loss, then the client

must be informed about this. Needs, expectations and interests can be shared through tools such as project start-ups, project follow-ups or other informal meetings.

It has a positive impact on the project when the client and contractor work at one location. The team should be large at the start of the project and then later reduce. In practice, this is often the other way around, but trouble and damage can often be avoided if the involved parties invest in a larger team at the start rather than invest in a larger team to repair problems. It is also important that the contractor be very clear from the beginning of the project. If the client submits a request for change and it costs the contractor money to sort this out, then this must only be started when there is a real instruction. The same applies to the implementation of changes; they should only be implemented when there is a final agreement.

4.4.3. During conflicts

If the contractor has or foresees a problem during the project, this should be reported immediately to the client. By informing the client immediately and telling that the problem is being addressed, the client can act to make adjustments if necessary. In addition, a problem must be isolated from the primary process. It is important that the primary process is not disturbed so that no additional problems and conflicts are created by the disruption. It is important to handle a conflict with a small team. If a large group of people focuses on the problem, then this reduces the speed of solving the conflict and the risk of a dispute becomes even greater. Also, when a large team focusses on the problem, more people are distracted from their core activities and the project will slow down. When the small team has figured out a solution, this should be shared with the rest of the organization for approval.

Also, escalating at the right moment is of great importance. If the parties cannot come to a solution together, the decision must be made to escalate. However, it is also important to de-escalate in a timely fashion, when there is an intention or agreement in principle, so the team can take over again. It may also help to set a deadline for resolving the conflict. If conflicts continue to simmer, they accumulate until the end of the project to yield larger consequences.

Finally, in infrastructural projects, the human factor is fundamental. There is also spoken about the three Ps: process, product and people. The process and product must be in order because they relate to the basis of the project, but people make the difference. It is important that each person takes the role that has been agreed upon, stays within the frameworks of the contract and acts correctly. Because the human factor is of such great importance, the key people from both sides should be changed within the project if they really do not match so that the success of the project is not undermined. Internal in the organization, it is also important that the right people are in the right places. Therefore, the organization must be monitored continuously.

4.5. Interpretation of results

This subparagraph interprets the research results. In general, the results are consistent with the expectations based on the theory. It appears that all aspects (agreements, expectations, communication, relationships, transparency and trust) have a significant impact on the process of a conflict to dispute. The results also reflect the expectations formed based on logical thinking/common sense. The improvements relate to quite simple matters. It concerns things that you would expect to be clear and automatic to everyone. However, this is apparently not the case, otherwise there would be no disputes between contractors and public clients in infrastructure projects and these improvements would not have been suggested in the interviews.

However, during the interviews, a number of examples were given that could be called unexpected. Even about simple matters, the contractor and client are able to create their own truth. They oppose things that are unreasonable, based on logical thinking. One example is a project in which the client did not take the danger of unexploded explosives seriously. The client did not accept that the contractor stopped the work because no investigation was carried out concerning the unexploded explosives and his employees were in danger. It is also quite surprising that expectations, interpretations and underlying wishes need separate attention, because you should expect that this is what a contract needs to cover.

In addition, examples also came forward that could be described as confusing or unfair. However, this is part of the game that is played in tendering. One example is from a project in which reinforcing steel was found in the concrete floor, while the client had provided information about borings and this was not mentioned. So the contractor did not expect this and did not include this in the budget. Then a problem emerged because the client felt that the contractor should have known this and should have included it in the price. Another example is related to inferring requirements in a way that it is positive for the contractor. This is a way to win a tender and is therefore part of the game.

The added value of this study is that it examines the process from conflict to dispute, because this process is still little known in the literature. In addition, the research is relevant to Dura Vermeer and is a reflection of Dura Vermeer. It reflects how the organization is currently working and what its bottlenecks are. However, these results are also useful for the whole construction industry. The research is of value for all Dutch contractors that focus on infrastructure projects with a public client because also solving disputes is an important issue for them. It is likely that other contractors work in a similar way and therefore experience similar problems. Through this research, other contractors can also gain insight into the improvements that are needed to prevent disputes in the future. Finally, this study is interesting to public clients because it provides insight into the process from conflict to dispute and therefore they can also learn from this.

5. Conclusion

This chapter contains the conclusion of the research, in which the answer is formulated to the following research question: *What are the most important actions for contractors in trying to prevent conflicts with public clients in Dutch infrastructure projects from becoming disputes?*

The results confirm the theory that disputes always have a negative effect. For example, a dispute can have consequences in the form of extra time, extra work and extra costs. A dispute can also lead to negative emotions. In addition, a dispute may increase the risks of new conflicts. Once again, it is emphasized that it is important to avoid disputes. In order to prevent disputes, the emergence is important. In the literature, a distinction is made between a conflict and a dispute according to which one follows the other. It is a process that starts with a disagreement (a conflict) and develops by itself or together with other discussions into a specific problem that must be resolved (a dispute). Therefore, there are two distinct ways to prevent disputes.

The first and the most obvious way is to avoid conflicts so that there are fewer discussions that can end in a specific problem. For the prevention of conflicts, the emergence of conflicts is of interest. The literature shows a difference between the sources and causes of conflicts. Based on the interviews results, it can be stated that, in general, the sources of conflict are related to the requirements in the contract or to changes in the situation of the project. It can also be concluded that the causes of a conflict are related to a disagreement about the requirements or money. It is difficult to influence changes in the situation, but influence can be exerted on how people deal with the requirements. Thus, the interviews showed that conflicts could be avoided by adding a phase that follows the tender in which decisions and interpretations can be discussed and in which both parties can point at deficiencies and mistakes. The contractor cannot force this phase, but he can attempt to convince the client of its usefulness and necessity before or during the tender. If plans are submitted in addition to the subscription price and are evaluated as a part of the contract, it is important during this phase to make clear when the contract must be handled and when the contractor must adhere to the promises in the plans. When writing the plans, it is important that the contractor does not make promises that cannot be fulfilled. This creates conflicts beforehand. In addition, the emergence of differences of opinion can be influenced. For the contractor, it begins by not taking on a project for or below the cost price. If there is financial pressure from the beginning, the chance of conflict increases. This also applies if the budget of the client is too tight.

However, in the situation of infrastructural projects, conflicts can only be prevented to a certain level because of conflicting interests. So conflicts will always emerge between contractors and clients. The second and also the most important way is therefore to prevent conflicts from ending in disputes. The research shows that this mainly concerns the following three actions: 1) make agreements before conflicts arise, 2) pay more attention to human interaction and 3) learn as an organization of previous projects.

5.1. Agreements

To prevent conflicts from ending in disputes, it is important to make agreements before conflicts arise. There will be conflicts in any case, and both parties must be prepared for them. It is important, if conflicts emerge, that there are agreements in place to fall back on. So the parties must agree in advance how they will handle conflicts. It is always easier to reach an agreement is if there are no issues in play and if both parties are still neutral. When there are problems, it is actually too late. Emotions will play a role, and it is less easy to reach an agreement. Therefore, it must be discussed in advance what can go wrong, what the consequences are and how they will be handled. There will always be changes during the project. Certain circumstances change and things do not go as planned, so respond to this. If you know that things are going to change but you just do not know how, you can keep this in mind and talk about the process of handling it. It is always better to have a discussion at the start of the project than during the project. Agreements must be made about the aligning of the organizations, the mandate, how to deal with changes, treatment times, verification moments, purposes of several meetings and deadlines for solving a conflict. In addition, it must be agreed how to escalate. Discussions should take place at the project level, because that is where the knowledge is to be found. But if the parties cannot come to a solution, there must be escalation to a level that transcends the project. Also, there must be agreements about de-escalating in a timely fashion. In addition, parties could also agree not to come to an arbitration case or lawsuit. Instead, they might compose an independent commission beforehand that can give advice about discussions at stake. Finally, it is important that all agreements are reviewed with respect to workability.

5.2. Human interaction

Besides making good agreements, it is important to pay more attention to human interaction. Eventually, the people have to do it. Methods of communication, whether things are debatable or not, the nature of the relationship between people, whether you are open and honest, and whether you trust each other and are trustworthy - these are important matters to consider concerning the transition from conflict to dispute. Among other things this implies that there should be given greater priority to the following improvements: sharing expectations, wishes and interests; working on one location; reporting problems or unforeseen issues on time; isolating the problem from the primary process; and tackling the conflict with a small team. Also, empathy is important; sometimes thinking along with the other party or just formulating something differently can have the result that certain things are accepted. There are also specific tools to focus on in human interaction. Examples include project start-ups, project follow-ups and construction reflection. The teams should look for appropriate tools to improve the interaction. It should not be the case that one party forces the other to use these tools. If so, they are often not taken seriously. Human interaction is so important that if certain key persons of both parties do not match, they should be exchanged in the organization. When the organization has become experienced with this, it can focus in advance on the characteristics of individuals.

5.3. Learning process

Whether or not a conflict leads to a dispute has mainly to do with how projects are handled by agreements and human interaction. Therefore, it is very important that organizations learn. Currently, there is often a large difference in approach between different projects. Each project is different, and they often start everything from scratch. In many cases, they are small islands that are not connected with each other. It depends on who is on the project, who is in charge and what are the preferences of this person, because people differ in generations, background and experience. Therefore, people in the project teams fulfil a very important role: they determine the approach of the project. A person learns from a project as an individual and as a member of a team. However, teams often fall apart after the project so that only the knowledge gained at the individual level remains. There is much knowledge within the organization, but it is not shared sufficiently. The interviews show many improvements based on experiences that not everyone has shared. The organization keeps making the same mistakes because new projects are not built on previous knowledge and experience. An organization could learn what agreements work and do not work, how to deal and how not to deal with the client and the circumstances in which certain tools that are intended to enhance interaction work and do not work. However, this applies not only to the prevention of conflicts that end in disputes but also to the prevention of conflicts. If it turns out that there is a conflict over a particular requirement, it is important to look at this requirement at the start of a new project. The main contractor has mainly an organizing role; this is why the main contractor must ensure that the knowledge and experience gained in previous projects is taken into account in new projects. In detail, every project is different, but in many cases, the essentials are the same. The organization can learn of each project and the aim is to become a bit better after every project.

6. Recommendations

This chapter offers recommendations for further research and for Dura Vermeer about how to practically implement the results and conclusions of this study. A distinction is made between quick wins and long-term success. The three main actions of the conclusion form the basis for the recommendations: make agreements before conflicts arise, pay more attention to human interaction and learn as an organization about previous projects.

6.1. Recommendations for further research

After the completion of this research, a number of suggestions for further research can be given. These suggestions are described below. First of all, it is recommended that research be conducted into the emergence of disputes in projects of multiple contractors to make sure that more and other improvements are identified. For example, this research could be conducted by a party such as Bouwend Nederland. It would also be interesting to investigate a combination of the perspectives of the contractor and client. Quantitative research should also be done on disputes. This means that quantitative research is being conducted on the various factors that influence the emergence of disputes (a factor-model).

In addition, it is highly recommended that further research be conducted into the financial consequences of disputes. The aim is to determine whether it is really interesting for contractors to initiate court cases and arbitration. Among many people in the building industry, the image is still alive that court cases and arbitration are ways to get money in conflicts. But such people neglect the consequences of disputes. Further research may provide insight into what exactly a court case or arbitration constitutes and what it costs for a contractor. On the basis of this research, the expectation has emerged that, in many cases, it constitutes very little because a court case or arbitration takes time and effort through the preparation and long procedures. The results are often a compromise, new negotiations or an unsatisfying judgement for both parties. Court cases or arbitration therefore offer little, unless the problems concern exceptionally high amounts. However, it should be realized that, by solving a problem in a good way, much more money could probably have been earned. Therefore, prevention of conflicts seems a better solution in every way. Therefore, it is important to study the financial amounts and outcomes, but also the percentages with which a deal is closed. By describing the financial side of disputes, it can actually be shown that court cases and arbitration are negative and should be avoided. Thus, understanding and acceptance are created, and this eventually leads to a change in the attitude of contractors.

6.2. Recommendations for Dura Vermeer

The recommendations for Dura Vermeer are divided into quick wins and long-term success. Quick wins are actions that do not require much effort and lead to rapid improvements. Long-term success concerns actions that require more time and investment to achieve better results and thus success. These recommendations are also relevant for other contractors than Dura Vermeer. It is likely that other contractors work in a similar way and therefore can benefit from the recommendations about the implementation of the improvements to prevent disputes in the future.

6.2.1. Quick wins

Agreements
The quick win involves making appropriate arrangements with the client. Research has shown that the following aspects are of great importance to make arrangements prior to the project in order to prevent disputes: the aligning of the organizations, the mandate, how to deal with changes, treatment times, verification moments, purposes of several meetings, deadlines for solving a conflict, escalation and de-escalation. Also, the agreements must be reviewed with respect to workability.

Some of the above issues have already been addressed in the contract, in the Uniform Administrative Conditions (in Dutch: UAV) or in the Uniform Administrative Conditions for Integrated Contract types (in Dutch: UAV-GC) if it is declared applicable to the project. Also, some issues have already been addressed in the project-management plan that the contractor writes. Some topics are not yet covered by specific documents. The contract is primarily a document drawn up unilaterally by the client. The UAV and UAV-GC are generic to all projects and the project-management plan is unilaterally drafted by the contractor. In all cases, consultation between both parties is lacking.

Next to the contract and the UAV and UAV-GC in its current form, it is recommended that these issues be discussed in advance during sessions with the client and contractor so that agreements can be made about them. Then these agreements must be included in the project-management plan. In this way, the project-management plan becomes a two-sided document for which both the contractor and the client stand. It is a document that can be fallen back upon during the project, as difficult conversations have already occurred. This should not be treated as yet another legal document over which one party may fight another if it is not adhered to. It is just an overview of the agreements both parties support and agree to. Some parts of the project-management plan, however, will not be two-sided, because this is only applicable to the contractor and therefore it is unnecessary to discuss this with the client.

Human interaction
The first quick win for the improvement of the human interaction concerns a toolkit. This toolkit includes tools that can be used in projects to pay more attention to human interactions. The current project-management-plan template already includes an item called “interaction with the client". It is recommended that the toolkit be added to this. In this way, the employees are pointed during the set-up of the project at all the opportunities that exist to improve human interaction. This can be discussed with the client and agreements can be made about the tools that will be used. The toolkit includes the following: project start-up; project follow-up; construction reflection; informal meetings (in Dutch: "*benen-op-tafel-overleg*") and celebrating milestones.

It is important that the teams get enough time to use the tools. This is one of the first things that employees drop when they are in need of time, especially when they are working with a small team. It is also important that the tools are taken seriously. The interviews showed that especially the client attaches little priority to this, but it is so important that both sides recognize the value of these tools. The contractor must therefore convince the client of the relevance of these tools. The relevance can be explained by giving examples of previous projects in which human interaction was the reason for mistakes.

The second quick win is to separate formal and informal meetings. It is important that the right things are discussed during the appropriate meetings, for example not discussing the interaction during a construction meeting, technical consulting or contract consultation. Separate attention must be given to the interaction because this must not be done quickly during a meeting that is aimed at another subject. It is also better, for example, to focus the project start-up and project follow-up on the personal side of collaboration and not on the content.

The third quick win involves attention to the composition of people in a project. Dura Vermeer already focuses on making appropriate (successful) matches between project needs and the deployment of people. It is of great importance that this method of selecting teams continues to be applied. It is also important that Dura Vermeer continues to monitor whether the right people are in the right places and that it changes people as necessary so as not to endanger the success of the project by bad human interaction.

6.2.2. Long-term success

The research has shown that knowledge and experience should be included in the approach of following projects so that the organization of each project learns and improves. At this moment, the organization seems to consist of many small islands, each of which have their own approaches. The employees gain many valuable experiences, but do not share them sufficiently with the rest of the organization. They therefore do not learn from each other's mistakes and areas for improvement are not taken in account in future projects.

In the ideal situation, the improvement of an organization is achieved by a process with a cyclic character. This process is called the Deming circle and includes four components: Plan, Do, Check and Act (see figure 3). An organization sets a goal and makes a plan to achieve this goal. After implementation, the organization must determine whether the results match the goal. If improvements are identified, the organization adjusts its approach to them (Lean info, 2015).

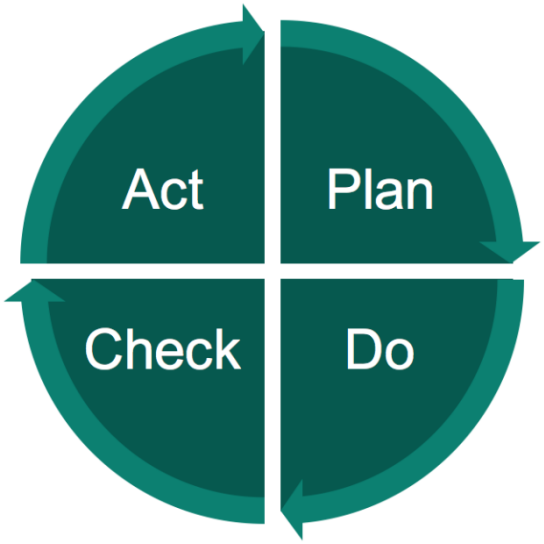

Figure 3. The Deming circle

The steps Plan, Do and Check are done within Dura Vermeer, but Dura Vermeer encounters difficulty when it comes time to refer the improvements back to the entire organization. In other words, the step Act is the problem. It is therefore advised that the improvement process be arranged so that all improvements can be directly integrated into the approach of the entire organization. This can be achieved by formulating a general basis for the project-management plan. By formulating principles that serve as the basis for any project, this base can be continuously expanded and improved.

This base is described by working the project-management-plan template out to more than just a list of items. Each section explains how this can be approached and which variations are possible. The general base explains the advantages and disadvantages of the different variants and in which cases it is a good choice to opt for a particular variant. Thus, each part can be filled in according to the specific situation of the project. An informed choice can be made based on the latest findings so that things will not be forgotten. This continues on the examples of the agreements and the toolkit for human interaction as described above, but it then refers to the complete project-management approach. It is also possible that a project deviates from the standard approach to test new methods through pilot projects. Then the project is executed according to the established project plan. Evaluations are held during and after the execution of the project. Based on new experiences, improvements can be identified to improve the existing basic approach. This is incorporated into the basic approach and can be used directly in the design of future projects. In this way, it continues building on the existing base and the entire organization benefits from the experience gained from a specific project. This method of standardization secures all improvements and can prevent a fall-back in the improvement process.

Because the employees carry out the evaluations themselves and can submit improvements that are added to the basic approach and see immediate results, they are motivated. In this way, a culture of improvement is created. Therefore, the importance of sharing experiences, evaluations and improvements is seen within the organization. Evaluations should not feel like forced work; the people who participate in them must be motivated to share learning experiences with the entire organization to improve the organization. It is very important that the management passes this interest on to the employees.

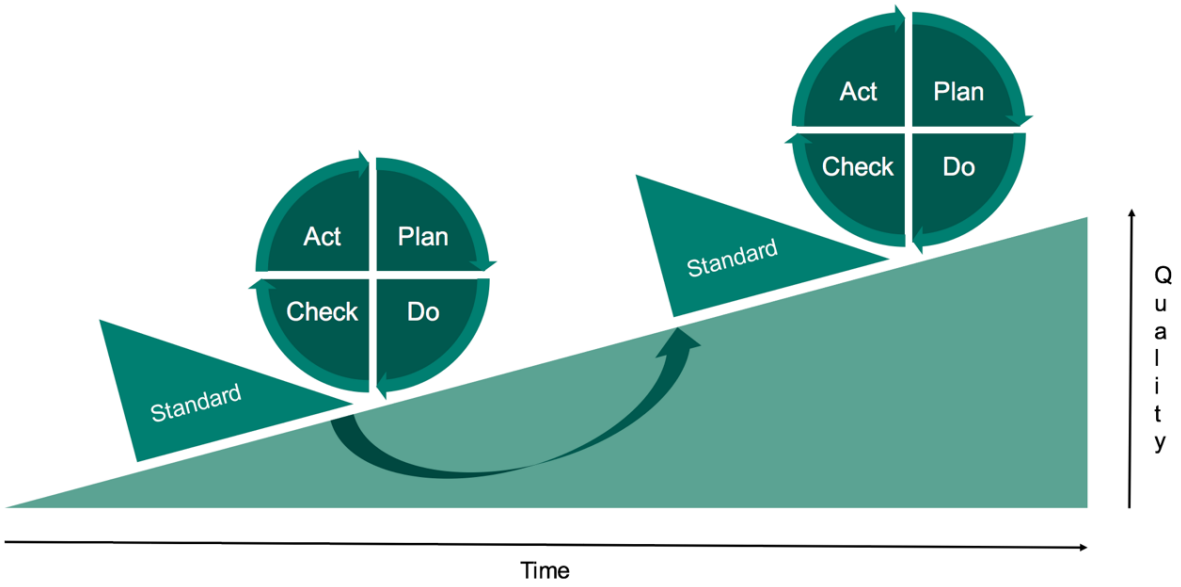

Figure 4. Continuous improvement through standardization.

So the key to success for Dura Vermeer is continuous improvement through standardization. By consolidation of the standards, the organization continues to improve the quality of the project-management approach (see figure 4). In this way, Dura Vermeer will not just prevent the emergence of conflicts and disputes, it will improve the entire way of working of the organization.

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Appendix I - Interview guide

Introduction
Introduction of the researcher, explanation of the research, purpose and reason for the interview, permission for audio recording, dealing with information (only supervisors read the transcriptions)

Introduction of the respondent, function, role and tasks during the project

Definitions
A *conflict* is a disagreement. When it is a specific problem that must be solved, it is a *dispute*. My research will gain insight into the emergence of disputes.

General
In which phase is the project now? What are the results? Has been planning achieved?

What is the main dispute? *

Where is the dispute about? And what is your opinion?

Why it has become a dispute? What is the cause?

How was the process? How was the transition from conflict to dispute?

When did you have the idea that this was not just easy to solve?

Based on what insights and considerations did you draw the conclusion that it was not just easy to solve?

What did you do then?

What were the consequences of the dispute for the project?

Specific subjects
Which agreements were made prior to the project?

Are the expectations of the project shared with the client?

How was the communication with the client?

How is the relationship maintained with the client?

Was there transparency with the client?

Was there trust in the client?

Improvements
How can a contractor prevent conflicts from ending in disputes?

* If no dispute has taken place, the main conflict will be questioned to see why it has not led to a dispute.

The interviews were held in Dutch.